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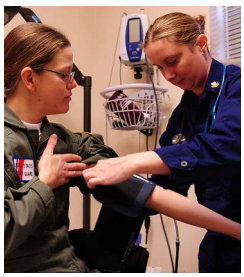
2018 Department of Defense Health Related Behaviors Survey (HRBS)

Results for the Active Component



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This report was updated in July 2026 to correct a coding error that impacted calculations of the prevalence of probable PTSD.

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Preface

The Health Related Behaviors Survey (HRBS) is the U.S. Department of Defense's flagship survey for understanding the health, health-related behaviors, and well-being of service members. Originally implemented to assess substance use (i.e., illicit drugs, alcohol, and tobacco), the survey now includes additional content areas—such as mental and physical health, sexual behavior, and postdeployment problems—that could affect force readiness or the ability to meet the demands of military life. The HRBS is intended to supplement administrative data already collected by the armed forces.

In 2016, the Defense Health Agency asked the RAND Corporation to review previous iterations of the HRBS, update survey content, administer a revised version of the survey, and analyze data from the resulting 2018 HRBS. The 2018 HRBS included U.S. Air Force, Army, Marine Corps, Navy, and Coast Guard personnel in both the active and reserve components, and this report details the survey methodology and results for the active component. A separate report details the survey methodology and results for the reserve component. No expertise in health, health-related behaviors, or health care is required to read this report. However, it may be of most use to individuals who provide direct care related to the health and health-related behaviors of active component service members or who are responsible for making related policy decisions.

The research reported here was completed in October 2019 and underwent security review with the sponsor and the Defense Office of Prepublication and Security Review before public release.

This research was sponsored by the Defense Health Agency and conducted within the Forces and Resources Policy Center of the RAND National Security Research Division (NSRD), which operates the National Defense Research Institute (NDRI), a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Navy, the Marine Corps, the defense agencies, and the defense intelligence enterprise.

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Contents

Preface iii
Figures and Tables ix
Summary xvii
Acknowledgments xxxix
Abbreviations xli

CHAPTER ONE
Introduction 1
Context for the 2018 Health Related Behaviors Survey 2
Organization of the Report 4

CHAPTER TWO
Methodology 7
Survey Development 7
Survey Administration 8
Population and Sample 10
Analytic Weights 14
Missing Data and Imputation 22
Analysis Approach 23
Limitations 25

CHAPTER THREE
Demographics 27
Service Branch, Pay Grade, and Gender 27
Age 29
Race/Ethnicity 31
Education 32
Marital Status 34
Parental (or Dependent) Status 35
Housing Status 36
Overall Sample Description 37
Summary 39

CHAPTER FOUR
Health Promotion and Disease Prevention 41
Weight Status 42

Physical Activity....45
Screen Time....54
Annual Physical Assessment....56
Sleep Health....58
Summary....70

CHAPTER FIVE
Substance Use....73
Alcohol....74
Tobacco....82
Marijuana Use and Drug Use....89
Prescription Drug Use....96
Summary....101

CHAPTER SIX
Mental and Emotional Health....103
Mental Health Status....104
Social and Emotional Factors Associated with Mental Health....108
Suicide....115
Problematic Gambling....118
Mental Health Services....120
Summary....132

CHAPTER SEVEN
Physical Health and Functional Limitations....135
Chronic Conditions....136
Physical Symptoms....140
Traumatic Brain Injury and Postconcussive Symptoms....145
Self-Rated Health....147
Health-Related Functional Limitations....149
Summary....151

CHAPTER EIGHT
Sexual Behavior and Health....153
Sexual Risk Behaviors and Outcomes....154
Contraceptive Use and Methods....159
Deployment-Related Unintended Pregnancy, Contraceptive Access and Counseling....165
HIV Testing....169
Summary....172

CHAPTER NINE
Sexual Orientation and Health....175
Sexual Orientation....176
LGB Health Promotion and Disease Prevention....177
LGB Substance Use....178
LGB Mental Health and Mental Health Services Use....179

LGB Physical Health 181
LGB Unwanted Sexual Contact and Physical Abuse 181
LGB Sexual and Reproductive Health 182
Summary 183

CHAPTER TEN
Deployment Experiences and Health 185
Frequency and Duration of Combat and Noncombat Deployments 185
Deployment Experiences and Health 195
Summary 200

CHAPTER ELEVEN
Summary and Policy Implications 203
Health Promotion and Disease Prevention 203
Substance Use 204
Mental and Emotional Health 205
Physical Health and Functional Limitations 207
Sexual Behavior and Health 207
Sexual Orientation and Health 208
Deployment Experiences and Health 209
Comparisons with Healthy People 2020 Goals 210
Comparisons Between the 2015 and 2018 HRBSs 212
Policy Implications and Recommendations 214
Conclusion 222

APPENDIXES
A. 2018 DoD Health Related Behaviors Survey 223
B. Invitation Letter and Letters of Support 263
C. Description of Measures Used in the 2018 DoD Health Related Behaviors Survey 271
D. Key Outcomes by Race/Ethnicity and Age Group 285
E. Missing Data and Imputation Method Detail 343

References 349

Figures and Tables

Figures

1.1. Eight Domains of Total Force Fitness 3
2.1. Flowchart for the 2018 HRBS Final Analytic Sample 13

Tables

S.1. Distribution of Service Branch, Pay Grade, and Gender in the 2018 HRBS Active Component Weighted Respondent Sample, with 2017 DoD Comparison xxiii
S.2. Comparison of 2018 HRBS with HP2020 Goals for Select Outcomes xxxi
S.3. Significant Differences Between the 2015 and 2018 HRBSs for Select Outcomes xxxii
2.1. 2018 HRBS Sampling Frame 12
2.2. Sampling Frame, Sample Size, and Response Rates, Overall Sample 14
2.3. Sample and Response Rates, Air Force 15
2.4. Sampling Frame, Sample Size, and Response Rates, Army 16
2.5. Sampling Frame, Sample Size, and Response Rates, Marine Corps 17
2.6. Sampling Frame, Sample Size, and Response Rates, Navy 18
2.7. Sampling Frame, Sample Size, and Response Rates, Coast Guard 19
2.8. Balance Table for Nonresponse Weights 20
3.1. Distribution of Service Branch, Pay Grade, and Gender in the 2018 HRBS Active Component Weighted Respondent Sample, with 2017 DoD Comparison 28
3.2. Pay Grade and Gender by Service Branch, Weighted Respondent Sample 29
3.3. Gender by Pay Grade, Weighted Respondent Sample 29
3.4. Age Groups by Service Branch, Weighted Respondent Sample 30
3.5. Age Groups by Pay Grade, Weighted Respondent Sample 30
3.6. Age Groups by Gender, Weighted Respondent Sample 30
3.7. Race/Ethnicity by Service Branch, Weighted Respondent Sample 31
3.8. Race/Ethnicity by Pay Grade, Weighted Respondent Sample 32
3.9. Race/Ethnicity by Gender, Weighted Respondent Sample 32
3.10. Education Level by Service Brach, Weighted Respondent Sample 33
3.11. Education Level by Pay Grade, Weighted Respondent Sample 33
3.12. Education Level by Gender, Weighted Respondent Sample 33
3.13. Marital Status by Service Branch, Weighted Respondent Sample 34
3.14. Marital Status by Pay Grade, Weighted Respondent Sample 34
3.15. Marital Status by Gender, Weighted Respondent Sample 35

3.16. Dependent Status by Service Branch, Weighted Respondent Sample....35
3.17. Dependent Status by Pay Grade, Weighted Respondent Sample....35
3.18. Dependent Status by Gender, Weighted Respondent Sample....36
3.19. Housing Status by Service Branch, Weighted Respondent Sample....36
3.20. Housing Status by Pay Grade, Weighted Respondent Sample....37
3.21. Housing Status by Gender, Weighted Respondent Sample....37
3.22. Overall Weighted Sample Description....38
4.1. Weight Status, by Service Branch....43
4.2. Weight Status, by Pay Grade....44
4.3. Weight Status, by Gender....45
4.4. Moderate and Vigorous Physical Activity in Past 30 Days, by Service Branch....47
4.5. Moderate and Vigorous Physical Activity in Past 30 Days, by Pay Grade....48
4.6. Moderate and Vigorous Physical Activity in Past 30 Days, by Gender....49
4.7. Strength Training in the Past 30 Days, by Service Branch....51
4.8. Strength Training in Past 30 Days, by Pay Grade....52
4.9. Strength Training in Past 30 Days, by Gender....53
4.10. Hours per Day of Screen Time, by Service Branch....54
4.11. Hours per Day of Screen Time, by Pay Grade....55
4.12. Hours per Day of Screen Time, by Gender....55
4.13. Past-Year Routine Medical Checkup, by Service Branch....56
4.14. Past-Year Routine Medical Checkup, by Pay Grade....57
4.15. Past-Year Routine Medical Checkup, by Gender....57
4.16. Past 30 Days Average Daily Hours of Sleep, by Service Branch....59
4.17. Past 30 Days Average Daily Hours of Sleep, by Pay Grade....60
4.18. Past 30 Days Average Daily Hours of Sleep, by Gender....60
4.19. Sleep Quality in Past 30 Days, by Service Branch....61
4.20. Sleep Quality in Past 30 Days, by Pay Grade....62
4.21. Sleep Quality in Past 30 Days, by Gender....62
4.22. Lack of Energy Due to Poor Sleep in the Past Week, by Service Branch....63
4.23. Lack of Energy Due to Poor Sleep in the Past Week, by Pay Grade....63
4.24. Lack of Energy Due to Poor Sleep in the Past Week, by Gender....63
4.25. Use of Sleep Medication in Past 30 Days, by Service Branch....64
4.26. Use of Sleep Medication in the Past 30 Days, by Pay Grade....65
4.27. Use of Sleep Medication in the Past 30 Days, by Gender....65
4.28. Use of Substances to Stay Awake in the Past 30 Days, by Service Branch....67
4.29. Use of Substances to Stay Awake in the Past 30 Days, by Pay Grade....68
4.30. Use of Substances to Stay Awake in the Past 30 Days, by Gender....69
5.1. Alcohol Use in Past 30 Days, by Service Branch....75
5.2. Alcohol Use in Past 30 Days, by Pay Grade....75
5.3. Alcohol Use in Past 30 Days, by Gender....76
5.4. Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Service Branch....78
5.5. Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Pay Grade....78
5.6. Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Gender....79
5.7. Perception of Military Drinking Culture, by Service Branch....80
5.8. Perception of Military Drinking Culture, by Pay Grade....81
5.9. Perception of Military Drinking Culture, by Gender....81

5.10. Current Tobacco Use, by Service Branch 83
5.11. Current Tobacco Use, by Pay Grade 84
5.12. Current Tobacco Use, by Gender 85
5.13. Past-Year Smoking Cessation Attempts Among Current Smokers, by Service Branch 86
5.14. Past-Year Smoking Cessation Attempts Among Current Smokers, by Pay Grade 87
5.15. Past-Year Smoking Cessation Attempts Among Current Smokers, by Gender 87
5.16. Reasons for E-Cigarette Use, by Service Branch 88
5.17. Reasons for E-Cigarette Use, by Pay Grade 88
5.18. Reasons for E-Cigarette Use, by Gender 89
5.19. Past-12-Month Drug Use, by Service Branch 91
5.20. Past-12-Month Drug Use, by Pay Grade 92
5.21. Past-12-Month Drug Use, by Gender 93
5.22. Past-30-Day Drug Use, by Service Branch 94
5.23. Past-30-Day Drug Use, by Pay Grade 95
5.24. Past-30-Day Drug Use, by Gender 95
5.25. Past-Year Prescription Drug Use, by Service Branch 97
5.26. Past-Year Prescription Drug Use, by Pay Grade 98
5.27. Past-Year Prescription Drug Use, by Gender 98
5.28. Past-Year Prescription Drug Misuse, by Service Branch 99
5.29. Past-Year Prescription Drug Misuse, by Pay Grade 100
5.30. Past-Year Prescription Drug Misuse, by Gender 101
6.1. Serious Psychological Distress, by Service Branch 105
6.2. Serious Psychological Distress, by Pay Grade 105
6.3. Serious Psychological Distress, by Gender 106
6.4. Probable PTSD, by Service Branch 107
6.5. Probable PTSD, by Pay Grade 107
6.6. Probable PTSD, by Gender 108
6.7. Angry and Aggressive Behaviors, by Service Branch 109
6.8. Angry and Aggressive Behaviors, by Pay Grade 109
6.9. Angry and Aggressive Behaviors, by Gender 110
6.10. Unwanted Sexual Contact, by Service Branch 112
6.11. Unwanted Sexual Contact, by Pay Grade 112
6.12. Unwanted Sexual Contact, by Gender 113
6.13. Physical Assault, by Service Branch 114
6.14. Physical Assault, by Pay Grade 114
6.15. Physical Assault, by Gender 115
6.16. Suicide, by Service Branch 116
6.17. Suicide, by Pay Grade 117
6.18. Suicide, by Gender 117
6.19. Past-Year Gambling Problem, by Service Branch 119
6.20. Past-Year Gambling Problem, by Pay Grade 119
6.21. Past-Year Gambling Problem, by Gender 120
6.22. Past-Year Mental Health Service Utilization, by Service Branch 122
6.23. Past-Year Mental Health Service Utilization, by Pay Grade 123
6.24. Past-Year Mental Health Service Utilization, by Gender 124
6.25. Past-Year Mental Health Medication Use, by Service Branch 125
6.26. Past-Year Mental Health Medication Use, by Pay Grade 125

6.27. Past-Year Mental Health Medication Use, by Gender 125
6.28. Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Service Branch 126
6.29. Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Pay Grade 127
6.30. Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Gender 127
6.31. Perceived Unmet Need for Mental Health Services, by Service Branch 128
6.32. Perceived Unmet Need for Mental Health Services, by Pay Grade 128
6.33. Perceived Unmet Need for Mental Health Services, by Gender 128
6.34. Reasons for Not Receiving Needed Treatment for Mental Health Problems in the Past Year 129
6.35. Perception That Seeking Mental Health Treatment Would Damage Military Career, by Service Branch 130
6.36. Perception That Seeking Mental Health Treatment Would Damage Military Career, by Pay Grade 131
6.37. Perception That Seeking Mental Health Treatment Would Damage Military Career, by Gender 131
7.1. Past Year Physician-Diagnosed Chronic Conditions, by Service Branch 137
7.2. Past Year Physician-Diagnosed Chronic Conditions, by Pay Grade 138
7.3. Past Year Physician-Diagnosed Chronic Conditions, by Gender 139
7.4. Bothered a Lot by Physical Symptoms in the Past 30 Days, by Service Branch 141
7.5. Bothered a Lot by Physical Symptoms in the Past 30 Days, by Pay Grade 142
7.6. Bothered a Lot by Physical Symptoms in the Past 30 Days, by Gender 143
7.7. Past-Year Injury, TBI, and Postconcussive Symptoms, by Service Branch 146
7.8. Past-Year Injury, TBI, and Postconcussive Symptoms, by Pay Grade 147
7.9. Past-Year Injury, TBI, and Postconcussive Symptoms, by Gender 147
7.10. Self-Rated Overall Physical Health, by Service Branch 148
7.11. Self-Rated Overall Physical Health, by Pay Grade 148
7.12. Self-Rated Overall Physical Health, by Gender 149
7.13. Health-Related Functional Limitations: Absenteeism and Presenteeism, by Service Branch 150
7.14. Health-Related Functional Limitations: Absenteeism and Presenteeism, by Pay Grade 151
7.15. Health-Related Functional Limitations: Absenteeism and Presenteeism, by Gender 151
8.1. Sexual Risk Behaviors and Outcomes, by Service Branch 155
8.2. Sexual Risk Behaviors and Outcomes, by Pay Grade 156
8.3. Sexual Risk Behaviors and Outcomes, by Gender 157
8.4. Method of Contraception Used During Most-Recent Vaginal Sex in Past Year 160
8.5. Method of Contraception, by Service Branch 161
8.6. Method of Contraception, by Pay Grade 162
8.7. Method of Contraception, by Gender 163
8.8. HP2020 Family Planning Objectives, by Service Branch 164
8.9. Deployment-Related Contraceptive Counseling and Access (Women Only), by Service Branch 166
8.10. Deployment-Related Contraceptive Counseling and Access (Women Only), by Pay Grade 167

8.11. Deployment-Related Contraceptive Counseling and Access (Men Only), by Service Branch 168
8.12. Deployment-Related Contraceptive Counseling and Access (Men Only), by Pay Grade 168
8.13. HIV Testing, by Service Branch 169
8.14. HIV Testing, by Pay Grade 170
8.15. HIV Testing, by Gender 171
9.1. Sexual Orientation, by Gender 176
9.2. LGB Identity, by Service Branch 177
9.3. LGB Identity, by Pay Grade 177
9.4. Health Promotion and Disease Prevention, by LGB Identity 178
9.5. Substance Use, by LGB Identity 179
9.6. Mental and Emotional Health and Mental Health Services Use, by LGB Identity 180
9.7. Physical Health, by LGB Identity 181
9.8. Unwanted Sexual Contact and Physical Abuse, by LGB Identity 182
9.9. Sexual and Reproductive Health, by LGB Identity 183
10.1. Lifetime Number of Deployments, by Service Branch 186
10.2. Lifetime Number of Deployments, by Pay Grade 186
10.3. Lifetime Number of Deployments, by Gender 187
10.4. Lifetime Number of Combat Zone Deployments, by Service Branch 187
10.5. Lifetime Number of Combat Zone Deployments, by Pay Grade 188
10.6. Lifetime Number of Combat Zone Deployments, by Gender 188
10.7. Lifetime Duration of Deployments, by Service Branch 189
10.8. Lifetime Duration of Deployments, by Pay Grade 190
10.9. Lifetime Duration of Deployments, by Gender 190
10.10. Total Duration of Deployments in the Past 12 Months, by Service Branch 191
10.11. Total Duration of Deployments in the Past 12 Months, by Pay Grade 192
10.12. Total Duration of Deployments in the Past 12 Months, by Gender 192
10.13. Lifetime Combat Trauma Experiences During Deployment, by Service Branch 193
10.14. Lifetime Combat Trauma Experiences During Deployment, by Pay Grade 194
10.15. Lifetime Combat Trauma Experiences During Deployment, by Gender 195
10.16. Substance Use, by Recent Deployment 196
10.17. Mental and Emotional Health Indicators, by Recent Deployment 198
10.18. Physical Health, by Any Deployment in Past 12 Months 200
11.1. Comparison of 2018 HRBS with Healthy People 2020 Goals for Select Outcomes 211
11.2. Significant Differences Between the 2015 and the 2018 HRBSs for Select Outcomes 213
D.1. Weight Status, by Race/Ethnicity 285
D.2. Weight Status, by Age Group 286
D.3. Moderate and Vigorous Physical Activity in Past 30 Days, by Race/Ethnicity 287
D.4. Moderate and Vigorous Physical Activity in Past 30 Days, by Age Group 288
D.5. Strength Training in the Past 30 Days, by Race/Ethnicity 289
D.6. Strength Training in the Past 30 Days, by Age Group 290
D.7. Hours per Day of Screen Time, by Race/Ethnicity 290
D.8. Hours per Day of Screen Time, by Age Group 291
D.9. Past-Year Routine Medical Checkup, by Race/Ethnicity 291
D.10. Past-Year Routine Medical Checkup, by Age Group 291
D.11. Past 30 Days Average Daily Hours of Sleep, by Race/Ethnicity 292
D.12. Past 30 Days Average Daily Hours of Sleep, by Age Group 293

D.13. Sleep Quality in Past 30 Days, by Race/Ethnicity ... 293
D.14. Sleep Quality in the Past 30 Days, by Age Group ... 294
D.15. Lack of Energy Due to Poor Sleep in the Past Week, by Race/Ethnicity ... 294
D.16. Lack of Energy Due to Poor Sleep in the Past Week, by Age Group ... 294
D.17. Use of Sleep Medication in Past 30 Days, by Race/Ethnicity ... 295
D.18. Use of Sleep Medication in Past 30 Days, by Age Group ... 295
D.19. Use of Substances to Stay Awake in the Past 30 Days, by Race/Ethnicity ... 296
D.20. Use of Substances to Stay Awake in the Past 30 Days, by Age Group ... 297
D.21. Alcohol Use in Past 30 Days, by Race/Ethnicity ... 298
D.22. Alcohol Use in Past 30 Days, by Age Group ... 298
D.23. Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Race/Ethnicity ... 299
D.24. Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Age Group ... 299
D.25. Perception of Military Drinking Culture, by Race/Ethnicity ... 300
D.26. Perception of Military Drinking Culture, by Age Group ... 300
D.27. Current Tobacco Use, by Race/Ethnicity ... 301
D.28. Current Tobacco Use, by Age Group ... 302
D.29. Past-Year Smoking Cessation Attempts Among Current Smokers, by Race/Ethnicity ... 302
D.30. Past-Year Smoking Cessation Attempts Among Current Smokers, by Age Group ... 303
D.31. Reasons for E-Cigarette Use, by Race/Ethnicity ... 303
D.32. Reasons for E-Cigarette Use, by Age Group ... 304
D.33. Past-Year Drug Use, by Race/Ethnicity ... 304
D.34. Past-Year Drug Use, by Age Group ... 305
D.35. Past-30-Day Drug Use, by Race/Ethnicity ... 305
D.36. Past-30-Day Drug Use, by Age Group ... 306
D.37. Past-Year Prescription Drug Use, by Race/Ethnicity ... 306
D.38. Past-Year Prescription Drug Use, by Age Group ... 307
D.39. Past-Year Prescription Drug Misuse, by Race/Ethnicity ... 307
D.40. Past-Year Prescription Drug Misuse, by Age Group ... 308
D.41. Serious Psychological Distress, by Race/Ethnicity ... 308
D.42. Serious Psychological Distress, by Age Group ... 309
D.43. Probable PTSD, by Race/Ethnicity ... 309
D.44. Probable PTSD, by Age Group ... 309
D.45. Angry and Aggressive Behaviors, by Race/Ethnicity ... 310
D.46. Angry and Aggressive Behaviors, by Age Group ... 310
D.47. Unwanted Sexual Contact, by Race/Ethnicity ... 311
D.48. Unwanted Sexual Contact, by Age Group ... 311
D.49. Physical Assault, by Race/Ethnicity ... 312
D.50. Physical Assault, by Age Group ... 312
D.51. Suicide, by Race/Ethnicity ... 313
D.52. Suicide, by Age Group ... 313
D.53. Past-Year Gambling Problem, by Race/Ethnicity ... 314
D.54. Past-Year Gambling Problem, by Age Group ... 314
D.55. Past-Year Mental Health Service Utilization, by Race/Ethnicity ... 315
D.56. Past-Year Mental Health Service Utilization, by Age Group ... 316
D.57. Past-Year Mental Health Medication Use, by Race/Ethnicity ... 316

D.58. Past-Year Mental Health Medication Use, by Age Group 317
D.59. Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Race/Ethnicity..... 317
D.60. Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Age Group 317
D.61. Perceived Unmet Need for Mental Health Services, by Race/Ethnicity..... 318
D.62. Perceived Unmet Need for Mental Health Services, by Age Group..... 318
D.63. Belief That Seeking Mental Health Treatment Would Damage Military Career, by Race/Ethnicity..... 318
D.64. Belief That Seeking Mental Health Treatment Would Damage Military Career, by Age Group 319
D.65. Past-Year Physician-Diagnosed Chronic Conditions, by Race/Ethnicity 320
D.66. Past-Year Physician-Diagnosed Chronic Conditions, by Age Group..... 321
D.67. Bothered a Lot by Physical Symptoms in the Past 30 Days, by Race/Ethnicity 322
D.68. Bothered a Lot by Physical Symptoms in the Past 30 Days, by Age Group..... 323
D.69. Past-Year Injury, TBI, and Postconcussive Symptoms, by Race/Ethnicity..... 324
D.70. Past-Year Injury, TBI, and Postconcussive Symptoms, by Age Group..... 324
D.71. Self-Rated Overall Physical Health, by Race/Ethnicity..... 325
D.72. Self-Rated Overall Physical Health, by Age Group..... 325
D.73. Health-Related Functional Limitations: Absenteeism and Presenteeism, by Race/Ethnicity..... 326
D.74. Health-Related Functional Limitations: Absenteeism and Presenteeism, by Age Group 326
D.75. Sexual Risk Behaviors and Outcomes, by Race/Ethnicity..... 327
D.76. Sexual Risk Behaviors and Outcomes, by Age Group..... 328
D.77. Method of Contraception, by Race/Ethnicity..... 329
D.78. Method of Contraception, by Age Group 330
D.79. Deployment-Related Contraceptive Counseling and Access (Women Only), by Race/Ethnicity..... 331
D.80. Deployment-Related Contraceptive Counseling and Access (Women Only), by Age Group 331
D.81. Deployment-Related Contraceptive Counseling and Access (Men Only), by Race/Ethnicity..... 332
D.82. Deployment-Related Contraceptive Counseling and Access (Men Only), by Age Group 332
D.83. HIV Testing, by Race/Ethnicity..... 333
D.84. HIV Testing, by Age Group..... 334
D.85. LGB Identity, by Race/Ethnicity 334
D.86. LGB Identity, by Age Group 335
D.87. Lifetime Number of Deployments, by Race/Ethnicity..... 335
D.88. Lifetime Number Deployments, by Age Group 336
D.89. Lifetime Number of Combat Zone Deployments, by Race/Ethnicity..... 336
D.90. Lifetime Number of Combat Zone Deployments, by Age Group..... 337
D.91. Lifetime Duration of Deployments, by Race/Ethnicity..... 337
D.92. Lifetime Duration of Deployments, by Age Group 338
D.93. Duration of Deployments in the Past 12 Months, by Race/Ethnicity 338
D.94. Duration of Deployments in the Past 12 Months, by Age Group..... 339
D.95. Lifetime Combat Trauma Experiences During Deployment, by Race/Ethnicity..... 340
D.96. Lifetime Combat Trauma Experiences During Deployment, by Age Group 341

E.1. Q61_2: In the Past 12 Months, Were You Wounded by a Bullet? 344
E.2. Q95: In the Past 12 Months, Have You Ever Had to Lie to People Important to You About How Much You Gambled? 344
E.3. Correlation Summary (in Terms of) Across Imputation Methods 345
E.4. Q40A: In the Past 12 Months, Have You Used Marijuana or Hashish? 346
E.5. Q95: In the Past 12 Months, Have You Ever Had to Lie to People Important to You About How Much You Gambled? (Marginal Distributions) 346
E.6. Correlation Summary for Convergence Diagnostics 347

Summary

The Health Related Behaviors Survey (HRBS) is the U.S. Department of Defense's (DoD's) flagship survey for understanding the health, health-related behaviors, and well-being of service members. The survey includes content areas that could negatively impact force readiness and prevent service members from being able to perform their duties and accomplish their missions. The Defense Health Agency asked the RAND Corporation to review previous iterations of the HRBS, update survey content, administer a revised version of the survey, and analyze data from the resulting 2018 HRBS of both active and reserve component personnel in the U.S. Air Force, Army, Marine Corps, Navy, and Coast Guard.

This report, one of two complementary publications, reviews survey methodology, sample demographics, key findings among active component personnel,[1] and policy implications for both force readiness and future iterations of the HRBS. Key health outcomes and health-related behaviors in the report are organized around the following domains: health promotion and disease prevention, substance use, mental and emotional health, physical health and functional limitations, sexual behavior and health, sexual orientation and health, and deployment experiences and health.

Methodology

Survey Development

Though largely similar to the 2015 HRBS (Meadows et al., 2018), the 2018 HRBS benefited from further refinement to reduce respondent burden; remove items that have infrequently been used in analysis of the data; and utilize existing, validated measures that facilitate comparisons with civilian populations. These changes mean, however, that some comparisons of items over time, across HRBSs, might not be appropriate. Our ultimate goal was to create a survey that met the wide-ranging needs of a large group of key stakeholders (e.g., senior DoD leaders, practitioners, commanders) but that did not duplicate already existing data and did not present a heavy burden on service members who completed it. The final survey can be found in Appendix A, and a description of the measures used in this report can be found in Appendix C.

Two other important changes were made between the most recent HRBS, fielded in late 2015 through early 2016, and the 2018 HRBS. First, because the 2018 survey was fielded among both the active and reserve components, the 2018 survey focused on service mem-

[1] A complementary report presents findings for the reserve component (Meadows et al., 2021).

bers in the active component as opposed to those on active duty.[2] Second, the survey shifted from a web-based anonymous survey to a web-based confidential survey. A confidential survey allowed the research team to make two important changes to survey procedures: a reduction in unwanted contacts by delivering reminders only to nonrespondents and a reduction in survey burden on respondents by linking their surveys to administrative data.

Survey Approval

The final survey, the sampling plan, all communication with potential respondents (see Appendix B), and the data security plan were reviewed by RAND's Institutional Review Board (known as the Human Subjects Protection Committee), the Westat Institutional Review Board, the Coast Guard's Institutional Review Board, the Office of People Analytics, the Office of the Under Secretary of Defense for Personnel and Readiness's Research Regulatory Oversight Office, the Office of the Assistant Secretary of Defense for Health Affairs and the Defense Health Agency's Human Research Protection Office, and the DoD Security Office. All survey materials included the survey report control system license number: DD-HA(BE)2189 (expires February 28, 2023). See Appendix A for the final 2018 DoD HRBS.

Survey Administration

RAND partnered with Westat, which implemented the web-based survey as a subcontractor. The survey opened on October 22, 2018, and closed on March 1, 2019.

Population and Sample

The sampling frame of the 2018 HRBS included all active component personnel as of September 2018 who were not enrolled as cadets in service academies, senior military colleges, and other Reserve Officers' Training Corps programs. Personnel in an active National Guard or reserve program and full-time National Guard members and reservists are classified as members of their reserve component branch of service and are included as part of a separate sample. We used data provided by the Defense Manpower Data Center (DMDC) to construct the sampling frame. The total sampling frame was 1,357,219 active component service members.

The sampling frame utilized 50 strata based on the interaction of service branch (five categories), pay grade (five categories), and gender (two categories). By taking into account anticipated response rates that differ across these strata, the sampling plan attempted to minimize the survey design effect (i.e., loss of precision). The 2016 Workplace and Gender Relations Survey of Active Duty Members was used to provide the best indicator of response rates that could be expected across strata because it was a large, DoD-wide survey that had recently been conducted.

Women were sampled at approximately twice the rate of men. Service members from the Coast Guard and Marine Corps were sampled at approximately 1.5 times the baseline rate, whereas Air Force service members were sampled at approximately 0.75 times the baseline rate. Lastly, junior enlisted service members (pay grades E1–E4) were sampled at approximately 1.15 times the baseline rate. The sampling rates were scaled so that exactly 150,000 service members would be sampled in total. A holdback sample of approximately 50,000 service mem-

[2] Reserve component service members, once activated, serve on active duty. Active component service members are, by default, considered active duty.

bers was also selected to help protect against lower-than-anticipated response rates. Ultimately, 199,996 active component service members were invited to participate in the 2018 HRBS.

Final Analytic Sample

The final analytic sample consisted of 17,166 surveys. A usable survey was defined as one in which the respondent provided at least one response to an alcohol-related item because this is the first major substantive area addressed. This is similar to how a usable survey was defined for the 2015 HRBS. Among those who were included in the final analytic sample, the average completion time was 20.5 minutes (standard deviation = 11.3 minutes). The majority of the sample accessed the survey via a laptop or desktop computer (93.3 percent), with 5.5 percent using a mobile device and 1.1 percent using a tablet.

Response Rates

Response rates were calculated as [number of submitted surveys / (number of released sample – ineligibles)] × 100. In this case, *ineligibles* refers to sample members who were deceased at the time of the survey (n = 11). This response rate calculation corresponds to American Association for Public Opinion Research Response Rate 1 (American Association for Public Opinion Research, 2016). We also present weighted response rates, using the design weights (weights are described in the next section). The overall unweighted response rate for the active component was 8.6 percent (9.6 percent weighted).[3] The response rate was highest among the Coast Guard (19.3 percent, unweighted) and lowest among the Army and Marine Corps (both 5.7 percent, unweighted). Senior officers (O4–O6) were the most likely to respond (24.4 percent, unweighted), and junior enlisted personnel (E1–E4) were the least likely to respond (4.6 percent, unweighted).

Weights

As is common practice in analysis of survey data, we used statistical weighting to correct for underlying differences between respondents and nonrespondents and to therefore improve the ability to generalize findings from the survey to the population of survey-eligible service members. Unlike the anonymous 2015 HRBS, the 2018 HRBS was confidential, which allowed us to link both respondents and nonrespondents to DMDC administrative files containing demographic information (e.g., service branch, age, education, race/ethnicity). This information was used to quantify the ways in which our respondents differ from the broader population of survey-eligible service members. We calculated analytic weights in two stages. First, we estimated design weights that counteract the survey design, which slightly oversampled Marines, women, and junior enlisted personnel to guarantee enough of those groups to yield reliable estimates. Second, we calculated nonresponse weights, which are used to make the respondents representative of those who were selected for sampling. The final analytic weights are calculated as the product of the design and nonresponse weights and are used to make the analytic sample representative of the eligible service member population. The generalizability of weighted HRBS findings to the population of survey-eligible service members is predicated on a handful of assumptions, primarily that the likelihood of a sampled service member responding to the survey (and any meaningful differences between respondents and

[3] The overall unweighted response rate for the 2018 HRBS, including both active and reserve components, was 8.4 percent, and the overall weighted response rate was 9.5 percent. The weighted response rate for the 2015 HRBS, which included only the active component, was 6.8 percent.

nonrespondents) is dependent only on characteristics that are observed for both respondents and nonrespondents (or, under further assumptions, characteristics for which population benchmarks exist).

Missing Data and Imputation

The bulk of missing data in the 2018 HRBS (approximately 94 percent) was due to dropout. Missingness rates in the data ranged from less than 0.1 percent for items appearing early in the survey to 7 percent for items that occurred later. A common approach for addressing missing data is imputation (Little and Rubin, 2019), wherein a predictive model is used to replace missing values with ones that are statistically plausible. Imputation results in a data set that is more representative of the inferential population and makes more-efficient use of the available data for all cases, even when participants did not complete every survey item. Furthermore, imputation can address bias when patterns of missingness are completely random or depend on observed data, but it does not prevent bias when patterns of missingness are dependent on unobserved data (Little and Rubin, 2019). Unlike prior HRBSs, missing data in the 2018 HRBS is imputed, creating a single imputed dataset.

The imputed dataset was created using mice in R (Van Buuren and Groothuis-Oudshoorn, 2011), which allows its user to specify the imputation method used for each variable (e.g., gaussian imputation, logistic imputation, polytomous imputation, predictive mean matching [PMM]), as well as the dependencies for each variable that is to be imputed. We used PMM (Little, 1988) to impute binary, ordinal, and continuous variables, whereas polytomous regression was used to impute categorical data. Logistic regression was not used as a manner of imputing binary data because it performed poorly for imputing variables with sparse distributions, which are common in HRBS data. Particular attention was paid to the complicated skip logic that underpins the HRBS survey instrument. Furthermore, a sequentially specified imputation model (in lieu of a fully specified one) was needed in order to prevent divergence across iterations of the Markov chain Monte Carlo (MCMC) procedure employed within mice. For final imputations, five iterations of MCMC were used, as this is recommended within existing literature (White, Royston, and Wood, 2011; Van Buuren, 2018). More details about the imputation procedure can be found in Appendix E.

Analysis Approach

Comparisons Across Military Subpopulations

All analyses used the analytic weights and imputations previously described. In most circumstances, differences in each outcome were tested across levels of key factors or by subgroups (service branch, pay grade, and gender) using a two-stage procedure.[4] First, we used the Rao-Scott chi-square test as a gateway test for whether there was any difference in the outcome across all levels of the factor. Second, if this test concluded that there was a statistically significant relationship between the outcome and the factor, then we attempted to identify the levels of the factor in which the outcome differed by constructing all possible pairwise comparisons of the outcome across the levels of the factor.

In cases where one or more subgroups had a zero on a particular outcome, those subgroups were omitted from the computation of the Rao-Scott chi-square text and were not included in

[4] Results by race/ethnicity and age groups can be found in Appendix D.

pairwise comparisons. In cases where estimates were suppressed, we omitted subgroups who had suppressed estimates in pairwise comparisons. Suppression of estimates occurred for one of two reasons. In the first case of suppression, both point estimates and confidence intervals (CIs) were suppressed when fewer than 15 service members were included in the denominator of any given cell—that is, when the eligible population was less than 15. In the second case of suppression, CIs, but not point estimates, are provided. This occurs when the half-width of a CI is 15 percent or greater (i.e., greater than the point estimate itself).

Comparisons with Healthy People 2020 Objectives

For roughly the past 30 years, the Office of Disease Prevention and Health Promotion has developed a set of evidence-based objectives aimed at improving the health of American citizens. Benchmarks are established for ten-year cycles. The current set of goals is outlined in Healthy People 2020 (HP2020). Department of Defense Instruction (DoDI) 1010.10 states that it is DoD policy to "[s]upport the achievement of the Department of Health and Human Services' vision for improving the health of all Americans as outlined in Healthy People 2020." As such, where possible, this report will compare results from the 2018 HRBS with HP2020 objectives. However, we caution readers that making direct comparisons between the military and civilian populations ignores the fact that the two groups are very different on some sociodemographic characteristics (e.g., gender, age) related to the health outcomes and health behaviors of interest.

Comparison with the 2015 HRBS

The 2018 HRBS is significantly different from the 2015 version in several ways, including item wording and implementation. *Thus, we strongly caution readers not to directly compare results from earlier versions of the HRBS, including the 2015 version, with the 2018 version.* Doing so could result in erroneous conclusions about why changes in health and behaviors have occurred over time. Differences between earlier surveys and the 2018 version could be the result of a number of factors, including changes in underlying population demographics, actual changes in behavior, or methodological differences across surveys.

We attempted to minimize the risk of such methodological artifacts by comparing the two survey years using regression models, in which we simultaneously controlled for many of the demographic differences across the two samples. Comparative results across years used adjusted risk ratios (ARRs) based on regression models and are embedded within each substantive chapter.[5] The relative risk ratios can be interpreted as the multiplicative factor by which the estimate changed in the 2018 HRBS relative to the 2015 HRBS. For example, an ARR of 1.2 implies a 20-percent increase in that outcome over time. To be clear, none of the comparisons between the 2015 and 2018 versions of the HRBS presented in this report are based on simple comparisons of raw percentages between the two survey years.

Limitations

The 2018 HRBS is not without limitations. First, as with any self-reported survey, social desirability bias is always a possibility, especially when topics may be sensitive or unflattering to the respondent. Second, though higher than in 2015, the response rate for the 2018 is still con-

[5] Regression models control for survey year, respondent age at time of survey, marital status, gender, pay grade, service branch, and race/ethnicity and include a series of interaction terms between survey year and service branch, pay grade, and gender, as well a series of interactions between service branch, pay grade, and gender.

sidered low for survey research. Although low response rates do not automatically mean that survey data are biased, the low rates do increase the probability of bias. Third, for some groups that make up a smaller percentage of the overall DoD population (e.g., warrant officers, non-Hispanic Asian service members), CIs of our estimates might be larger, indicating a lower level of precision in the estimate. Thus, these results should be interpreted with caution. Fourth, direct comparisons between civilians and active component service members might not be appropriate given demographic difference between the two populations. And, fifth, comparisons with prior HRBSs are not recommended given the substantial methodological differences over time; where appropriate, we do make comparisons between the 2015 and 2018 HRBSs.

Sample Demographics

Table S.1 presents the distribution of the weighted 2018 HRBS active component sample (with and without the Coast Guard included; columns one and two, respectively[6]) by the three characteristics used for sampling: service branch, pay grade, and gender. The final column in the table compares the weighted 2018 HRBS with the 2017 DoD active-duty population.[7]

Key Findings

Below we highlight key findings, organized by substantive area. This summary does not include CIs around point estimates, which can be found in the main chapters in the report itself.

Health Promotion and Disease Prevention

Within this domain, we examined weight status, physical activity, screen time, annual physical assessments, and sleep. Key findings include the following:

- Overall, 33.3 percent of service members 20 years of age or older reported a body mass index (BMI) consistent with Centers for Disease Control and Prevention (CDC) guidelines for normal weight (the general population HP2020 goal is at least 33.9 percent);[8] 15.1 percent were classified as obese (the HP2020 goal is less than 30.5 percent).
- Just under two-thirds of service members (71.8 percent) met the HP2020 goal for moderate physical activity (MPA) of 150 minutes per week or vigorous physical activity (VPA) for at least 75 minutes per week. Roughly one-half (45.3 percent) met the HP2020 goal for MPA of 300 minutes per week or VPA for at least 150 minutes per week. Roughly half (49.6 percent) of service members reported engaging in muscle strengthening activities three or more days per week (the HP2020 goal for two or more days per week is at least 24.1 percent).

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6 The Coast Guard is not managed by DoD but rather by the Department of Homeland Security and thus is not included in the DoD column's total.

7 We use fiscal year (FY) 2017 data for two reasons. First, this time period coincides with the timing of sample selection. Second, comparable FY 2018 data were not available when this report was written. Also note that the DMDC data we use here are for service members on active duty, not the active component. Therefore, some of the service members included in the DoD population percentages are activated reservists.

8 Note that the HP2020 goal is specific to adults age 20 or older.

Table S.1.
Distribution of Service Branch, Pay Grade, and Gender in the 2018 HRBS Active Component Weighted Respondent Sample, with 2017 DoD Comparison

	2018 HRBS Weighted Respondent Sample with Coast Guard (%)	2018 HRBS Weighted Respondent Sample Without Coast Guard (%)	2017 DoD Active-Duty Population (%)
Service branch			
Air Force	24.1	24.9	24.6
Army	34.5	35.6	36.5
Marine Corps	13.9	14.4	14.2
Navy	24.4	25.2	24.7
Coast Guard	3.2	Excluded[a]	NA[b]
Pay grade			
E1–E4	42.4	42.6	43.8
E5–E6	29.8	29.7	28.8
E7–E9	9.8	9.8	9.6
W1–W5	1.5	1.4	1.4
O1–O3	10.1	10.1	10.0
O4–O6[c]	6.3	6.3	6.3
Gender			
Men	83.3	83.3	83.8
Women	16.7	16.7	16.2

SOURCE: Information in the first two columns comes from the 2018 HRBS; the third column is from DMDC, *DMDC Active Duty Military Personnel Master File (September 2017)*, Washington, D.C.: Office of the Deputy Assistant Secretary of Defense for Military Community and Family Policy, 2018.

[a] Coast Guard data were not included in this calculation.

[b] NA = not applicable. DoD does not maintain demographic information about the Coast Guard.

[c] Officers above the rank of O6 are excluded from the HRBS sample. They make up less than 1 percent of the DoD total.

- Overall, 27.2 percent of service members reported five or more hours per day of non–work-related screen time. This included time gaming or at a computer, television, smartphone, tablet, or other handheld device.
- Just 70.3 percent reported receiving a routine medical check-up in the previous year, falling short of military standards that every service member should receive a medical check-up annually.
- About one-third of service members met the HP2020 standard for sufficient sleep. The HP2020 target is 72.8 percent. All enlisted pay grade groups were significantly less likely than officers to report getting an average of seven or more hours of sleep per night over the

past 30 days. Furthermore, 29.7 percent of service members rated their sleep as fairly bad, and 6.1 percent rated their sleep as very bad; 27.5 percent of service members reported being severely or moderately bothered by a lack of energy because of poor sleep over the past week. Finally, 13.1 percent of service members reported using over-the-counter (OTC) or prescription medications to sleep at least once per week over the past 30 days.

- About one-fifth (16.5 percent) of service members reported consuming energy drinks three or more times a week over the previous 30 days, including 22.7 percent of Marines (significantly higher than any other service). Less than 4 percent reported any consistent (i.e., one or more times per week) use of OTC medications to stay awake, and fewer still reported consistent use of prescription medications.

Substance Use

Within this domain, we examined the use of alcohol, tobacco and nicotine, marijuana and synthetic cannabis, other drugs, and prescription drugs. Key findings include the following:

- According to survey estimates, more than one in three service members (34.0 percent) were current binge drinkers. The rate for binge drinking was significantly higher than the most recent available estimate for the U.S. population of adults aged 18 and above from the 2018 National Survey on Drug Use and Health (NSDUH; 26.5 percent).
- Approximately one in ten service members (9.8 percent) were current heavy drinkers. Though rates for heavy drinking were not directly comparable because of differences in definitions across surveys, when we recalculated raw 2017 NSDUH data, we found that the rate for heavy drinking was higher in the 2018 HRBS than in the population of U.S. adults over the age of 18 (8.9 percent).
- 6.2 percent of service members experienced one or more serious consequences from drinking in the past year, 4.9 percent reported any risky drinking and driving behavior, and 5.7 percent reported work-related productivity loss from alcohol use.
- More than one-quarter (28.2 percent) of all service members agreed with at least one of the following statements about military culture being supportive of drinking: finding it hard to fit in with one's command if they do not drink, belief that drinking is part of being in one's unit, belief that everyone is encouraged to drink at social events, and belief that leaders are tolerant of drunkenness when personnel are off duty.
- An estimated 37.8 percent of service members currently use tobacco in some form. This rate is higher than estimated rates of current tobacco use in the general population (approximately 19.3 percent). Rates of e-cigarette use are also higher among active component service members (16.2 percent) than in the general population (4.6 percent; CDC, 2017).
- Few service members reported use of any drugs in the past year (1.3 percent). Less than 1 percent reported use of any nonprescription cough or cold medicine in the past year (0.4 percent), nonprescription anabolic steroids (0.2 percent), marijuana or synthetic cannabis (0.9 percent), and drugs other than marijuana and synthetic cannabis (0.8 percent; these included cocaine [including crack], lysergic acid diethylamide [LSD], phencyclidine [PCP], 3,4-methylenedioxy-methamphetamine [MDMA, commonly called ecstasy], methamphetamine, heroin, and gamma hydroxybutyrate [GHB]).
- Less than 1 percent (0.5 percent) of all service members reported use of drugs in the past 30 days. 0.4 percent reported use of marijuana or synthetic cannabis, and 0.3 percent reported use of drugs other than marijuana and synthetic cannabis in the past 30 days.

- Regarding prescription drugs, results suggest lower rates of past-year use of stimulants, sedatives, and pain relievers among service members than among civilians, as well as lower rates of misuse.

Mental and Emotional Health

Within this domain, we examined mental health indicators (i.e., serious psychological distress and posttraumatic stress disorder [PTSD]), social and emotional factors associated with mental health (i.e., angry and aggressive behaviors, unwanted sexual contact, physical abuse, problematic gambling), self-harm (including suicidal ideation, suicide plans, and suicide attempts), mental health service utilization, perceived unmet mental health treatment need, barriers to utilizing mental health services, and concerns that mental health treatment would damage one's military career. Key findings include the following:

- Approximately one in ten service members (9.6 percent) reported serious psychological distress in the past 30 days, and 11.5 percent of service members evidenced probable PTSD. Rates of both serious psychological distress and probable PTSD are higher than those observed among the general population (2.9 percent to 5.2 percent for serious psychological distress [Center for Behavioral Health Statistics and Quality, 2018]; 4 percent for PTSD [Kessler, Berglund, et al., 2004]).
- Approximately half (49.1 percent) of active component service members reported any angry or aggressive behavior in the past 30 days.
- Almost one-tenth (9.6 percent) of active component service members indicated experiencing any unwanted sexual contact since joining the military, with 2.5 percent of individuals indicating that they had experienced unwanted sexual contact in the past year. Women were six times more likely to have experienced unwanted sexual contact since joining the military than men (31.6 percent of women versus 5.2 percent of men) and eight times more likely to have experienced unwanted sexual contact within the past year than men (9.1 percent of women versus 1.2 percent of men). It is important to keep in mind that the Workplace and Gender Relations Survey of Active Duty Members (WGRA) and the HRBS measure different constructs. The WGRA measures *sexual assault*. The HRBS measures *unwanted sexual contact*, which is a broader construct. We defined *unwanted sexual contact* as "times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration." Thus, results are not comparable across the two surveys.
- Relatively few military personnel responded that they had experienced a physical assault while in the military (5.3 percent) or in the past year (1.1 percent). By comparison, in the general population, approximately 1.7 percent of individuals ages 12 and older indicated experiencing a physical assault in the past year (Morgan and Kena, 2018).
- In the 2018 HRBS, 8.3 percent of all service members endorsed having thoughts of suicide in the past 12 months, 2.7 percent reported suicide plans, and 1.2 percent reported a suicide attempt. These rates are higher than those observed among the general population: Among adults aged 18 or older in the general population, 4.3 percent endorsed thoughts of suicide, 1.3 percent endorsed suicide plans, and 0.6 percent reported a suicide attempt in the past year (Substance Abuse and Mental Health Services Administration, 2019b).

- The prevalence of problem gambling in the total active component population was approximately 1.6 percent, which is lower than the prevalence of pathological gambling in the U.S. civilian population (2.3 percent; Kessler, Hwang, et al., 2008).
- Overall, approximately one in four service members (25.5 percent) reported using any mental health services. This proportion is higher than that found in the general population in the 2018 NSDUH, where 15.2 percent of adults ages 18–25 and 16.1 percent of adults ages 26–49 reported using mental health services (Substance Abuse and Mental Health Services Administration, 2019b).
- Receipt of mental health services was more common from specialty mental health providers (18.2 percent) than from general medical providers (13.4 percent). This pattern differs from that observed in the general population, where most individuals who receive mental health care receive that care from general medical providers (Olfson et al., 2019). Among service members in the 2018 HRBS, the average frequency of service use was about one mental health visit per month (11.9 visits in the past year).
- Approximately 8.5 percent of all active component service members reported using a medication for a mental health condition in the past year. By comparison, in the civilian population, about 12 percent of adults age 18 and over reported using a prescription medication for a mental health problem in the past year (Substance Abuse and Mental Health Services Administration, 2019b). Medication is the most commonly received form of mental health treatment in the general population, which is different from the pattern of mental health treatment utilization observed among active component service members.
- Among all service members, approximately 7 percent endorsed unmet need for mental health treatment at some point in the past year (i.e., he or she needed mental health care in the past 12 months and did not receive it). Among those with stated unmet need for treatment or a positive screen for moderate or severe psychological distress, the most commonly endorsed reason for not receiving care was thinking that treatment was not needed at the time. This is consistent with findings from the civilian literature suggesting that low perceived need for treatment is the most common reason that people with mental health problems do not seek care (Mojtabai, Olfson, and Mechanic, 2002). Practical challenges associated with taking time off from work duties and scheduling appointments were also commonly endorsed reasons for not utilizing mental health services.
- Among active component service members, regardless of need for or actual receipt of care, 34.2 percent indicated that seeking mental health treatment was damaging to one's military career.

Physical Health and Functional Limitations

Within this domain, we examined chronic health conditions (e.g., hypertension, high cholesterol, diabetes), physical symptoms, pain, traumatic brain injury, mild traumatic brain injury (mTBI), postconcussive symptoms, and self-reported health. Key findings include the following:

- Overall, 40.3 percent reported being told by a health care provider that they had at least one chronic condition. The most common conditions were bone, joint, or muscle injury and back pain. These conditions were significantly more common among senior enlisted and warrant officers, as well as among members of the Army and Marine Corps.

- Rates of hypertension, high cholesterol, and diabetes were low relative to the general population.
- The most commonly reported physical symptoms included trouble sleeping and feeling tired or having low energy. These were more common among enlisted service members than among officers. The Air Force and Coast Guard had the lowest rates of sleep problems and fatigue.
- Back pain and pain in the arms, legs, and joints were also common. Approximately 29.4 percent reported bodily pain, including headache. Rates of pain were highest among members of the Army and Marine Corps and among senior enlisted and warrant officers.
- Rates of physical symptoms were significantly lower in 2018 compared with the 2015 HRBS.
- An estimated 6.1 percent of service members screened positive for mTBI, with mTBI occurring more frequently among Army, Marine Corps, and Navy service members. An estimated 4.2 percent reported postconcussive symptoms.
- Approximately 52.3 percent of service members reported that their health was very good or excellent.
- On average, service members reported missing 0.62 days of work (i.e., absenteeism) and experiencing reduced productivity (i.e., presenteeism) on 2.19 days in the past 30 days. Members of the Air Force and Coast Guard reported significantly less presenteeism than members of the Army, Marine Corps, and Navy, and officers reported less absenteeism and presenteeism than enlisted personnel.

Sexual Behavior and Health

Within this domain, we examined past-year sexual risk behaviors, sexually transmitted infections (STIs) and unintended pregnancies, use of and access to contraceptives, and human immunodeficiency virus (HIV) testing. Key findings include the following:

- Risky sexual behavior among service members was not uncommon: 19.3 percent reported more than one sex partner in the past year, 34.9 percent did not use condoms with new sex partners, and 21.8 percent were at high risk for HIV infection at the time of the survey. Rates of these behaviors were highest in the Marine Corps and among junior enlisted personnel (pay grades E1–E4).
- A total of 3.4 percent of service members reported an STI. Rates of STIs were highest among junior enlisted personnel (pay grades E1–E4) and were higher among women (7.0 percent) than among men (2.7 percent).
- Among women, 5.5 percent reported an unintended pregnancy in the past year; for men, 2.4 reported causing an unintended pregnancy in the past year. Unintended pregnancy during deployment was rare (0.08 percent).
- A total of 16.8 percent of service members reported that they did not use any contraception during the most-recent time they had vaginal sex. At the same time, only 77 percent of women at risk for pregnancy used contraception during the most-recent time they had vaginal sex, nearly 15 percentage points short of the 91.6 percent HP2020 goal.
- Less-effective contraceptive methods (birth control pills, shots, patch, or ring; diaphragm; condoms; or some other method) are used by roughly one-third of service members and are the most common methods overall. Junior enlisted personnel (pay grades E1–E4) were the least likely to report using highly effective methods and the most likely to report

using less-effective methods. Highly effective (i.e., long-acting) contraception methods are defined as a contraceptive implant, an intrauterine device (IUD), or sterilization.
- Most service members did not receive any contraceptive counseling prior to deployment. Counseling rates were significantly lower for men (14.5 percent) than for women (39.0 percent).
- Most female service members who sought birth control before deployment (86.4 percent) or during deployment (77.7 percent) were able to access the method they preferred, although this leaves a notable percentage (roughly 14 and 22 percent, respectively) without such access. In contrast, most male service members who sought birth control before or during deployment were unable to get their preferred method (13.5 percent were able to access it before deployment and 19.0 percent were able to access it during deployment).
- A total of 75.8 percent of service members reported past-year HIV testing. The services exceeded the HP2020 target of 68.4 percent for the percentage of men who have sex with men (MSM) who reported past-year HIV testing (78.6 percent). Still, a notable percentage of both MSM (about 21 percent) and those at high risk for contracting HIV (about one in five service members) were not tested during this recommended period. *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

Sexual Orientation and Health

Within this domain, we provided an estimate of the percentage of service members who are lesbian, gay, or bisexual (LGB) and key information about the health-related behavior and health status of LGB service members. Key findings include the following:

- Overall, 3.4 percent of servicemen and 9.9 percent of servicewomen reported one or more same-sex partners in the prior year.
- Just over six percent (6.3 percent) of all active component service members identified as LGB. Significantly more women (17.6 percent) than men (4.1 percent) identified as LGB.
- The Navy had the highest percentage of LGB service members, though it was significantly different only from the Coast Guard.
- LGB personnel tended to be younger (under age 35), to be junior enlisted personnel, and to be officers.
- Compared with their non-LGB counterparts, LGB service members were more likely to engage in binge drinking (39.1 versus 33.7 percent) and heavy drinking (13.9 versus 9.5 percent), use e-cigarettes (24.5 versus 15.7 percent), and use any illicit drug in the past 30 days (3.4 versus 1.5 percent). LGB service members were less likely to use smokeless tobacco than other personnel (5.8 versus 13.9 percent).
- LGB service members also engaged in more risky sexual behavior and had more negative sexual health outcomes on some measures. They were more likely to have had sex with a new partner without a condom in the past 12 months (43.5 versus 34.3 percent), more likely to have had more than one sex partner in the past 12 months (41.8 versus 17.8 percent), and more likely to have had an STI in the past 12 months (10.2 versus 2.9 percent) than their non-LGB peers. However, LGB personnel were more likely than non-LGB personnel to have had an HIV test in the past six months (43.1 versus 37.9 percent).

- LGB service members were more likely than their non-LGB peers to have suffered from a host of mental and emotional health issues in the past year. These include serious psychological distress (30.5 versus 15.5 percent), probable PTSD (16.6 versus 11.2 percent), suicidal ideation (15.8 versus 7.7 percent), suicide attempts (3.2 versus 1.1 percent), and angry and aggressive behavior (54.4 versus 48.8 percent). Use of mental health services by LGB service members was also higher, including care from mental health care specialists (30.5 versus 17.3 percent) and general medical doctors (19.6 versus 13.0 percent). Use of medications for mental health issues in the past year was also more common among LGB service members (13.0 versus 8.1 percent). Finally, both perceived unmet need for treatment (13.8 versus 6.3 percent) and perceived career-related stigma (45.6 versus 33.5 percent) were greater among LGB service members.
- LGB service members were more likely than their non-LGB peers to indicate that they had experienced unwanted sexual contact both since joining the military (29.5 versus 8.2 percent) and in the past year (10.9 versus 1.9 percent). Similarly, LGB service members were more likely than their non-LGB peers to indicate that they had experienced physical assault both since joining the military (8.2 versus 5.1 percent) and in the past year (2.8 versus 1.0 percent). These findings are similar to those in both the 2016 (Davis et al., 2017) and 2018 WGRAs (Breslin et al., 2019).
- We did not find significant differences between LGB and non-LGB service members on the percentages who have had a routine physical health assessment in the past year; amount of physical exercise; average amount of nightly sleep; use of prescription pain relievers in the past year; common chronic conditions (e.g., high blood pressure, diabetes, high cholesterol, and asthma); back pain; and bone, joint or muscle injuries.

Deployment Experiences and Health

Within this domain, we examined the frequency and duration of deployments (including both combat and noncombat deployments), combat trauma exposure, and deployment experiences and health. Key findings include the following:

- Across all services, the majority of service members (60.4 percent) have been deployed at least once, either in a combat or noncombat environment. Roughly 40 percent (39.6 percent) reported never having deployed.
- Just over one-quarter (27.3 percent) of all service members who have ever deployed have never been on a combat deployment.
- Slightly more than half (54.3 percent) of previously deployed active component personnel reported that they had not deployed in the past 12 months.
- Overall, just over one-third (36.2 percent) of all service members had experienced at least one of the six types of combat traumas we measured. The most frequently endorsed trauma was knowing someone who was killed in combat (22.3 percent), and the least endorsed item was being wounded (3.0 percent).
- We examined a number of outcomes between service members who had and had not deployed in the past year. Both binge drinking (39.8 versus 31.8 percent) and heavy drinking (12.6 versus 8.7 percent) were more common among the recently deployed. Recent deployers were significantly more likely to be current cigarette users (22.4 versus 16.8 percent), but there was only a small difference in current e-cigarette use (17.2 versus 15.8 percent). Significantly more recent deployers met the criteria for past-year moder-

ate psychological distress compared with those who did not recently deploy (14.6 versus 11.0 percent), but no difference in the prevalence of PTSD between the two groups was found (12.2 versus 11.3 percent).

Comparisons with Healthy People 2020

DoDI 1010.10 states that it is department policy to "[s]upport the achievement of the Department of Health and Human Services' vision for improving the health of all Americans as outlined in Healthy People 2020." As such, it is important to be able to compare results from the HRBS to HP2020 goals to see how well the military is doing compared with these goals.[9] Table S.2 shows comparisons between HP2020 goals and findings from the 2018 HRBS. Green cells indicate where DoD is doing as well or better than the relevant HP2020 goal; red cells indicate where DoD is doing worse. The table presents only the HP2020 goals for which HRBS is comparable (or nearly comparable). This means that for some areas for which HP2020 has objectives but not concrete goals, we do not make comparisons (e.g., prescription drug misuse, diabetes, asthma). When interpreting comparisons between the U.S. active component military and the general U.S. population, it is important to keep in mind the demographic differences (e.g., gender, age) between the two. These, as well as differences in unobservable characteristics (e.g., personality traits), could make direct comparisons difficult to interpret.

DoD is doing well with respect to several HP2020 goals: obesity, physical activity, strength training, high blood pressure, high cholesterol, and HIV testing among MSM. However, on several HP2020 topics, active component service members fall short of HP2020 goals. Binge drinking, heavy drinking, and tobacco use (including cigarettes, cigars, and smokeless tobacco) are all areas where the prevalences of service members' behaviors are much higher than the goals set by HP2020. Adequate amounts of sleep are another potential area of concern; the percentage of active component service members who achieve this metric is below the HP2020 goal. Finally, contraceptive use and prevention of unintended pregnancy are also areas where the active component could improve.

Comparisons Between the 2015 and 2018 HRBSs

Given methodological changes between the 2018 HRBS and earlier iterations, it was not possible to make direct comparisons. However, we did employ a regression model approach that allowed us to compare between the 2015 and 2018 versions of the HRBS when survey items were identical across years. It is important to note that not all of the methodological differences between the surveys can be accounted for by this method. Table S.3 summarizes the results of these comparisons. Outcomes are grouped by substantive area, as they are in the main body of the report, and focus only on overall difference (i.e., across all service branches). Details about cross-survey differences by service branch, pay grade, and gender can be found in Chapters Four through Eight. Rather than focusing on actual numbers, Table S.3 uses a color-coded approach—green topics indicate an improvement between 2015 and 2018, orange indicates no change, and red indicates a decline.

[9] Again, we caution readers that making direct comparisons between the military and civilian populations ignores the fact that the two groups are very different on some sociodemographic characteristics (e.g., gender, age) related to the health outcomes and health behaviors of interest.

Table S.2
Comparison of 2018 HRBS with HP2020 Goals for Select Outcomes

Topic	HP2020 Goal	2018 HRBS
Health promotion and disease prevention		
Obesity (ages 20 and older)	30.5% (or less)	15.1%
Normal weight (ages 20 and older)	(at least) 33.9%	33.3%
MPA for at least 150 minutes per week or VPA for at least 75 minutes per week	(at least) 47.9%	71.8%
MPA for more than 300 minutes per week or VPA for at least 150 minutes per week	(at least) 31.3%	45.3%
Muscle-strengthening activities on three or more days per week[a]	(at least) 24.1%	49.6%
Sleep: 8 hours per 24-hour period for those 18–21 years of age, 7 hours per 24-hour period for those older than 21	(at least) 72.8%	33.3%
Substance use		
Binge drinking	24.2% (or less)	34.0%
Current cigarette smoking	12.0% (or less)	18.4%
Current cigar smoking	0.3% (or less)	10.0%
Current smokeless tobacco use	0.2% (or less)	13.4%
Physical health and functioning		
High blood pressure	26.9% (or less)	9.1%
High cholesterol	13.5% (or less)	4.2%
Sexual behavior and health		
Use of contraceptive during the most-recent time that women at risk for pregnancy had vaginal sex (ages 15–44)	91.6% (or higher)	77.0%[b]
Use of moderately or most-effective contraceptive (ages 20–44)	69.3% (or higher)	65.0%
Annual HIV testing among MSM	68.4% (or higher)	78.6%

NOTES: HP2020 goals can be found at Healthy People, 2020a–2020u. The 2018 HRBS data in this table come from the "Total DoD" column in the relevant tables in Chapters Four through Eight.

[a] The HP2020 goal is for two or more days per week, but the HRBS measure cannot be disaggregated in this way. Instead, the HRBS value represents strength training of three or more days per week, which therefore underestimates the percentage of service members meeting the HP2020 goal.

[b] The HRBS estimate is for women ages 17 to 44 because women below that age are not eligible to join the military.

Table S.3
Significant Differences Between the 2015 and 2018 HRBSs for Select Outcomes

Health Promotion and Disease Prevention	Substance Use	Mental and Emotional Health	Physical Health and Functioning	Sexual Behavior and Health
Underweight	Binge drinking	Any angry behavior in the past 30 days	Bodily pain within the past 30 days (excluding headache)	Two or more sex partners in past year
Normal weight	Heavy drinking	Angry behavior 5 or more times in the past 30 days	Bodily pain within the past 30 days (including headache)	New-partner sex without condom use in the past year
Overweight	Any productivity loss due to drinking	Past-year suicidal thoughts	High physical symptom severity	Condom use during most-recent vaginal sex
Obese	Current cigarette smoker	Past-year suicide attempt	Stomach or bowel problems	STI in past year
MPA for less than 150 minutes per week	Current e-cigarette use	Past-year mental health care service utilization	Back pain	No contraceptive use at most-recent sex
MPA for 150–299 minutes per week	Current pipe or hookah user	Past-year use of medication for mental health problem	Pain in arms, legs, or joints	Used IUD at most-recent sex
MPA for 300 or more minutes per week	Current smokeless tobacco user	Perceived career-related stigma	Headaches	Used implant at most-recent sex
VPA for less than 75 minutes per week	Past-year prescription stimulant use		Chest pain or shortness of breath	Used moderately or most-effective birth control method (women 20–44 years old)
VPA for 75–150 minutes per week	Past-year prescription sedative use		Dizziness	HIV test in past year
VPA 150 or more minutes per week	Past-year prescription pain reliever use		Feeling tired or having low energy	High risk for HIV
Strength training 3 or more days per week	Past-year drug use (including marijuana)		Trouble sleeping	High risk for HIV tested in past year
Strength training 1–2 days per week	Past-year drug use (excluding marijuana)			Unintended pregnancy in past year
Strength training less than 1 day per week	Past-year marijuana use (including synthetics)			
Routine annual physical exam	Past-30-day drug use (including marijuana)			
Moderate to severe lack of energy due to poor sleep	Past-30-day drug use (excluding marijuana)			
	Past-30-day marijuana use (including synthetics)			

NOTES: Only identical survey items are compared across surveys. Green cells indicate improvement between the 2015 and the 2018 HRBSs. Orange indicates no change between surveys. Red indicates a decline between the 2015 and the 2018 HRBSs.

Policy Implications

Force Readiness, Health, and Well-Being

One of the key uses of the HRBS is to assess the readiness of the force with respect to the health and health-related behavior of service members. As such, in the section below we offer several observations to help DoD and the Coast Guard identify immediate and future threats to readiness, and we outline relevant policy implications derived from those observations.

Health Promotion and Disease Prevention

- Roughly 15 percent of the force was classified as obese based on BMI. However, BMI may not accurately reflect physical health and conditioning. DoD is currently reviewing DoDI 1308.3, which outlines how to assess physical fitness and body fat across the military, and the individual branches of the services have been reviewing and making changes to their own physical fitness tests. **As part of these revisions, DoD, the services, and the Coast Guard should consider whether BMI is an appropriate measure of weight for service members.**
- Just one-third of service members met HP2020 guidelines for adequate sleep, and roughly 36 percent rated their sleep as fairly bad or very bad. The issue is also significantly worse among the enlisted ranks. **DoD, the services, and the Coast Guard should make efforts to educate service members on the importance of sleep, and these efforts should be especially be targeted to enlisted service members.**
- An annual check-up is required for all service members. However, nearly 30 percent of respondents had not had this annual medical appointment in the previous year. **By improving access to and emphasizing these appointments, DoD, the services, and the Coast Guard will have additional opportunities to address sleep and weight issues among service members and could improve the health of the force.**

Substance Use

- More than one-third of service members reported binge drinking in the past 30 days, and nearly ten percent were categorized as heavy drinkers. More than one-quarter of all service members reported that military culture was supportive of drinking. **DoD, the services, and the Coast Guard must better understand the culture and climate surrounding alcohol use and then take steps to shift the culture away from excessive use.**
- More than one-third of service members reported using tobacco in some form, such as combustible cigarettes, e-cigarettes, cigars, smokeless tobacco, pipes, or hookahs. **Reducing tobacco use in all forms should be a high priority for DoD, the services, and the Coast Guard, given the long-term health consequences of use.** Intervention and prevention approaches to address tobacco use will likely need to be informed by current evidence-based approaches used with civilians and should pay particular attention to beliefs related to e-cigarettes as a replacement to traditional combustible cigarettes.
- **The rate of use for prescription stimulants, sedatives, and pain relievers was low (in an absolute sense), with just over 1 percent of service members reporting misuse of any prescription drugs in the past 12 months; however, given their potential for misuse, DoD, the services, and the Coast Guard should continue to monitor pre-**

scription drug availability in the military. This might include monitoring the most-common sources of prescription drugs among service members, as well as monitoring prescribing practices among military prescribers. This is especially true for prescription pain relievers, which were most commonly misused. Relatedly, prescription pain reliever use and misuse should continue to be monitored, especially given that pain-related conditions were among the more prevalent physical health concerns.

Mental and Emotional Health

- Findings from the 2018 HRBS indicate that symptoms of psychological distress were common among service members, with nearly one in ten individuals meeting criteria for current serious psychological distress. If untreated, these symptoms could persist and lead to significant functional impairments, which have major implications for service member well-being and force readiness. **DoD, the services, and the Coast Guard should continue their efforts to monitor, understand, and support service member mental health.**
- Although a large percentage of service members receives mental health treatment, the process of seeking care remains a barrier. Practical challenges associated with scheduling an appointment and taking time off from work duties were commonly endorsed reasons for not utilizing mental health services. **DoD, the services, and the Coast Guard should continue their efforts to help mitigate challenges associated with scheduling and attending appointments for mental health treatment.** In addition to these practical barriers, the belief that treatment is not needed and the belief that treatment will not be effective were among the most common reasons for not seeking treatment. Furthermore, despite efforts to reduce stigma associated with mental health treatment, the belief that mental health treatment would harm one's military career remains widespread, reported by over one-third of active component service members. Improving availability of mental health care alone will not fully address these barriers to care. **Therefore, DoD, the services, and the Coast Guard should explore the potential for enhancing the role of peers and commanders as facilitators of treatment-seeking through mental health literacy training and dissemination of information about mental health resources.** Studies to determine the most-effective ways to address barriers related to service members' knowledge and beliefs about engaging in formal mental health treatment could help improve these programs and increase utilization of available treatment resources.
- Although specialty mental health providers were the most commonly endorsed source of mental health treatment, nearly half of mental health services were delivered by nonspecialists. **Additional research is needed to identify, improve, and evaluate the sources, quality, and outcomes of nonspecialty mental health services utilized by service members.**
- We also found that a significant minority of service members—roughly 20 percent—received mental health care in a civilian facility. **Additional research is needed to understand the reasons that service members seek mental health care services outside the military health system (MHS), differences in types of services received by service members across civilian versus military facilities, and the impact of civilian services on continuity of military mental health care.**

- Over 8 percent of all service members reported having thoughts of suicide in the past year, a figure nearly twice as high as that observed among the general population (4.3 percent; Substance Abuse and Mental Health Services Administration, 2018). Women, younger service members, and junior enlisted service members demonstrated the highest rates of past-year suicide ideation. **Despite an already substantial investment in funding to understand and prevent suicide among service members, additional efforts are needed to determine whether different prevention strategies would benefit different subgroups of service members (e.g., by level of risk, demographic or psychosocial characteristics, etc.).**
- In addition, although rates of suicide attempts remained stable, rates of suicide ideation among all service members increased significantly between the 2015 and 2018 HRBSs. Because individuals are likely to have thought about suicide prior to or during an attempt, this increase is concerning. **In the context of increasing rates of suicide ideation, more information is urgently needed to identify early precursors to suicide to improve prevention efforts.**

Physical Health and Functioning

- Absenteeism was fairly low (0.5 missed days per month), but presenteeism averaged just over two days per month. **The underlying causes of absenteeism and presenteeism should be explored because addressing these factors may be the most effective way to reduce lost productivity.**
- Pain was a commonly reported health condition by service members, with 30 percent reporting some bodily pain the past 30 days. High levels of pain may be unsurprising given that musculoskeletal injuries in the military are common. Pain relievers were the most frequently misused prescription drug in the survey (though the rate was roughly 1 percent). Thus, the potential for pain to lead to misuse and abuse of prescription drugs makes it a potential area of concern for readiness. **Continued policy and program attention by DoD, the services, and the Coast Guard should be placed on both preventing pain (e.g., reducing musculoskeletal and overuse injuries) and treating it through a variety of approaches (e.g., medication, behavioral interventions [such as cognitive behavioral therapy and complementary and alternative medicine]).**

Sexual Behavior and Health

- **DoD, the services, and the Coast Guard should consider ways to increase the proportion of personnel who receive predeployment contraceptive counseling.** The 2016 National Defense Authorization Act required DoD to "establish and disseminate clinical practice guidelines on standards of care" for contraceptive counseling and to provide comprehensive counseling, including pre-deployment counseling (National Defense Authorization Act for Fiscal Year 2016, 2015). DoD adopted these guidelines at the end of 2016 with the publication of DHA-IPM 16-003 (DoD, 2016). Educational efforts should make clear to both MHS providers and service members that directives to provide contraceptive counseling are relevant for *all* personnel, including both men and women. These efforts might include informational campaigns directed at health care providers and service members and/or the promotion of the use of apps and informational websites designed to assist both providers and patients with contraceptive decisionmaking.

- **DoD, the services, and the Coast Guard should consider expanding efforts to provide contraceptive counseling specifically to men.** Research is ongoing to develop effective contraceptive counseling strategies that target men. Such strategies include counseling men on condom use and how to support their partners in using other methods, such as IUDs, as well as providing counseling services to couples.
- **DoD, the services, and the Coast Guard should explore mechanisms to increase the consistent and effective use of contraception.** Under the new contraceptive guidelines adapted by DoD, IUDs and implants are to be considered first-line methods of contraception. However, providers and service members might need additional training and education about the benefits of the most-effective contraceptive methods.
- **To address the escalating rates of STIs, DoD, the services, and the Coast Guard should ensure that condoms are easily available through TRICARE and are available to service members, regardless of location, at no or reduced cost.** Evidence from school-based condom availability programs indicates that these programs result in increased use of condoms and decreased rates of STIs without promoting sexual activity or increasing numbers of sex partners (Algur et al., 2019; Scott-Sheldon et al., 2011). **DoD, the services, and the Coast Guard should also consider implementing regular testing for STIs, especially among women.** Servicewomen were significantly more likely to report a past-year STI than servicemen were, and there are links between untreated chlamydia and infertility among women (Haggerty et al., 2010; Hafner, 2015).
- **Annual testing for HIV infection among those at high risk might be increased through better screening for risk as part of the Periodic Health Assessment (PHA).** Although the current Form 3024 asks pertinent questions, it is not clear that information on various contributors to risk is combined to detect those in the highest risk category, nor is it clear that certain risks (e.g., MSM) or combinations of risks should consistently trigger more-frequent (annual or biannual) testing for HIV infection.

Sexual Orientation and Health

- **Broadly targeted health promotion efforts by DoD, the services, and the Coast Guard should include LGB-specific considerations, as appropriate, recognizing that LGB individuals are part of the service.** Addressing LGB health disparities is unlikely to require the development of programs or policies targeted specifically to this group.
- **DoD, the services, and the Coast Guard should address the unique mental health needs of LGB personnel.** Current and future campaigns to reduce stigma surrounding mental health and service utilization should include messaging and images relevant to LGB personnel and should be tested for acceptability and perceived effectiveness in this subgroup of service members prior to implementation. Mental health service providers should also be sensitive to the unique needs of LGB service.
- **Sexual health disparities, including the high rates of STI and HIV risk behavior, could be reduced through education of providers in the MHS.** It is unclear whether MHS providers are aware of the high percentage of LGB personnel identifying as bisexual; roughly 60 percent of LGB servicemen and 65 percent of LGB servicewomen are bisexual. Incorrect assumptions that bisexual service members are heterosexual or gay based on the sex of their current sexual partners may lead to incomplete or incorrect counseling regarding use of condoms and other contraceptives and testing for STIs. Adaptation of

patient screening and counseling protocols and clinic forms could also be appropriate to recognize the presence of LGB personnel as part of the patient mix.

Future Iterations of the HRBS

The HRBS has a long history within DoD, and, over the years, there have been many changes in both survey content and survey implementation. The 2018 HRBS is the fourth consecutive iteration to rely solely on internet administration. Over that same period, response rates have also declined. Below we offer some recommendations for future iterations of the HRBS, focusing on ways to improve the efficiency and effectiveness of data collection.

Consider the use of survey incentives. The general consensus among those who study survey implementation is that there is a positive association between incentives and response rates (Singer and Ye, 2012). Whether such incentives could improve response rates, and thus reduce the possible response bias, among active component service members is an open question. According to DoDI 3216.02, it is possible for a federal contractor to compensate service members, who are considered federal employees, for participation in a survey. The next iteration of the HRBS should explore the use of targeted incentives, especially prepaid incentives that are not dependent on survey completion, to increase participation among certain groups with traditionally low response rates (e.g., junior enlisted personnel).

Shorten the survey and focus survey content. Though the 2018 HRBS was somewhat shorter than the 2015 version (measured in terms of time to complete) it is still a lengthy survey that can become tedious for the respondents, especially if they have recently answered similar survey items in other service-specific or DoD-wide surveys. Survey fatigue is a continued problem among service members, especially when it comes to health and health behavior topics. Service members are required to complete the annual PHA (DD Form 3024; DoDI 6200.06). Some, though not all, of the content in the survey portion of the PHA overlaps with topics covered in the HRBS (e.g., chronic conditions, mental health, alcohol use). DoD should consider whether this duplication is necessary. On the one hand, overlapping surveys could be driving down response rates on the HRBS. On the other hand, the PHA is not anonymous or confidential; responses are directly tied to service members and could incentivize service members not to be entirely truthful if they feel that their responses could potentially result in negative career-related consequences. As a first step, DoD should explore whether and how responses to the similar items differ across the PHA and the HRBS.

An alternative approach to reducing survey content could involve the use of modules. Modules would be based on content—for example, a tobacco use module or a pain and musculoskeletal injury module. In this approach, not every service member would receive every set of items on the survey but could be randomly (or deliberately) assigned to receive a certain number or type of modules. Modules that address high-frequency topics might not need as many respondents as modules related to topics that occur with a much lower prevalence (e.g., drug use). And the same set of modules might not need to be asked at every iteration of the HRBS, especially if trend data suggest little change over time.

Explore the use of a service member panel for tracking risky behaviors over time. Finally, as a supplement to the HRBS, DoD should consider the use of a service member panel to gather information about certain health outcomes and health-related behaviors on a real-time basis. Panels are groups of individuals who agree to participate in a series of surveys for a period of time (e.g., six months, a year) and are replenished at regular intervals as members leave the panel. Panels do require constant maintenance to ensure that they remain represen-

tative of some underlying population of interest, and panels generally are not efficient when it comes to assessing the population prevalence of rare outcomes. However, the use of a panel could be beneficial in terms of reducing the overall scope of the HRBS, which may positively impact response rates. In addition, a panel may be an attractive option because surveys cover a variety of topics that may impact readiness.

Conclusion

The HRBS is used by DoD and the Coast Guard to assess the current health and well-being of the force and to identify possible threats to readiness. This report provided an overview of health outcomes and health-related behaviors across seven domains. The future of this study might face challenges—declining response rates, overlapping content with other surveys, and competition for resources—but it remains an important source of data for tracking trends, informing policy, and making programmatic decisions.

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[10] Office affiliations and ranks were current as of the writing of this report.

Abbreviations

ARR	adjusted risk ratio
BMI	body mass index
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CI	confidence interval
DMDC	Defense Manpower Data Center
DoD	U.S. Department of Defense
DoDI	Department of Defense Instruction
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, version 5
EMP	empirical distribution transformation
FAQ	frequently asked questions
FCS	fully conditional specification
FY	fiscal year
GAD-7	Generalized Anxiety Disorder 7-Item Scale
GBM	Generalized Boosted Models
GHB	gamma hydroxybutyrate
GLMER	generalized linear mixed effects regression
HHS	U.S. Department of Health and Human Services
HIV	human immunodeficiency virus
HRBS	Health Related Behaviors Survey
HP2020	Healthy People 2020
ID	identification

IDP	imminent danger pay
IUD	intrauterine device
K6	Kessler 6 Mental Health Scale
kg	kilograms
LGB	lesbian, gay, or bisexual
LSD	lysergic acid diethylamide
m^2	meters squared
MCMC	Markov chain Monte Carlo
MDMA	3,4-methylenedioxy-methamphetamine
MHS	military health system
MPA	moderate physical activity
MSM	men who have sex with men
mTBI	mild traumatic brain injury
NCO	noncommissioned officer
NDAA	National Defense Authorization Act
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NR	not reportable
NSDUH	National Survey on Drug Use and Health
OCAR	Office of the Chief of the Army Reserve
OTC	over-the-counter
PC-PTSD-5	Primary Care PTSD Screen for DSM-5
PCL-C	PTSD Checklist–Civilian
PCP	phencyclidine
PHA	Periodic Health Assessment
PHQ-9	Patient Health Questionnaire-9
PMM	predictive mean matching
PTSD	posttraumatic stress disorder
STI	sexually transmitted infection

TBI	traumatic brain injury
TFF	Total Force Fitness
TWANG	Toolkit for Weighting and Analysis of Nonequivalent Groups
VA	U.S. Department of Veterans Affairs
VPA	vigorous physical activity
WGRA	Workplace and Gender Relations Survey of Active Duty Members

CHAPTER ONE

Introduction

For more than 30 years, the U.S. Department of Defense (DoD) has relied on the Health Related Behaviors Survey (HRBS) for self-reported data on the health and well-being of service members. The earliest iterations of the survey sought to better understand substance use (i.e., illicit drugs, alcohol, and tobacco) by service members.[1] In more-recent versions, the survey has expanded to cover other topics related to the readiness[2] of the force: mental, emotional, and physical health; risky sexual behavior; and the health of service members who have recently experienced a deployment. Additional content is updated periodically to address issues impacting service members at the time.

Using a stratified random survey approach, the HRBS collects data from active and reserve component members of the four DoD services—the Air Force, Army, Marine Corps, and Navy—as well as the Department of Homeland Security's Coast Guard. Title 14 of the United States Code refers to these five entities collectively as the armed forces. Traditionally, the survey has been completely anonymous; however, in 2018, the HRBS was administered as a confidential web-based survey. The reasons for this change in approach will be discussed later in the report.

The HRBS is intended to supplement, not replace, data from other sources, including administrative and patient health records, the Periodic Health Assessment (PHA), the Postdeployment Health Assessment, and the Postdeployment Health Reassessment. Problems and issues that do not reach a clinical threshold are sometimes masked in official data, and various incentives may influence how service members respond to official queries about their health and health behaviors. Ultimately, triangulation of all these different data sources will help DoD and the Coast Guard better understand the ways in which the health, health-related behaviors, and well-being of service members may impact force readiness. For this reason, the HRBS has historically been used to make policy and programming decisions across DoD and the Coast Guard.[3] In addition, data from the HRBS are used by researchers to advance the field of military medicine.

This report provides more detail about the design, implementation, and results of the 2018 HRBS and focuses on the health, health-related behaviors, and well-being of service members in the active component. A second report (Meadows et al., 2021) focuses on the

[1] The current HRBS is authorized in DoD Instructions 1010.4 and 1010.01, both of which reference substance use.

[2] We use the DoD definition of *readiness*: "[t]he ability of military forces to fight and meet the demands of assigned missions" (see Joint Publication 1, 2020, and DoD, 2020).

[3] It should be noted that the HRBS is not designed to *evaluate* any specific program or set of programs.

health, health-related behaviors, and well-being of service members in the reserve component, including the National Guard and Air National Guard.

In addition to these reports, the project also produced a series of research briefs and infographics that explore specific topic areas (e.g., mental and emotional health, substance use) and service branch–specific results.[4]

Context for the 2018 Health Related Behaviors Survey

One of the three lines of effort outlined in the 2018 National Defense Strategy is developing a more-ready, lethal force (DoD, 2018). The strategy goes on to state, "A more lethal, resilient, and rapidly innovating Joint Force, combined with a robust constellation of allies and partners, will sustain American influence and ensure favorable balances of power that safeguard the free and open international order" (p. 3). Such a ready, lethal force will result in a competitive advantage against current and future threats. Though readiness and lethality depend on a number of factors—training, equipment, technology, force structure—the health and well-being of service members is in some ways a fundamental enabler.

Total Force Fitness (TFF) is a useful framework for thinking about how data from the HRBS can help DoD create and maintain a ready, lethal force. In 2010, with assistance from the Consortium for Health and Military Performance at the Uniformed Services University of the Health Sciences, former Chairman of the Joint Chiefs of Staff ADM Michael Mullen outlined the TFF concept in a special issue of the journal *Military Medicine*. He noted, "A total force that has achieved total fitness is healthy, ready, and resilient; capable of meeting challenges and surviving threats" (Joint Chiefs of Staff, 2011). The framework incorporates both mind and body in the eight domains outlined in Figure 1.1. Factors within each domain contribute to a service member's ability to meet the demands of military life. In other words, these factors set the stage for readiness (and resilience). By monitoring aggregate levels of key factors, the armed forces can assess how prepared they are to accomplish their missions.

The 2018 HRBS contains factors across all eight TFF domains. The list below is not comprehensive but does highlight some of the key factors captured in each domain:

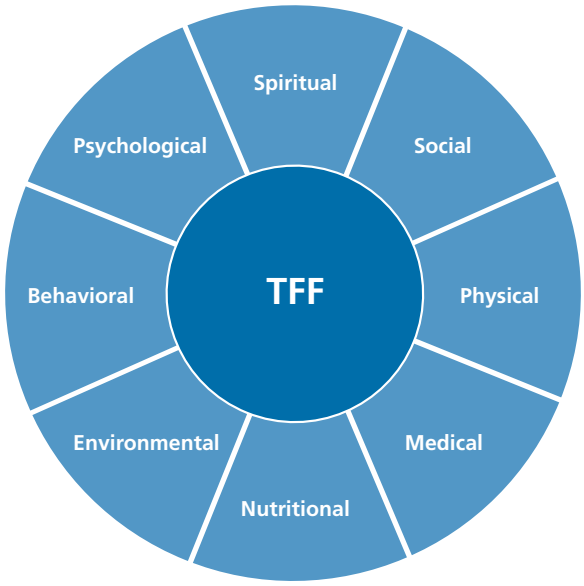
- Psychological: psychological distress, posttraumatic stress disorder (PTSD), suicide, and suicidal ideation
- Spiritual: spirituality
- Social: marital status
- Physical: exercise, limitations
- Medical: chronic conditions; medication use
- Nutritional: caffeine use, supplement use
- Environmental: deployment experiences
- Behavioral: alcohol use, tobacco use, substance use, sexual behavior, sleep.

Survey History and Background

The 2018 HRBS represents the 14th iteration of the survey, with earlier versions in 2015 (active duty only), 2014 (active duty and reserve), 2011 (active duty only), and 2009 (reserve compo-

[4] These materials can be found on the project webpage: https://www.rand.org/nsrd/projects/hrbs.html.

Figure 1.1
Eight Domains of Total Force Fitness



SOURCE: Meadows et al., 2018.

nent only). Administration occurs roughly every three to four years; all surveys since 2011 have used web-based administration. Earlier iterations were completed on paper in a group setting at military installations across the world. Other methodological improvements have occurred over time: changes in sampling strategy (from a geographic-based cluster approach to a population-based stratified random approach), increasingly sophisticated weighting and analysis approaches (e.g., imputation of missing data), and, as we describe below and later in the report, a shift from an anonymous to a confidential survey. Similarly, survey content has changed over time, reflecting shifts in the types of behaviors (both positive and negative) in which service members engage. The most-recent versions of the survey also strived to use existing, validated measures to compare findings with the U.S. civilian population. For example, one key civilian comparison is the Healthy People 2020 (HP2020) objectives established by the U.S. Department of Health and Human Services (HHS) Office of Disease Prevention and Health Promotion.[5] One important consequence of these survey changes is that some comparisons over time and across surveys are sometimes not advisable.

Updates to the 2018 HRBS

Several important changes were made between the previous HRBS, fielded in late 2015 through early 2016, and the 2018 HRBS. First, because the 2018 survey was fielded among

[5] For more information on the HP2020 objectives, see Healthy People, 2020r.

both the active and reserve components, the 2018 survey focused on service members in the active component as opposed to those on active duty.[6]

Second, the survey shifted from a web-based anonymous survey to a web-based confidential survey. Prior experience with the 2015 HRBS led the research team to advocate for this change (see Meadows et al., 2018). A confidential survey allowed the research team to make two important changes to survey procedures: reduction in unwanted contacts by focusing reminders only on nonresponders and reducing survey burden on respondents by linking their surveys to administrative data. These changes will be explored further in Chapter Two.

Third, the research team reviewed all survey content from the 2015 HRBS and, in consultation with the sponsor and other key stakeholders, made updates to the survey content. For example, two recent National Defense Authorization Acts (NDAAs) required DoD to report on specific topics (e.g., reproductive health and gambling), which were added to the 2018 HRBS. These areas will be further explored later in the report. In contrast, some topic areas were removed from the survey. As noted above, because respondents were linked to administrative data, the survey did not ask about many sociodemographic and military factors (e.g., age, race/ethnicity, service branch, pay grade). Similarly, other topics were removed from the survey because they were determined to be unnecessary in every survey iteration (e.g., use of complementary and alternative medicine, texting while driving) or were no longer relevant (e.g., age at first alcohol use).

Finally, the team reviewed the content of the 2105 HRBS and identified areas where survey items could be revised or updated. In some cases, this meant dropping items that were redundant with others on the survey (e.g., the AUDIT-C [Alcohol Use Disorders Identification Test for Consumption], which assesses hazardous drinking). In other instances, this meant wholescale changes in measures (e.g., using the Kessler 6 Mental Health Scale [K6] to assess psychological distress instead of the Patient Health Questionnaire-9 [PHQ-9] to assess probable depression and the Generalized Anxiety Disorder 7-Item Scale [GAD-7] to assess probable generalized anxiety). And, in some cases, edits were made to improve the readability and clarity of survey items or to reduce survey burden on respondents (e.g., collapsing response options).

Organization of the Report

Chapter Two briefly summarizes the methodology of the survey, including the sampling design, questionnaire development, survey administration, imputation of missing data, weights, and the general analytic plan. Chapter Three provides a summary of the weighted final sample in terms of sociodemographic and military characteristics. The remaining chapters each focus on a key substantive issue addressed in the survey, as follows:

- Chapter Four: Health Promotion and Disease Prevention
- Chapter Five: Substance Use
- Chapter Six: Mental and Emotional Health
- Chapter Seven: Physical Health and Functional Limitations
- Chapter Eight: Sexual Behavior and Health

[6] Reserve component service members, once activated, serve on active duty. Active component service members are, by default, considered active duty.

- Chapter Nine: Sexual Orientation and Health
- Chapter Ten: Deployment Experiences and Health.

The results of these substantive chapters may help DoD, the services, and the Coast Guard identify existing and emerging health problems among service members, develop programs and policies that target negative health behaviors, and, ultimately, maintain a ready force.

Finally, Chapter Eleven provides a brief, high-level summary of the results and outlines policy implications for DoD, the services, the Coast Guard, and the Defense Health Agency to consider. Policy recommendation are offered in two domains: (1) improving the health, health behaviors, and well-being of service members and (2) future implementation of the HRBS.

The report also contains five appendixes. Appendix A reproduces the web-based 2018 DoD HRBS. Appendix B contains the letters of support provided by the Office of the Assistant Secretary of Defense for Health Affairs and each of the service branches. Appendix C contains a description of key measures (organized by each substantive chapter), including how values were recoded, transformed, or combined for analysis and reporting. It also includes information on how we calculated scales and composite measures. Appendix D contains additional results that are not discussed in the main substantive chapters but might be of interest to some readers. Specifically, the tables in this appendix provide key outcomes broken down by age and racial/ethnic groups. Appendix E provides more detail about missing data and the imputation approach used in the study.

Finally, readers should always keep in mind that the survey results in this report can offer only statistical estimates of true population characteristics. Given the scope of the HRBS and the amount of material presented in this report, we often opt for less-precise terminology in the interest of readability. For example, though each table represents estimates rather than known values for the population of interest, we do not label each table as with an estimate of a specific outcome.

CHAPTER TWO

Methodology

This chapter reviews the methodology used to conduct the 2018 HRBS. At the onset of the study, the research team reviewed prior HRBSs, with a focus on updating the 2011 and 2015 HRBSs of active-duty military personnel. As noted in Chapter One, we removed some existing content areas while adding others to measure emerging areas of concern. The remainder of this chapter provides a detailed description of the process used to review and revise survey content, the administration of the survey, the population and sampling plan, imputation of missing data, creation of survey weights, the analytic plan for the final data set, and, finally, limitations of the approach described here.

Survey Development

Though largely similar to the 2015 HRBS, the 2018 HRBS benefited from further refinement to reduce respondent burden; remove items that are not used in analysis of the data; and utilize existing, validated measures that facilitate comparisons with civilian populations. In doing so, however, some comparison of items over time and across HRBSs may not be appropriate. Our ultimate goal was to create a survey that met the wide-ranging needs of a large group of key stakeholders but that did not duplicate already existing data and did not present a heavy burden on service members who completed it.

Advisory Group

At the outset of the study, the sponsor organized a group of roughly 20 key stakeholders and subject-matter experts to serve as the 2018 HRBS Advisory Group. These individuals were asked to provide feedback on survey content, methods, and analysis throughout the study. Individuals in the group represented each of the DoD services, as well as the Coast Guard. In addition, the following DoD offices were represented: the Reserve Medical Programs office (of the Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs), the Defense Health Agency (specifically, the Women's Health, Medical Ethics, and Patient Advocacy division; Clinical Support division; and Communications division), the Drug Testing and Program Policy office (of the Office of the Under Secretary of Defense for Personnel and Readiness), the Sexual Assault Prevention and Response Office, the Defense Suicide Prevention Office, Walter Reed National Military Medical Center, and Uniformed Services University.

Cognitive Pretesting

An early version of the survey was pretested with a group of Air Force and Army military fellows who spent fiscal year (FY) 2018 at the RAND Corporation. These fellows were all at the rank of major or lieutenant colonel and included both men and women. Feedback was provided in writing and during an hourlong focus group led by one of the research team leads. Fellows offered changes in wording and advice about topics to include and exclude.

Once the final survey instrument was programmed by Westat but was not yet live and available to respondents, a group of Pardee RAND Graduate School students tested the web survey, each portraying a persona (e.g., female, junior enlisted, with PTSD) designed to verify that skip patterns were working properly. These students also provided feedback on the general clarity of survey.

Approval Process

The final survey, the sampling plan, all communication with potential respondents, and the data security plan were reviewed by RAND's Institutional Review Board (known as the Human Subjects Protection Committee), the Westat Institutional Review Board, the Coast Guard's Institutional Review Board, the Office of People Analytics, the Office of the Under Secretary of Defense for Personnel and Readiness's Research Regulatory Oversight Office, the Office of the Assistant Secretary of Defense for Health Affairs and the Defense Health Agency's Human Research Protection Office, and the DoD Security Office. All survey materials included the survey report control system license number: DD-HA(BE)2189 (expires February 28, 2023). See Appendix A for the final 2018 DoD HRBS.

Survey Administration

This section reviews the procedures used to administer the 2018 HRBS. RAND partnered with Westat, which implemented the web-based survey as a subcontractor. The survey opened on October 22, 2018, and closed on March 1, 2019.

Service Liaison Officers

Each of the services and components, including the Coast Guard, identified a senior officer and/or civilian to perform the duties of a service liaison officer. The service liaison officer's primary function was to facilitate activities related to data collection, to include

- obtaining a letter of support from a senior leader (i.e., a flag office or civilian member of the Senior Executive Service) within their component or branch, which would then be shared with potential respondents
- helping to identify procedures for whitelisting the survey website address (or, in some cases, removing it from a blacklist)
- developing and distributing a marketing campaign for the survey (e.g., flyers, social media posts, and press releases).

Sample Contact

The initial contact with sample members included a mailed invitation from RAND and Westat, a letter from the (then-acting) Assistant Deputy Secretary of Defense for Health Affairs (see

Appendix B), and a set of frequently asked questions (FAQs; see Appendix A). All sample members with a valid DoD email address also received an introductory email. After that initial contact, service members who had not completed the survey or who had not requested to be opted out of future communication received reminders via email and postal letter. Service members who had a valid email address received up to six email reminders; service members with a valid mailing address received three letter reminders. Reminders were sent roughly weekly for ten weeks (excluding holiday weeks) with a single reminder (i.e., email *or* letter) sent weekly, with the exception of week 10, in which both an email and letter were sent. The final email and letter reminded potential respondents of the final day to complete the survey. The Defense Manpower Data Center (DMDC) provided all contact information (e.g., email and mailing addresses).

Survey Support and Help Desk

Service members who experienced technical difficulties could contact Westat via a 1-800 number or dedicated email address. Additional help information was provided via a help button programmed on each screen of the survey. The Westat helpdesk was staffed from 8 a.m. to 5 p.m. (Eastern time) Monday through Friday, with voicemail and email available 24 hours a day. The majority of helpdesk contacts were related to opting out of future reminders or refusals.

A list of FAQs and answers was also available to potential respondents on the 2018 HRBS website (see Appendix A). The document contained an email address to which questions about the overall study could be sent, as well as contact information for RAND's Human Subjects Protection Committee, in case respondents had questions about their rights as participants.

Ensuring Confidentiality

Unlike prior HRBSs, the 2018 version was confidential rather than anonymous. Several steps were taken to ensure that participant data remained confidential. All confidentiality procedures were outlined in the survey consent and start screens. First, only RAND and Westat had access to information that could potentially identify respondents (e.g., email addresses). Second, a scrambled identification (ID) number linked respondent contact information to survey data, and only a select group of researchers at RAND and Westat had access to the linkage file. Third, any transfer of data—either contact data or survey data—used a secure encryption program. Fourth, both RAND and Westat had physical security procedures in place to protect confidential information and survey data (e.g., locked file cabinets, use of a cold room). Finally, data are reported only in the aggregate. That is, individual service member data are not reported in this final report, nor will they be provided to anyone in DoD. To ensure that individuals cannot be identified by inference, this report presents estimates only if they are based on more than 15 possible individuals eligible to experience the outcome in question.[1]

One final step taken to protect the privacy of respondents was receipt of a Certificate of Confidentiality from the National Institutes of Health. A Certificate of Confidentiality provides researchers with the right to legally refuse to disclose information that could identify specific respondents in any federal, state, or local civil, criminal, administrative, legislative, or other proceedings (e.g., court subpoena).

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[1] Note that results may be reported for estimates based on fewer than 15 *actual* cases in the numerator. *Possible cases* refers to the exposed population (i.e., the denominator) or those who are eligible to experience the outcome in question.

Population and Sample

Population

The sampling frame of the 2018 HRBS included all active component personnel as of September 2018 who were not enrolled as cadets in service academies, senior military colleges, and other Reserve Officers' Training Corps programs. Personnel in an active National Guard or reserve program and full-time National Guard members and reservists are classified as members of their reserve component branch of service and are included as part of a separate sample.[2] We used data provided by the DMDC to construct the sampling frame. The total sampling frame was 1,357,219 active component service members.

Sampling Design

The eligible population was segmented into 50 strata based on the interaction of service branch (five categories), pay grade (five categories), and gender (two categories). Domains were then defined as strata that embodied a single category of one of the characteristics used for stratification (e.g., all women, all Marines, all E1–E4). The 2018 HRBS active component sample was selected so as to enable analyses across each of these domains and, in certain cases, interactions of two of the domains. In particular, it was determined that an effective sample size (which accounts for loss of precision due to weighting) of at least 2,500 was needed in each domain and of at least 1,000 was needed within composite strata defined by interactions of gender (and/or junior enlisted pay grades) and service branches. These thresholds were needed to facilitate analyses of dichotomous variables with sparse distributions, such as illicit drug use.[3] Furthermore, these thresholds were large enough to hedge against response rates that were lower than anticipated. As described shortly, our sample design accounted for anticipated rates of nonresponse, and the effective sample sizes aimed to be large enough to hedge against nonresponse rates that were higher than anticipated.

For a given hypothetical sample design (where sampling rates do not vary within strata defined by the interaction of service branch, pay grade, and gender but could vary across them), if we assume prespecified response rates (that also may vary across these strata but do not vary within them), we can devise hypothetical poststratified weights and apply the Kish formula (Kish, 1968) in order to determine the effective sample size for analyses that involve the full sample or composites of strata (i.e., subgroups).[4] The 2016 Workplace and Gender

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[2] See Meadows et al., 2021.

[3] For example, a comparison across two groups with an effective sample size of 2,500 of a dichotomous outcome that has a populationwide endorsement rate of 1 percent in the first group and 1.96 percent in the second group can be done with 80-percent power (assuming a significance level of 5 percent). A similar comparison across two groups of an effective sample size of 1,000 can be performed with 80-percent power when the first group has a populationwide endorsement rate of 1 percent and the second group has a rate of 2.68 percent.

[4] The effective sample size for a hypothetical sample is calculated under the assumption that each responding service member in a given stratum (where strata are the interaction of service branch, pay grade, and gender) is assigned a weight that is equal to the number of individuals in that stratum from the population divided by the number of respondents from that stratum. Using these weights, we use the Kish formula,

$$DEFF \approx \frac{n\sum w_i^2}{\left(\sum w_i\right)^2},$$

Relations Survey of Active Duty Members (WGRA) was used to provide the best indicator of response rates that could be expected across strata because it was a large, DoD-wide survey that had recently been conducted. The 2016 WGRA was used in lieu of the 2015 HRBS because the methodologies used in fielding the 2016 WGRA were more in line with those employed for the 2018 HRBS. By taking the WGRA-based anticipated response rates into account, we were able to create a sampling design (as described below) that would minimize the design effect (i.e., loss of precision) while ensuring (to the degree possible) that the desired thresholds for the effective sample size of analyses of composite strata were satisfied.

To meet the threshold requirements for effective sample size within domains and composite strata, it proved optimal to oversample from less-prevalent strata (e.g., those containing women, Marines) and sample from more-prevalent strata at lower rates. Specifically, women were sampled at approximately twice the rate of men. Service members from the Coast Guard and Marine Corps were sampled at approximately 1.5 times the baseline rate, whereas Air Force service members were sampled at approximately 0.75 times the baseline rate. Lastly, junior enlisted service members (pay grades E1–E4) were sampled at approximately 1.15 times the baseline rate. More-dramatic oversampling was not needed because, in many cases, more-prevalent strata (e.g., those involving Army and/or junior enlisted personnel) were those that were assumed to have lower response rates, whereas less-prevalent strata (e.g., those involving Coast Guard and/or senior officers) were assumed to have higher response rates. The sampling rates were scaled so that exactly 150,000 service members would be sampled in total. A hold-back sample of approximately 50,000 service members was also selected to help protect against lower-than-anticipated response rates.

Table 2.1 shows the sampling rates, expected response patterns, and expected effective sample sizes across domains for the 2018 HRBS sampling design while using expected response patterns from the 2016 WGRA. The figures in the table were used for precision calculations that served to validate the proposed sample design and assess whether the desired thresholds for effective sample size would be met.

Final Analytic Sample

Figure 2.1 provides a flowchart showing how the research team arrived at the final analytic sample of 17,166 surveys. The chart begins with the 19,787 individuals who logged into the survey website. Just over 1,700 chose not to proceed through the introductory material to the first question. An additional 889 surveys were dropped because they were not considered usable surveys, which we defined as those in which the respondent provided at least one response to an alcohol-related item. This is similar to how a usable survey was defined for the 2015 HRBS.

Among those who were included in the final analytic sample, the average completion time was 20.5 minutes (standard deviation = 11.3 minutes). The majority of the sample accessed the survey via a laptop or desktop computer (93.3 percent), with 5.5 percent using a mobile device and 1.1 percent using a tablet.

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to approximate the design effect for an analysis across any a given stratum (or composite of strata); the approximated design effect then yields an approximate effective sample size (where $ESS = n/DEFF$). Note that unlike the process outlined here, our method used to determine final 2018 HRBS weights will account for variables (e.g,. race/ethnicity) other than those that define strata; therefore, the final design effect may be higher than the one used in these preliminary calculations.

Table 2.1
2018 HRBS Sampling Frame

	Sampling Frame	Number Selected	Number of Expected Respondents[a]	Expected Effective Sample Size[b]	Sampling Rate
All active component	1,357,219	199,996	43,645	26,983	14.7%
Service branch					
Air Force	322,964	33,628	11,547	9,871	10.4%
Army	477,389	64,325	12,220	7,320	13.5%
Marine Corps[c]	186,913	45,282	6,970	4,661	24.2%
Navy	327,742	47,962	8,785	5,782	14.6%
Coast Guard[c]	42,211	8,799	4,123	3,621	20.8%
Pay grade					
E1–E4	580,114	102,522	11,181	7,617	17.7%
E5–E6	399,431	50,295	13,327	10,796	12.6%
E7–E9 and W1–W5[d]	153,782	18,960	7,896	6,469	12.3%
O1–O3	137,714	17,810	6,106	4,858	12.9%
O4–O6	86,178	10,409	5,136	4,251	12.1%
Gender					
Male	1,135,498	146,668	29,120	20,280	12.9%
Female[c]	221,721	53,328	14,525	10,486	24.1%
Oversampled strata[c]					
Female, Air Force	64,892	11,298	4,376	4,246	17.4%
Female, Army	70,969	16,690	4,324	3,060	23.5%
Female, Marine Corps	16,008	7,196	1,603	1,234	45.0%
Female, Navy	63,684	15,904	3,075	2,243	25.0%
Female, Coast Guard	6,170	2,241	1,147	1,104	36.3%
E1–E4, Air Force	123,936	15,179	3,857	3,382	12.2%
E1–E4, Army	209,763	32,608	2,390	2,007	15.5%
E1–E4, Marine Corps	109,824	29,544	2,288	2,008	26.9%
E1–E4, Navy	121,913	21,589	1,505	1,292	17.7%
E1–E4, Coast Guard	14,679	3,603	1,141	1,048	24.5%

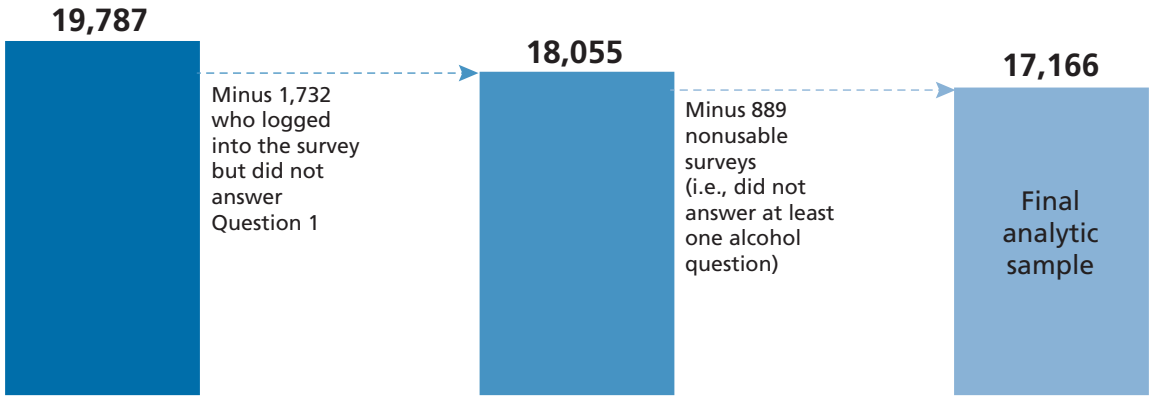
[a] Based on response rates observed in the 2016 WGRA.

[b] Based on design effects calculated using the Kish approximation and hypothetical poststratification weights.

[c] Denotes an oversample. Women were sampled at approximately twice the rate of men. Service members from the Coast Guard and Marine Corps were sampled at approximately 1.5 times the baseline rate, whereas Air Force service members were sampled at approximately 0.75 times the baseline rate. Junior enlisted service members (pay grades E1–E4) were sampled at approximately 1.15 times the baseline rate.

[d] Senior enlisted personnel and warrant officers were combined for the sampling procedure.

Figure 2.1
Flowchart for the 2018 HRBS Final Analytic Sample



NOTE: We do not know whether the 19,787 individuals who logged into the survey viewed the consent screen.

Response Rates

Response rates were calculated as [number of submitted surveys / (number of released sample – ineligibles)] × 100. In this case, *ineligibles* refers to sample members who were deceased at the time of the survey (n = 11). This response rate calculation corresponds to American Association for Public Opinion Research Response Rate 1 (American Association for Public Opinion Research, 2016). We also present weighted response rates, using the design weights (weights are described in the next section).

Table 2.2 breaks down the sampling frame, total sample size (including the primary and holdback samples), and response rates (both weighted and unweighted) by service branch, pay grade, and gender. Table 2.2 also shows noncontacts, which are defined as sample members for whom we did not have either a mailing address or an email address in the DMDC sample data file. The primary sample size was 150,000, and the secondary sample size was 49,996, for a total sample size of 199,996. The overall unweighted response rate for the active component was 8.6 percent (9.6 percent, weighted).[5] The response rate was highest among the Coast Guard (19.3 percent, unweighted) and lowest among the Army and Marine Corps (both 5.7 percent, unweighted). Senior officers (O4–O6) were the most likely to respond (24.4 percent, unweighted), and junior enlisted (E1–E4) were the least likely to respond (4.6 percent, unweighted).

Tables 2.3 through 2.7 provide a summary of the total sample (primary and holdback) and response rates (unweighted and weighted) for each service branch, broken down by pay grade and gender. Note that weighted and unweighted response rates in each group are identical because they are based on the design weight, which accounts only for service branch, gender, and pay grade.

[5] The overall unweighted response rate for the 2018 HRBS, including both active and reserve components, was 8.4 percent, and the overall weighted response rate was 9.5 percent. The weighted response rate for the 2015 HRBS, which included only the active component, was 6.8 percent.

Table 2.2
Sampling Frame, Sample Size, and Response Rates, Overall Sample

	Sampling Frame	Total Sample Size	Primary Sample Size	Holdback Sample Size	Non-contacts[a]	Analytic Sample Size	Unweighted Response Rate (%)[b]	Weighted Response Rate (%)
Service branch								
Air Force	322,964	33,628	25,222	8,406	64	5,579	16.6	16.7
Army	477,389	64,325	48,245	16,080	211	3,646	5.7	6.0
Marine Corps	186,913	45,282	33,961	11,321	1,302	2,569	5.7	6.1
Navy	327,742	47,962	35,972	11,990	57	3,675	7.7	8.3
Coast Guard	42,211	8,799	6,600	2,199	52	1,697	19.3	19.2
Pay grade								
E1–E4	580,114	102,522	76,892	25,630	1,518	4,444	4.3	4.6
E5–E6	399,431	50,295	37,721	12,574	44	4,585	9.1	9.5
E7–E9	133,007	16,278	12,195	4,083	12	2,727	16.8	16.8
W1–W5	20,775	2,682	2,025	657	19	398	14.8	13.7
O1–O3	137,714	17,810	13,359	4,451	68	2,469	13.9	13.8
O4–O6	86,178	10,409	7,808	2,601	25	2,543	24.4	24.2
Gender								
Men	1,135,498	146,668	110,002	36,666	1,252	11,813	8.1	9.3
Women	221,721	53,328	39,998	13,330	434	5,353	10.0	11.1
Total	1,357,219	199,996	150,000	49,996	1,686	17,166	8.6	9.6

[a] Noncontacts include sample members for whom we did not have either a mailing address or an email address in the DMDC sample data file.

[b] Response rates were calculated as [number of submitted surveys / (number of released sample – ineligibles)] × 100. *Ineligibles* are defined as deceased.

Analytic Weights

The 2018 HRBS analytic sample differs in composition from the eligible DoD service member population from which it was drawn for two primary reasons: (1) sample design (i.e., we selected specific types of service members for inclusion in the sample at a higher rate than other types of service members to ensure adequate representation of important subgroups) and (2) nonresponse (i.e., specific types of sampled service members were more likely to respond to the survey). Such differences in composition have the potential to jeopardize the generalizability of results collected from the survey to the greater population of survey-eligible service members. In order for estimates based on the respondents to be generalizable to the respective population, the sample must be weighted so that types of service members that are underrepresented in the sample are given more emphasis than those who are overrepresented. Therefore, weight-

Table 2.3
Sample and Response Rates, Air Force

	Total Sample Size	Primary Sample Size	Holdback Sample Size	Non-contacts[a]	Analytic Sample Size	Unweighted Response Rate (%)[b]	Weighted Response Rate (%)
Men							
E1–E4	9,905	7,429	2,476	22	1,175	11.9	11.9
E5–E6	6,510	4,882	1,628	8	1,068	16.4	16.4
E7–E9	2,041	1,531	510	0	454	22.2	22.2
O1–O3	2,140	1,605	535	5	416	19.4	19.4
O4–O6	1,734	1,300	434	2	436	25.1	25.1
Total	22,330	16,747	5,583	37	3,549	15.9	16.4
Women							
E1–E4	5,274	3,956	1,318	17	847	16.1	16.1
E5–E6	2,901	2,176	725	2	466	16.1	16.1
E7–E9	1,042	782	260	0	226	21.7	21.7
O1–O3	1,313	985	328	7	269	20.5	20.5
O4–O6	768	576	192	1	222	28.9	28.9
Total	11,298	8,475	2,823	27	2,030	18.0	18.2
Air Force total	33,628	25,222	8,406	64	5,579	16.6	16.7

NOTE: The Air Force does not use warrant officers.

[a] Noncontacts include sample members for whom we did not have either a mailing address or an email address in the DMDC sample data file.

[b] Response rates were calculated as [number of submitted surveys / (number of released sample – ineligibles)] × 100. *Ineligibles* are defined as deceased.

ing hinges on the ability of the analyst to quantify differences between the set of respondents and the greater population from which they were collected.

Unlike the anonymous 2015 HRBS, the 2018 HRBS was confidential, which allowed us to link both respondents and nonrespondents to DMDC administrative files containing demographic information (e.g., service branch, age, education, race/ethnicity). This information was used to quantify the ways in which our respondents differed from the broader population of survey-eligible service members. We calculated analytic weights in two stages. First, we estimated design weights that counteracted the survey design, which slightly oversampled Marines, women, and junior enlisted personnel to guarantee enough of those groups to yield reliable estimates. Second, we calculated nonresponse weights, which were used to make the respondents representative of those who were selected for sampling. The final analytic weights were calculated as the product of the design and nonresponse weights and were used to make the analytic sample representative of the eligible service member population.

Table 2.4
Sampling Frame, Sample Size, and Response Rates, Army

	Total Sample Size	Primary Sample Size	Holdback Sample Size	Non-contacts[a]	Analytic Sample Size	Unweighted Response Rate (%)[b]	Weighted Response Rate (%)
Men							
E1–E4	24,000	18,000	6,000	101	368	1.5	1.5
E5–E6	10,811	8,108	2,703	11	592	5.5	5.5
E7–E9	4,704	3,523	1,181	8	554	11.8	11.8
W1–W5	1,408	1,061	347	11	151	10.7	10.7
O1–O3	4,165	3,124	1,041	25	385	9.2	9.2
O4–O6	2,547	1,911	636	12	504	19.8	19.8
Total	47,635	35,727	11,908	168	2,554	5.4	5.9
Women							
E1–E4	8,608	6,456	2,152	12	262	3.0	3.0
E5–E6	3,424	2,568	856	5	213	6.2	6.2
E7–E9	1,251	926	325	3	145	11.6	11.6
W1–W5	310	245	65	8	35	11.3	11.3
O1–O3	2,085	1,564	521	11	226	10.8	10.8
O4–O6	1,012	759	253	4	211	20.8	20.8
Total	16,690	12,518	4,172	43	1,092	6.5	7.0
Army total	64,325	48,245	16,080	211	3,646	5.7	6.0

[a] Noncontacts include sample members for whom we did not have either a mailing address or an email address in the DMDC sample data file.

[b] Response rates were calculated as [number of submitted surveys / (number of released sample – ineligibles)] × 100. *Ineligibles* are defined as deceased.

Design Weights

As outlined above, the sample design for the 2018 HRBS sample involved segmentation of the eligible population into 50 strata based on the interaction of service branch, pay grade, and gender. Service members in the same stratum were randomly sampled with the same probability, although these probabilities differ across strata. A service member's design weight was the inverse of his or her probability of being selected for sampling. Specifically, the design weight was equal to the number of eligible individuals in the service member's respective stratum divided by the number that were selected for sampling from that stratum.

Nonresponse Weights

Nonresponse weights were also computed as inverse probability weights, where the probability of being a respondent was estimated using a statistical model. This process gave greater weight to those respondents who looked most similar to the nonrespondents across a large set of demographic and military characteristics. The process resulted in a set of analytic weights that

Table 2.5
Sampling Frame, Sample Size, and Response Rates, Marine Corps

	Total Sample Size	Primary Sample Size	Holdback Sample Size	Non-contacts[a]	Analytic Sample Size	Unweighted Response Rate (%)[b]	Weighted Response Rates (%)
Men							
E1–E4	24,663	18,497	6,166	951	544	2.2	2.2
E5–E6	7,199	5,399	1,800	3	521	7.2	7.2
E7–E9	2,424	1,834	590	1	414	17.1	17.1
W1–W5	411	292	119	0	74	18.0	18.0
O1–O3	2,235	1,676	559	8	263	11.8	11.8
O4–O6	1,154	866	288	1	248	21.5	21.5
Total	38,086	28,564	9,522	964	2,064	5.4	6.0
Women							
E1–E4	4,881	3,661	1,220	336	271	5.6	5.6
E5–E6	1,395	1,046	349	1	81	5.8	5.8
E7–E9	292	224	68	0	45	15.4	15.4
W1–W5	50	32	18	0	11	22.0	22.0
O1–O3	449	337	112	1	63	14.0	14.0
O4–O6	129	97	32	0	34	26.4	26.4
Total	7,196	5,397	1,799	338	505	7.0	7.3
Marine Corps total	45,282	33,961	11,321	1,302	2,569	5.7	6.1

[a] Noncontacts include sample members for whom we did not have either a mailing address or an email address in the DMDC sample data file.

[b] Response rates were calculated as [number of submitted surveys / (number of released sample – ineligibles)] × 100. *Ineligibles* are defined as deceased.

yielded an analytic sample that closely matched the full survey-eligible military population on a wide range of characteristics, as shown in Table 2.8.

The nonresponse weights were derived using the Toolkit for Weighting and Analysis of Nonequivalent Groups (TWANG) package (Ridgeway et al., 2014) in the R statistical programming language. This package uses a machine learning regression model, Generalized Boosted Models (GBM), to estimate each sampled individual's probability of being a respondent. GBM (Ridgeway, 2005) is a general, automated, data-adaptive modeling algorithm that can estimate the relationship between a variable of interest and a large number of covariates of mixed type, while also allowing for flexible nonlinear relationships between the covariates and the response propensity (Ridgeway, 2001; Friedman, 2001). This approach allows for flexible modeling and has been shown to improve on the performance of logistic regression (McCaffrey, Ridgeway, and Morral, 2004; Ridgeway and McCaffrey, 2007). Specifically, the model attempted to balance the design-weighted respondents to the full sample frame on all

Table 2.6
Sampling Frame, Sample Size, and Response Rates, Navy

	Total Sample Size	Primary Sample Size	Holdback Sample Size	Non-contacts[a]	Analytic Sample Size	Weighted Response Rate (%)[b]	Unweighted Response Rate (%)
Men							
E1–E4	13,294	9,970	3,324	26	288	2.2	2.2
E5–E6	10,857	8,143	2,714	12	767	7.1	7.1
E7–E9	2,932	2,191	741	0	538	18.3	18.3
W1–W5	160	128	32	0	26	16.3	16.3
O1–O3	2,926	2,195	731	6	361	12.3	12.3
O4–O6	1,890	1,418	472	5	527	27.9	27.9
Total	32,059	24,045	8,014	49	2,507	7.8	8.4
Women							
E1–E4	8,294	6,220	2,074	1	243	2.9	2.9
E5–E6	4,525	3,394	1,131	2	343	7.6	7.6
E7–E9	767	577	190	0	134	17.5	17.5
W1–W5	32	22	10	0	11	34.4	34.4
O1–O3	1,637	1,228	409	5	253	15.5	15.5
O4–O6	648	486	162	0	184	28.4	28.4
Total	15,903	11,927	3,976	8	1,168	7.3	8.0
Navy total	47,962	35,972	11,990	57	3,675	7.7	8.3

[a] Noncontacts include sample members for whom we did not have either a mailing address or an email address in the DMDC sample data file.

[b] Response rates were calculated as [number of submitted surveys / (number of released sample – ineligibles)] × 100. *Ineligibles* are defined as deceased.

the variables included in Table 2.8 as well as all two- and three-way interactions among those variables. The model iteration used for our weights was selected based on the ES.mean criteria in TWANG—i.e., minimizing the mean of the standardized differences between the distribution of respondents and nonrespondents. Thus, the GBM machine learning algorithm stopped when the weights achieved the best balance between the cumulative distributions of responders and nonresponders on all of the predictor variables in the model.

The resulting weights created a highly representative sample on many important characteristics, which reduced the threat of serious nonresponse biases in the data, but the weights did slightly decrease the precision of estimates based on the respondents. Specifically, the overall design effect (Kish, 1968) of the final analytic weight was 2.68. This implies that our sample of 17,166 respondents offers the statistical precision that would be achieved by a simple random sample of the population of 6,405 (17,166/2.68) when used to estimate characteristics of the entire active-duty force. However, the design effect is somewhat smaller when used to estimate characteristics of subgroups of the overall population (e.g., estimates among Marines).

Table 2.7
Sampling Frame, Sample Size, and Response Rates, Coast Guard

	Total Sample Size	Primary Sample Size	Holdback Sample Size	Non-contacts[a]	Analytic Sample Size	Unweighted Response Rate (%)[b]	Weighted Response Rate (%)
Men							
E1–E4	2,697	2,023	674	34	289	10.7	10.7
E5–E6	2,034	1,526	508	0	359	17.6	17.6
E7–E9	694	510	184	0	173	24.9	24.9
W1–W5	265	209	56	0	79	29.8	29.8
O1–O3	501	376	125	0	119	23.8	23.8
O4–O6	367	275	92	0	120	32.7	32.7
Total	6,558	4,919	1,639	34	1,139	17.4	18.1
Women							
E1–E4	906	680	226	18	157	17.3	17.3
E5–E6	639	479	160	0	175	27.4	27.4
E7–E9	131	97	34	0	44	33.6	33.6
W1–W5	46	36	10	0	11	23.9	23.9
O1–O3	359	269	90	0	114	31.8	31.8
O4–O6	160	120	40	0	57	35.6	35.6
Total	2,241	1,681	560	18	558	24.9	25.7
Coast Guard total	8,799	6,600	2,199	52	1,697	19.3	19.2

[a] Noncontacts include sample members for whom we did not have either a mailing address or an email address in the DMDC sample data file.

[b] Response rates were calculated as [number of submitted surveys / (number of released sample – ineligibles)] × 100. *Ineligibles* are defined as deceased.

All estimates based on the 2018 sample that are presented in this report account for the effect of these weights on both the means and the variances of the estimates.

Note that the generalizability of weighted HRBS findings to the population of survey-eligible service members is predicated upon a handful of assumptions. These include (1) that that the likelihood of a sampled service member responding to the survey (and with it, any meaningful differences between respondents and nonrespondents) is dependent only on characteristics that are observed for both respondents and nonrespondents (or, under further assumptions, characteristics for which population benchmarks exist)—this is also known as a missing-at-random assumption; (2) that all sampled respondents have a nonzero probability of responding to the survey; and (3) that the model used to quantify response propensities is of the correct form. Weighted analyses of survey data could be biased if these assumptions are not satisfied; however, it is difficult to assess the validity of these assumptions in practice.

Table 2.8
Balance Table for Nonresponse Weights

	Sample Frame Percentage	Weighted Respondents Percentage
Service branch		
Air Force	23.80	24.09
Army	35.17	34.48
Marine Corps	13.77	13.90
Navy	24.15	24.36
Coast Guard	3.11	3.17
Gender		
Men	83.66	83.31
Women	16.34	16.69
Pay grade		
E1–E4	42.74	42.40
E5–E6	29.43	29.80
E7–E9	9.81	9.82
W1–W5	1.52	1.50
O1–O3	10.15	10.14
O4–O6	6.35	6.34
Race/ethnicity		
Non-Hispanic white	57.90	57.63
Non-Hispanic black	16.14	16.18
Hispanic	15.81	15.99
Non-Hispanic Asian	5.41	5.56
Other	3.90	3.92
Marital status		
Married	55.51	55.51
Divorced, separated, or widowed	5.34	5.28
Never married	39.04	39.14
Education		
High school or less	64.33	64.41
Some college	12.82	12.82
College degree	21.56	21.61
Number of dependent children		
0	60.38	60.30

Table 2.8—Continued

	Sample Frame Percentage	Weighted Respondents Percentage
1	13.26	13.23
2	14.40	14.70
3+	11.96	11.78
DoD occupation code		
10	17.75	17.48
11	7.49	7.51
12	7.49	7.50
13	5.31	5.48
14	2.25	2.24
15	10.46	10.62
16	16.19	16.15
17	2.83	2.73
18	8.85	8.85
19	2.17	2.21
20	1.53	1.52
21	0.35	0.33
22	5.31	5.41
23	1.25	1.26
24	1.95	1.94
25	1.17	1.16
26	2.49	2.52
27	1.20	1.20
28	1.28	1.27
29	1.14	1.14
	Mean (standard deviation)	**Mean (standard deviation)**
Age in years	28.7 (7.6)	28.6 (8.6)
Armed Forces Qualification Test percentile	63.8 (18.2)	63.9 (18.1)
Months deployed since September 2001	6.2 (9.2)	6.2 (11.0)
Years of service	7.9 (6.7)	7.8 (8.2)

Missing Data and Imputation

Missing values present an obstacle to analysis of survey data. For instance, they can complicate multivariate analyses because, if left unaddressed, the analyst might be forced to use a complete case analysis wherein only cases that have observed data for all variables involved are used, resulting in the exclusion of some observed data. Furthermore, univariate analyses could be confounded by missing data because the unreported values might be systematically different from the reported ones. In this case, an analysis across only observed data might be biased. A common approach for addressing missing data is imputation (Little and Rubin, 2019), wherein a predictive model is used to replace missing values with ones that are statistically plausible. Imputation results in a data set that is more representative of the inferential population and makes more-efficient use of the available data for all cases, even where they did not complete every survey item. Furthermore, imputation can address bias when patterns of missingness are completely random or depend on observed data, but it does not prevent bias when patterns of missingness are dependent on unobserved data (Little and Rubin, 2019).

Missingness can occur through two primary means: (1) dropout, which occurs when an individual who began responding to the survey stops midway through and fails to return to complete the survey, and (2) refusal, which occurs when an individual fails to respond to a specific item on the survey but does respond to some subsequent items. The bulk of the missingness in the 2018 HRBS (approximately 94 percent) was due to dropout. Missingness rates in the data ranged from less than 0.1 percent for items appearing early in the survey to 7 percent for items that occurred later. For the 2015 HRBS, missing data were not addressed in a rigorous manner, which is a reasonable approach in settings where rates of missingness are small. However, to improve the rigor and defensibility of findings from HRBS data, it was determined that missing data for the 2018 HRBS would be imputed. The active and reserve components were imputed jointly, although component status was used as a predictor in the imputation model. We created and analyzed a single imputed data set in lieu of multiple ones because the rates of missingness were not deemed high enough to warrant the use of the complex analytical tools needed to produce estimates from multiply imputed data.

Imputations were created using mice in R (Van Buuren and Groothuis-Oudshoorn, 2011), which allows its user to specify the imputation method used for each variable (e.g., gaussian imputation, logistic imputation, polytomous imputation, predictive mean matching [PMM]) as well as the dependencies for each variable that is to be imputed. We used PMM (Little, 1988) to impute binary, ordinal, and continuous variables, whereas polytomous regression was used to impute categorical data. Logistic regression was not used as a manner of imputing binary data because it performed poorly for imputing variables with sparse distributions, which are common in HRBS data. Particular attention was paid to the complicated skip logic that underpins the HRBS survey instrument. Furthermore, a sequentially specified imputation model (in lieu of a fully specified one) was needed to prevent divergence across iterations of the Markov chain Monte Carlo (MCMC) procedure employed within mice. For final imputations, five iterations of MCMC were used, as this is recommended within existing literature (White, Royston and Wood, 2011; Van Buuren and Groothuis-Oudshoorn, 2011). More details about the imputation procedure can be found in Appendix E.

Analysis Approach

All analyses, unless otherwise noted, used the analytic weights and imputations previously described. Variance inflation due to weighting was handled by using the survey procedures of SAS 9.4 when producing our summary statistics. Confidence intervals (CIs) for estimates were computed using the Wald method.

Comparisons Across Military Subpopulations

In most circumstances, differences in each outcome were tested across levels of key factors or by subgroups (service branch, pay grade, and gender; see Chapter Three).[6] This was done in a two-step procedure that was designed to ensure that significance testing maintained a 0.05 probability of any false positive (Type I) error across all of the pairwise comparisons on a single outcome implied by the levels of each factor. This correction for family-wise error, or multiple testing, was done separately for each outcome and for each factor that defined separate military subpopulations. For example, there are ten possible pairwise comparisons across the five military service branches. When analyzing a single outcome, we wished to conduct significance testing in a manner than ensured a 0.05 probability of any false positive across those ten comparisons. To do this, we first used the Rao-Scott chi-square test as an overall test of the relationship between the outcome and the factor. This tests the hypothesis that there is any difference in the outcome across all levels of the factor. If this test concluded that there was a $p < 0.05$ significant relationship between the outcome and the factor, then we attempted to identify the levels of the factor in which the outcome differed by constructing all possible pairwise comparisons of the outcome across the levels of the factor. We used a simple t-test and adjusted the p values for multiple comparisons using the Tukey-Kramer adjustment (Tukey, 1953), which is designed to account for the multiple testing associated with all possible pairwise comparisons across factor levels.

In cases where one or more subgroup had a zero on a particular outcome, those subgroups were omitted from the computation of the Rao-Scott chi-square text and were not included in pairwise comparisons. In cases where estimates were suppressed (see the "Suppression of Results" section later in this chapter), we omitted subgroups that had suppressed estimates in pairwise comparisons.

It is worth noting that our corrections for familywise error due to multiple comparisons were done separately for each outcome and were only conducted when testing for equality across military subpopulations. Because the report covers a wide range of outcomes and the analyses were designed to meet the needs of a diverse audience, the report contains significance tests for a very broad range of possible hypotheses of interest. Although the procedures used were designed to produce significance testing with a 0.05 probability of a false positive when the null hypothesis was true for each individual test, if the reader draws conclusions that depend on inferences across a large number of tests, these procedures will not result in a 0.05 probability of a false positive that any of the tests are significant. For example, if we tested for gender differences across 40 separate outcomes, each of these tests would have a 0.05 probability of a false positive, but the probability that one or more of the 40 tests would result in a false positive would be considerably higher than 0.05. If the reader wishes to control for familywise error across a specific set of tests that are being interpreted together, we would encourage

[6] Results by race/ethnicity and age groups can be found in Appendix D.

them to perform a Bonferroni correction (Dunn, 1961) across the relevant family of tests to rescale the *p* values that we presented in a way that controls for familywise Type 1 error. The reader should bear in mind, however, that such techniques are known to apply a very strict threshold for statistical significance (especially when considered across a large number of tests) and, as such, could lead to a large number of false negatives. Therefore, procedures that instead control the false discovery rate (e.g., Benjamini and Hochberg, 1995) should be considered as well.

Comparisons with Healthy People 2020 Objectives

For roughly the past 30 years, the Office of Disease Prevention and Health Promotion has developed a set of evidence-based objectives aimed at improving the health of American citizens. Benchmarks are established for ten-year cycles, and the current set of goals is outlined in HP2020. Department of Defense Instruction (DoDI) 1010.10 states that it is department policy to "[s]upport the achievement of the Department of Health and Human Services' vision for improving the health of all Americans as outlined in Healthy People 2020." As such, where possible, the authors have compared results from the 2018 HRBS with HP2020 objectives. In some cases, which are identified in subsequent chapters of the report, the comparability of measures between the HRBS and HP2020 objectives was not exact because of differences between HRBS data and the data used in the construction of HP2020 objectives. In addition, we caution readers that making direct comparisons between the military and civilian populations ignores the fact that the two groups are very different on some sociodemographic characteristics (e.g., gender, age) related to the health outcomes and health behaviors of interest.

Comparison with the 2015 HRBS

Tracking trends in the health and health behavior of service members can help policymakers, senior DoD and Coast Guard leadership, and practitioners identify areas that deserve further attention. However, the ability to track trends depends on whether the data are comparable over time, and, in survey work, that comparability can be impacted by both how survey items are worded, and the way surveys are administered. The 2018 HRBS is significantly different from the 2015 version in several ways, including item wording and implementation. *Thus, we strongly caution readers not to directly compare results from earlier versions of the HRBS, including the 2015 edition, with the 2018 edition*. Doing so could result in making erroneous conclusions about why changes in health and behaviors have occurred over time. Differences between earlier surveys and the 2018 survey could be the result of a number of factors, including changes in underlying population demographics, actual changes in behavior, or methodological differences across surveys.

This report does present some select comparisons between the 2015 and 2018 HRBSs. In these cases, item wording was identical across surveys. Because of several differences in the sampling and weighting across the two surveys, it is possible that shifts in the weighted estimates could occur because of those changes. We attempted to minimize the risk of such methodological artifacts by comparing the two survey years using regression models, in which we simultaneously controlled for many of the demographic differences across the two samples. Regression models controlled for survey year, respondent age at time of survey, marital status, gender, pay grade, service branch, and race/ethnicity and included a series of interaction terms between survey year and service branch, pay grade, and gender, as well a series of interactions between service branch, pay grade, and gender.

Comparative results across years used adjusted risk ratios (ARRs) based on these regression models and are embedded within each substantive chapter. The relative risk ratio can be interpreted as the multiplicative factor by which the estimate changed in the 2018 HRBS relative to the 2015 HRBS. For example, an ARR of 1.2 implies a 20-percent increase in that outcome over time. When interpreting ARRs and percentage changes across surveys, it is important to keep in mind what the base for that increase is. That is, an ARR of 0.2, or a 20-percent increase for an outcome with a 2015 prevalence of 2 percent, represents a much smaller increase in absolute value than the same ARR and percentage increase for an outcome with a 2015 prevalence of 25 percent (0.4 versus 5.0 percent). Thus, extremely large percentage increases (or decreases) across surveys are often substantively small, while the ARR and percentage change appear quite large.

We only present statistically significant ARRs for four sets of comparisons: overall (i.e., across the entire sample), by service branch, by pay grade, and by gender. Subgroup analyses can be interpreted as the difference within that particular group across surveys (e.g., the Army in 2015 versus the Army in 2018, junior enlisted personnel in 2015 versus junior enlisted personnel in 2018, and women in 2015 versus women in 2018). It is possible that, for some outcomes, the overall sample difference between 2015 and 2018 is statistically significantly different, but subgroup differences are not. For example, differences may exist within some or all of the five service branches that, *in the aggregate*, differ from the 2015 survey, but *within* each branch, the difference between the 2015 and 2018 surveys may not meet the significance threshold. For a small group of outcomes with very low prevalence (e.g., suicide attempt, marijuana and drug use, and unintended pregnancy), we present only results for the overall sample and do not present differences by service branch, pay grade, and gender.[7]

To be clear, none of the comparisons between the 2015 and 2018 surveys presented in this report are based on simple comparisons of raw percentages between the two survey years.

Suppression of Results

In some cases, point estimates and/or CIs are not shown in the tables. We do this for two reasons. First, and as noted earlier, we suppressed estimates to protect the confidentiality of respondents. And second, we suppressed estimates to identify when estimates might be so unstable as to not be considered reliable. In the first case of suppression, both point estimates and CIs were suppressed when fewer than 15 service members were included in the denominator of any given cell—that is, when the eligible population is fewer than 15. In the second case of suppression, CIs, but not point estimates, are provided. This occurs when the half-width of a CI is 15 percent or greater (i.e., greater than the point estimate itself). As noted earlier, in cases where estimates were suppressed, we omitted subgroups who had suppressed estimates in pairwise comparisons.

Limitations

The 2018 HRBS is not without limitations. First, as with any self-report survey, social desirability bias is always a possibility, especially when topics may be sensitive or unflattering to

[7] Note that the low-prevalence model drops the interactions between service branch, pay grade, and gender. Full model results are available from the authors.

the respondent. Second, though higher than in 2015, the response rate for the 2018 is still considered low for survey research. Although low response rates do not automatically mean that survey data are biased, low response rates do increase the probability of bias. The direction of this possible bias, however, is unclear. One way we addressed this potential bias with respect to nonresponse was through the use of weights. Third, for some groups that make up a smaller percentage of the overall DoD population (e.g., warrant officers, non-Hispanic Asian service members), CIs of our estimates may be larger, indicating a lower level of precision in the estimate. Thus, these results should be interpreted with caution. Fourth, direct comparisons between civilians and active component service members might not be appropriate given demographic difference between the two populations. And fifth, comparisons with prior HRBSs are not recommended given the substantial methodological differences over time; where appropriate, we do make comparisons between the 2015 and 2018 HRBSs.

CHAPTER THREE

Demographics

This chapter presents key demographics of the 2018 HRBS active component weighted respondent sample and is designed to provide context for the substantive chapters that follow. The companion report to this one provides similar context for the 2018 HRBS reserve component weighted respondent sample.[1] Of the overall 2018 HRBS weighted sample, 62.6 percent are in the active component, and 37.4 percent are in the reserve component.

Service Branch, Pay Grade, and Gender

Table 3.1 presents the distribution of the weighted 2018 HRBS active component sample (with and without the Coast Guard included—columns one and two, respectively[2]) by the three characteristics used for sampling: service branch, pay grade, and gender. The final column in the table compares the weighted 2018 HRBS with the 2017 DoD active-duty population.[3] Not surprisingly, the weighted 2018 HRBS sample (excluding the Coast Guard) looks almost identical to the DoD population because the weights were designed to do just that.

According to both the 2018 HRBS weighted respondent sample and the 2017 DoD population, the largest service is the Army (roughly one-third of all active component service members), followed by the Navy, Air Force, and Marine Corps. The majority of active-duty service members are junior enlisted personnel in the ranks of E1 to E4 (43.8 percent), followed by those in the E5 and E6 pay grades (28.8 percent), junior officers in pay grades O1 to O3 (10.0 percent), senior enlisted officers in the pay grades of E7 to E9 (9.6 percent), mid-grade officers in the pay grades O4 to O6 (6.3 percent), and warrant officers in all grades (1.4 percent). Approximately 85 percent of DoD active-duty service members are men.

Although the Coast Guard is not included in Table 3.1, we also examined the pay grade and gender distribution in that service branch. Like the DoD services, the U.S. Coast Guard is predominantly composed of junior enlisted personnel (35.1 percent), followed by mid-grade enlisted (E5 and E6; 32.5 percent), senior enlisted (11.2 percent), junior officers (10.4 percent), mid-grade officers (6.5 officers), and warrant officers (4.3 percent). The gender distribution

[1] See Meadows et al., 2021. Note that the HRBS sampled only from the select reserve.

[2] The Coast Guard is not managed by DoD but rather by the Department of Homeland Security and, thus, would not be included in the DoD column's total.

[3] We used FY 2017 data for two reasons. First, this time period coincided with the timing of sample selection. Second, comparable FY 2018 data were not available at the time of the writing of this report. Also note that the DMDC data we use here are for service members on active duty, not the active component. Therefore, some of the service members included in the DoD population percentages are activated reservists.

Table 3.1
Distribution of Service Branch, Pay Grade, and Gender in the 2018 HRBS Active Component Weighted Respondent Sample, with 2017 DoD Comparison

	2018 HRBS Weighted Respondent Sample With Coast Guard (%)	2018 HRBS Weighted Respondent Sample Without Coast Guard (%)	2017 DoD Active-Duty Population (%)
Service branch			
Air Force	24.1	24.9	24.6
Army	34.5	35.6	36.5
Marine Corps	13.9	14.4	14.2
Navy	24.4	25.2	24.7
Coast Guard	3.2	Excluded[a]	NA[b]
Pay grade			
E1–E4	42.4	42.6	43.8
E5–E6	29.8	29.7	28.8
E7–E9	9.8	9.8	9.6
W1–W5	1.5	1.4	1.4
O1–O3	10.1	10.1	10.0
O4–O6[c]	6.3	6.3	6.3
Gender			
Men	83.3	83.3	83.8
Women	16.7	16.7	16.2

SOURCES: Information in the first two columns comes from the 2018 HRBS; the third column is from DMDC, *DMDC Active Duty Military Personnel Master File (September 2017)*, Washington, D.C.: Office of the Deputy Assistant Secretary of Defense for Military Community and Family Policy, 2018.

[a] Coast Guard data were not included in this calculation.

[b] NA = not applicable. DoD does not maintain demographic information about the Coast Guard.

[c] Officers above the rank of O6 were excluded from the HRBS sample. They make up less than 1 percent of the DoD total.

of the Coast Guard is similar to that of the DoD services: 84.7 percent men and 15.3 percent women.

Tables 3.2 and 3.3 present other cross-tabulations based on the sample strata variables that may be of interest (i.e., service branch, pay grade, and gender). Note that these tables do not include CIs or use significance tests because the respondent sample was weighted to exactly match the sampling frame on service branch, pay grade, and gender. These variables are taken from DMDC personnel files. Key findings include the following:

Table 3.2
Pay Grade and Gender by Service Branch, Weighted Respondent Sample

	Air Force (%)	Army (%)	Marine Corps (%)	Navy (%)	Coast Guard (%)
Pay grade					
E1–E4	40.4	41.4	57.0	38.4	35.1
E5–E6	30.7	27.4	23.9	35.3	32.5
E7–E9	9.8	10.9	7.5	9.5	11.2
W1–W5	NA[a]	3.1	1.4	0.4	4.3
O1–O3	11.1	10.8	6.8	10.1	10.4
O4–O6	8.0	6.4	3.4	6.3	6.5
Gender					
Men	80.7	84.0	90.4	80.6	84.7
Women	19.3	16.0	9.6	19.4	15.3

NOTE: All data are weighted.

[a] NA = not applicable. The Air Force does not use warrant officers.

Table 3.3
Gender by Pay Grade, Weighted Respondent Sample

	E1–E4 (%)	E5–E6 (%)	E7–E9 (%)	W1–W5 (%)	O1–O3 (%)	O4–O6 (%)
Men	81.1	85.5	87.6	90.6	80.2	84.1
Women	18.9	14.5	12.4	9.4	19.8	15.9

NOTE: All data are weighted.

- The Marine Corps is the service branch with the largest proportion of junior enlisted personnel. More than half of the force is in the pay grades of E1 to E4 (Table 3.2).
- The Marine Corps has the smallest percentage of women, while the Navy has the largest, followed closely by the Air Force (Table 3.2).
- The percentage of women declines with increasing seniority for both enlisted personnel and officers, while the reverse is true for men (Table 3.3). This is consistent with observed trends in retention by gender (DoD, 2017).

Age

Age in years was obtained from DMDC personnel data files and calculated as of September 1, 2018. Table 3.4 presents the percentage of service members in each age group in the full 2018 HRBS weighted respondent sample and by service branch, Table 3.5 presents age groups by pay grade, and Table 3.6 presents age groups by gender. Key findings include the following:

- The Marine Corps has the largest population of young service members (Table 3.4), consistent with the finding that it also has the largest population of junior enlisted service

Table 3.4
Age Groups by Service Branch, Weighted Respondent Sample

	Air Force	Army	Marine Corps	Navy	Coast Guard
Ages 17–24	33.2% (31.8–34.7)	33.5% (30.6–36.4)	60.6% (58.1–63.1)	37.0% (34.1–39.9)	24.8% (21.9–27.6)
Ages 25–34	43.5% (42.0–45.0)	41.9% (39.5–44.4)	27.5% (25.3–29.7)	40.8% (38.3–43.2)	39.0% (36.3–41.7)
Ages 35–44	20.3% (19.2–21.4)	19.3% (17.9–20.7)	10.1% (9.1–11.1)	18.1% (16.8–19.4)	30.7% (28.3–33.1)
Ages 45+	3.0% (2.6–3.4)	5.3% (4.7–5.9)	1.8% (1.5–2.1)	4.1% (3.7–4.6)	5.5% (4.5–6.5)

NOTES: Ages are as of September 1, 2018. All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.5
Age Groups by Pay Grade, Weighted Respondent Sample

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Ages 17–24	75.8% (74.0–77.6)	13.6% (11.9–15.3)	NA[a]	NA[a]	15.7% (13.4–17.9)	NA[a]
Ages 25–34	23.2% (21.5–25.0)	67.8% (66.0–69.7)	19.8% (17.2–22.4)	21.3% (14.6–28.0)	67.9% (65.4–70.3)	11.3% (9.8–12.9)
Ages 35–44	0.9% (0.6–1.1)	17.2% (16.1–18.4)	69.8% 67.3–72.4)	60.4% (53.8–67.0)	14.3% (12.8–15.7)	57.1% (54.9–59.3)
Ages 45+	0.1% (0.0–0.3)	1.3% (1.0–1.7)	10.4% (9.3–11.5)	18.3% (14.3–22.3)	2.2% (1.2–3.2)	31.6% (29.6–33.6)

NOTES: Ages are as of September 1, 2018. All data are weighted. 95-percent CIs are presented in parentheses.
[a] NA = not applicable. No respondents in the cell.

Table 3.6
Age Groups by Gender, Weighted Respondent Sample

	Men	Women
Ages 17–24	36.9% (35.3–38.4)	42.4% (40.2–44.5)
Ages 25–34	40.0% (38.7–41.4)	39.3% (37.5–41.2)
Ages 35–44	18.9% (18.2–19.7)	15.3% (14.3–16.3)
Ages 45+	4.2% (3.9–4.5)	3.0% (2.6–3.5)

NOTES: Ages are as of September 1, 2018. All data are weighted. 95-percent CIs are presented in parentheses.

members. The Air Force, Army, and Coast Guard have higher percentages of service members over age 35.
- As expected, age and pay grade are positively related such that the higher one's pay grade, the higher their age (Table 3.5).
- The gender distribution by pay grade skews somewhat to the left for women and right for men (Table 3.6). This is also consistent with observed trends in retention by gender (DoD, 2017).

Race/Ethnicity

Respondents' racial/ethnic statuses were also taken from DMDC personnel files. Race/ethnicity is hierarchically coded such that ethnicity (i.e., Hispanic) is coded first and outweighs any other racial category. The other racial/ethnic group includes those who selected multiple racial groups but did not also select Hispanic as their ethnicity. Table 3.7 presents race/ethnicity by service branch, Table 3.8 by pay grade, and Table 3.9 by gender. Key findings include the following:

- The Coast Guard has the highest percentage of non-Hispanic white members, while the Army and the Navy have the lowest (Table 3.7). Hispanic and non-Hispanic black are the two most prevalent minority racial/ethnic groups across all the service branches.
- Racial/ethnic diversity decreases as pay grade increases, though this is more apparent in the officer ranks (Table 3.8).
- Servicewomen are more diverse than servicemen, with a larger percentage of service members identifying as a member of a racial/ethnic minority group (Table 3.9).

Table 3.7
Race/Ethnicity by Service Branch, Weighted Respondent Sample

	Air Force	Army	Marine Corps	Navy	Coast Guard
Non-Hispanic white	64.1% (62.7–65.5)	54.3% (51.7–56.9)	59.8% (57.0–62.6)	54.3% (51.7–56.9)	73.4% (70.8–76.0)
Non-Hispanic black	13.2% (12.2–14.3)	21.7% (19.5–23.9)	12.2% (10.3–14.1)	15.4% (13.5–17.4)	4.7% (3.4–6.1)
Hispanic	14.7% (13.7–15.8)	15.5% (13.5–17.5)	22.3% (19.8–24.7)	15.3% (13.5–17.2)	11.8% (10.0–13.5)
Non-Hispanic Asian	3.9% (3.4–4.4)	7.3% (6.1–8.5)	3.2% (2.3–4.1)	6.6% (5.5–7.7)	3.1% (1.8–4.3)
Other	4.0% (3.4–4.6)	1.1% (0.6–1.7)	2.6% (1.8–3.4)	8.4% (7.00–9.7)	7.0% (5.6–8.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.8
Race/Ethnicity by Pay Grade, Weighted Respondent Sample

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Non-Hispanic white	52.4% (50.0–54.7)	54.9% (52.9–56.8)	58.7% (56.4–60.9)	67.3% (61.4–73.2)	76.4% (74.2–78.5)	78.7% (76.9–80.6)
Non-Hispanic black	17.9% (16.0–19.8)	18.2% (16.5–19.8)	19.0% (17.2–20.8)	12.9% (8.8–17.0)	6.9% (5.5–8.3)	8.3% (7.0–9.5)
Hispanic	20.5% (18.6–22.4)	15.8% (14.4–17.3)	14.2% (12.7–15.8)	10.4% (6.6–14.2)	7.7% (6.5–9.0)	5.6% (4.5–6.6)
Non-Hispanic Asian	6.0% (4.9–7.00)	5.8% (5.0–6.6)	4.8% (3.9–5.7)	4.0% (2.00–5.9)	5.4% (4.3–6.5)	4.1% (3.2–4.9)
Other	3.3% (2.5–4.0)	5.3% (4.5–6.1)	3.3% (2.5–4.1)	5.4% (2.5–8.4)	3.6% (2.7–4.5)	3.3% (2.4–4.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.9
Race/Ethnicity by Gender, Weighted Respondent Sample

	Men	Women
Non-Hispanic white	60.2% (58.8–61.6)	47.1% (45.2–49.1)
Non-Hispanic black	14.7% (13.6–15.8)	24.2% (22.2–26.1)
Hispanic	15.8% (14.7–16.9)	17.6% (16.0–19.2)
Non-Hispanic Asian	5.6% (5.0–6.2)	5.7% (4.9–6.5)
Other	3.7% (3.2–4.1)	5.4% (4.5–6.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Education

Respondent education was derived from DMDC personnel files. Categories were collapsed into three groups: high school or less (including those with a General Educational Development [GED] certificate or high school diploma), some college (including an associate's degree), and bachelor's degree or more (including all advanced and professional degrees, such as a master's, Ph.D., or M.D.). Education level is presented by service branch in Table 3.10, by pay grade in Table 3.11, and by gender in Table 3.12. Key findings include the following:

- The largest educational attainment group across all service branches is high school or less, with the Marine Corps having the most members in this category (Table 3.10). The Air Force has the largest percentage of members with a bachelor's degree or more, followed closely by the Army.

Table 3.10
Education Level by Service Brach, Weighted Respondent Sample

	Air Force	Army	Marine Corps	Navy	Coast Guard
High school or less	54.4% (52.9–55.9)	57.9% (55.5–60.2)	85.6% (84.3–86.9)	73.9% (72.2–75.6)	69.9% (67.5–72.3)
Some college	19.2% (18.1–20.4)	16.3% (14.8–17.7)	2.7% (2.0–3.3)	7.8% (6.8–8.8)	14.3% (12.4–16.1)
Bachelor's degree or more	26.4% (25.2–27.6)	25.9% (24.2–27.6)	11.7% (10.6–12.9)	18.3% (16.9–19.6)	15.8% (14.0–17.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.11
Education Level by Pay Grade, Weighted Respondent Sample

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
High school or less	92.0% (91.0–92.9)	69.0% (67.4–70.6)	40.0% (37.7–42.4)	16.6% (13.1–20.0)	7.8% (6.5–9.2)	0.9% (0.6–1.1)
Some college	4.0% (3.2–4.7)	22.4% (20.9–23.9)	34.7% (32.5–36.9)	51.1% (44.6–57.7)	3.2% (2.3–4.2)	0.6% (0.3–0.8)
Bachelor's degree or more	4.1% (3.4–4.7)	8.6% (7.8–9.4)	25.3% (23.5–27.1)	32.3% (26.3–38.3)	88.9% (87.3–90.5)	98.6% (98.2–98.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.12
Education Level by Gender, Weighted Respondent Sample

	Men	Women
High school or less	65.9% (64.8–67.1)	61.4% (59.6–63.2)
Some college	12.9% (12.2–13.7)	13.3% (12.2–14.4)
Bachelor's degree or more	21.2% (20.3–22.0)	25.3% (23.9–26.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

- As expected, as pay grade increases, the percentage of service members with more-advanced educational experience also increases (Table 3.11). The most prevalent educational group among junior enlisted is high school or less, whereas for senior officers it is a bachelor's degree or more.
- The largest education group for both men and women is high school or less.

Marital Status

Marital status was derived from a single survey item on the 2018 HRBS. Table 3.13 (by service branch), Table 3.14 (by pay grade), and Table 3.15 (by gender) show the percentage of service members falling into each of the following categories: married; cohabiting (living together but not married); never married; and separated, divorced, or widowed. Key findings include the following:

- Across all service branches, married is the most common marital status, followed by never married (Table 3.13). The Coast Guard has the highest percentage of married members, and the Marine Corps has the lowest.
- More senior enlisted personnel and officers are married than are junior officers and enlisted (Table 3.14).
- More men than women are married, but more women than men are separated, divorced, or widowed (Table 3.15).

Table 3.13
Marital Status by Service Branch, Weighted Respondent Sample

	Air Force	Army	Marine Corps	Navy	Coast Guard
Married	55.3% (53.8–56.8)	58.4% (55.7–61.0)	45.2% (42.4–48.0)	49.9% (47.3–52.5)	61.2% (58.3–64.0)
Cohabiting	7.4% (6.5–8.2)	5.2% (3.9–6.5)	11.8% (9.7–13.9)	9.7% (8.0–11.4)	6.6% (5.2–8.1)
Never married	30.7% (29.3–32.1)	29.4% (26.7–32.0)	40.1% (37.2–43.1)	33.7% (30.9–36.5)	25.8% (23.1–28.5)
Separated, divorced, or widowed	6.6% (5.9–7.4)	7.1% (5.9–8.3)	2.9% (2.3–3.5)	6.7% (5.5–7.8)	6.4% (5.0–7.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.14
Marital Status by Pay Grade, Weighted Respondent Sample

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Married	32.3% (30.2–34.5)	65.0% (63.1–66.9)	82.0% (79.7–84.3)	84.3% (79.1–89.6)	58.4% (55.9–61.0)	86.6% (85.2–88.1)
Cohabiting	11.2% (9.8–12.7)	6.4% (5.4–7.4)	3.3% (2.5–4.1)	0.8% (0.1–1.6)	6.6% (5.3–7.8)	1.7% (1.2–2.3)
Never married	53.4% (51.0–55.7)	18.6% (17.0–20.2)	4.0% (3.1–4.8)	5.3% (1.3–9.4)	31.1% (28.6–33.6)	5.3% (4.4–6.1)
Separated, divorced, or widowed	3.1% (2.3–3.8)	10.0% (8.8–11.1)	10.8% (8.6–12.9)	9.5% (5.6–13.3)	3.9% (3.0–4.7)	6.4% (5.3–7.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.15
Marital Status by Gender, Weighted Respondent Sample

	Men	Women
Married	55.6% (54.1–57.0)	45.1% (43.1–47.1)
Cohabiting	7.5% (6.7–8.4)	8.9% (7.8–10.1)
Never married	31.6% (30.1–33.0)	34.8% (32.8–36.9)
Separated, divorced, or widowed	5.3% (4.7–5.9)	11.1% (10.0–12.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Parental (or Dependent) Status

Whether a respondent was a parent, defined here as whether the service member had a DoD-defined dependent under the age of 18, was derived from DMDC personnel data, specifically the Defense Enrollment Eligibility Reporting System file. Table 3.16 presents the percent of respondents who have a dependent in the DoD record system by service branch, Table 3.17 presents results by pay grade, and Table 3.18 presents results by gender. Key findings include the following:

- The Army and Coast Guard had the largest percentage of members who were parents (by our definition), and the Marine Corps had the smallest (Table 3.16).
- Age and having a dependent are positively correlated, with more older than younger service members having at least one DoD dependent (Table 3.17).
- More men than women had at least one DoD dependent (Table 3.18).

Table 3.16
Dependent Status by Service Branch, Weighted Respondent Sample

	Air Force	Army	Marine Corps	Navy	Coast Guard
Dependent in household	39.9% (38.5–41.4)	45.6% (43.1–48.2)	27.3% (25.2–29.4)	37.3% (35.1–39.6)	46.0% (43.2–48.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.17
Dependent Status by Pay Grade, Weighted Respondent Sample

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Dependent in household	13.0% (11.4–14.6)	53.9% (52.0–55.9)	85.4% 83.2–87.6)	84.9% (79.6–90.2)	31.6% (29.4–33.8)	82.9% (81.4–84.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.18
Dependent Status by Gender, Weighted Respondent Sample

	Men	Women
Dependent in household	41.3% (40.0–42.6)	31.6% (29.8–33.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Housing Status

Finally, one item asked service members to indicate where they lived at the time of the survey, including both on and off installation options. Table 3.19 (by service branch), Table 3.20 (by pay grade), and Table 3.21 (by gender) show the percentage of service members living outside a military installation (including privatized military housing, personally mortgaged housing, and rental housing), on an installation in dorms or barracks, in other housing on an installation (including privatized military housing), and in some other housing situation (including with parents or in temporary housing). Key findings include the following:

- The majority of all service members lived in off-installation housing, with the exception of Marines, who were more likely to live on an installation (either in dorms or barracks or other types of housing; Table 3.19).
- More junior enlisted service members lived on installations, especially in dorms or barracks, than did more-senior enlisted personnel or officers (Table 3.20).
- Both men and women were more likely to live off an installation (Table 3.21).

Table 3.19
Housing Status by Service Branch, Weighted Respondent Sample

	Air Force	Army	Marine Corps	Navy	Coast Guard
Off-installation housing	67.0% (65.6–68.5)	51.6% (49.0–54.2)	37.2% (34.6–39.8)	69.4% (66.6–72.2)	88.8% (86.9–90.6)
Dorms or barracks on an installation	16.0% (14.9–17.1)	26.8% (24.1–29.5)	42.8% (39.8–45.8)	18.4% (15.8–21.0)	4.6% (3.3–5.9)
Other on-installation housing	16.2% (15.1–17.3)	18.5% (16.7–20.4)	16.5% (14.5–18.4)	7.6% (6.3–8.9)	5.3% (4.1–6.5)
Other housing situation	0.8% (0.5–1.1)	3.1% (1.9–4.3)	3.5% (2.3–4.8)	4.6% (3.0–6.2)	1.3% (0.7–1.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.20
Housing Status by Pay Grade, Weighted Respondent Sample

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Off-installation housing	34.3% (32.2–36.4)	72.5% (70.7–74.4)	77.5% (75.5–79.4)	77.0% (71.5–82.6)	85.1% (83.3–86.9)	83.2% (81.5–84.9)
Dorms or barracks on an installation	49.2% (46.9–51.6)	7.4% (6.2–8.6)	2.5% (1.8–3.2)	2.7% (0.0–5.4)	2.6% (1.8–3.5)	0.5% (0.3–0.8)
Other on-installation housing	11.9% (10.4–13.3)	17.8% (16.3–19.3)	18.9% (17.1–20.7)	18.4% (13.5–23.2)	11.4% (9.8–13.0)	15.6% (13.9–17.2)
Other housing situation	4.6% (3.3–5.8)	2.3% (1.5–3.1)	1.2% (0.7–1.7)	1.9% (0.0–3.9)	0.8% (0.4–1.3)	0.7% (0.3–1.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Table 3.21
Housing Status by Gender, Weighted Respondent Sample

	Men	Women
Off-installation housing	58.0% (56.5–59.4)	63.2% (61.1–65.3)
Dorms or barracks on an installation	23.8% (22.3–25.3)	23.0% (20.9–25.0)
Other on-installation housing	15.1% (14.2–16.1)	11.9% (10.6–13.2)
Other housing situation	3.1% (2.4–3.8)	1.9% (1.2–2.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

Overall Sample Description

Below we examine the overall sample by the demographic characteristics explored above. In the first column, we present the results based only on the DoD service branches (Air Force, Army, Marine Corps, and Navy). The second column of Table 3.22 includes the Coast Guard in the total calculations.

Table 3.22
Overall Weighted Sample Description

	2018 HRBS Weighted Respondent Sample With Coast Guard (%)	2018 HRBS Weighted Respondent Sample Without Coast Guard (%)
Age group[a]		
Ages 17–24	37.8% (36.4–39.1)	38.2% (36.8–39.6)
Ages 25–34	39.9% (38.8–41.1)	40.0% (38.8–41.1)
Ages 35–44	18.3% (17.7–19.)	17.9% (17.3–18.6)
Ages 45+	4.0% (3.7–4.2)	3.9% (3.7–4.2)
Racial/ethnic group		
Non-Hispanic white	58.0% (56.8–59.3)	57.5% (56.3–58.8)
Non-Hispanic black	16.3% (15.3–17.3)	16.7% (15.7–17.7)
Hispanic	16.1% (15.2–17.0)	16.2% (15.3–17.2)
Non-Hispanic Asian	5.6% (5.1–6.1)	5.7% (5.2–6.2)
Other	3.9% (3.5–4.4)	3.8% (3.4–4.3)
Education		
High school or less	65.2% (64.2–66.2)	65.0% (64.0–66.0)
Some college	13.0% (12.3–13.6)	12.9% (12.3–13.6)
Bachelor's degree or more	21.9% (21.1–22.6)	22.1% (21.3–22.8)
Marital status		
Married	53.8% (52.6–55.1)	53.6% (52.3–54.9)
Cohabiting	7.8% (7.1–8.5)	7.8% (7.1–8.5)
Never married	32.1% (30.9–33.4)	32.3% (31.0–33.6)
Separated, divorced, or widowed	6.3% (5.7–6.8)	6.3% (5.7–6.8)
Parent (has DoD dependent)	39.7% (38.6–40.8)	39.5% (38.3–40.7)

Table 3.22—Continued

	2018 HRBS Weighted Respondent Sample With Coast Guard (%)	2018 HRBS Weighted Respondent Sample Without Coast Guard (%)
Housing status		
Off installation housing	58.8% (57.6–60.1)	57.9% (56.5–59.2)
Dorms or barracks on an installation	23.7% (22.4–24.9)	24.3% (23.0–25.6)
Other on-installation housing	14.6% (13.8–15.4)	14.9% (14.1–15.7)
Other housing situation	2.9% (2.3–3.5)	2.9% (2.3–3.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Age as of September 1, 2018.

Summary

Use of postratification weights ensured that the 2018 HRBS weighted respondent sample matched the three factors that were included in the sampling design: service branch, pay grade, and gender. The Army was the largest service branch represented in the weighted sample (and in DoD), followed by the Navy, Air Force, and Marine Corps. The Coast Guard was the smallest service. Junior enlisted service members outnumbered their more-senior enlisted colleagues and outnumber junior, mid-grade, and warrant officers. Almost five times as many men as women served in the active component. The average HRBS respondent was under the age of 35, non-Hispanic white, married with no DoD dependent, living off an installation, and had at least a high school degree.[4] In reviewing the rest of the results presented in this report, it is important to keep in mind that each of the service branches, including the Coast Guard, has a unique demographic profile. Differences in certain key characteristics, like age and gender, can impact health and health behaviors.

[4] Readers of the 2015 HRBS final report (Meadows et al., 2018) may notice that the mean educational category in that survey was "some college." Because the 2018 HRBS uses DoD personnel data from administrative records, it might not accurately represent a service member's current level of educational attainment. Thus, many service members who appear to have only a high school degree in our data could very well have taken some college courses since joining the military. If administrative records were not updated, this coursework would not be reflected in the data presented here.

CHAPTER FOUR

Health Promotion and Disease Prevention

This chapter presents analyses of several health promotion and disease prevention indicators among active component service members. Specifically, we examined self-reported service member weight, physical activity, and sleep health, as well as use of electronic devices (or screen time), routine medical care, energy supplements, and sleep aids. We also compare active component service members with the HP2020 objectives, a set of national health objectives designed by HHS to improve the health of the U.S. population. However, the military population is notably different demographically from the general population; for example, it is disproportionally younger and male. Furthermore, individuals are only permitted to join the military if they meet certain physical requirements. This means that the military population is likely to be quite different from the general population with regard to many health-related factors, such as obesity and physical activity. This limits the applicability of the HP2020 guidelines in the area of health promotion.

We provide analysis of each topic by service branch, pay grade, and gender. Further analysis by race/ethnicity and age group can be found in Appendix D. Key measures are described in the corresponding section. Additional detail on these measures can be found in Appendix C. Analyses show statistically significant omnibus tests (a Rao-Scott chi-square test for categorical variables and F-tests for continuous variables) unless noted in the tables. Statistically significant pairwise comparisons are also presented with the tables. Statistically significant differences that the research team's subject-matter experts deemed important—meaning that the results could be used to change or develop policy or contribute to important inequalities in health outcomes across subgroups—are discussed in the text.

It is difficult to interpret 2018 HRBS results in comparison with the 2015 HRBS results and with survey results from other populations. Any comparisons are not necessarily statistically significant and could instead reflect sampling variability across samples. However, this report does compare the 2015 and 2018 HRBSs using a regression framework to control for methodological differences when identical or very similar questions were used (see Chapter Two). When interpreting changes across surveys, it is important to keep in mind what the base for that increase is. That is, a 20-percent increase for an outcome with a 2015 prevalence of 2 percent represents a much smaller increase in absolute value than the same percentage increase for an outcome with a 2015 prevalence of 25 percent (0.4 versus 5.0 percent). Thus, extremely large percentage increases (or decreases) across surveys are often substantively small while the percentage changes appear quite large.

Weight Status

Nearly 40 percent of the general U.S. population is classified as obese by the Centers for Disease Control and Prevention (CDC), and over 70 percent is classified as obese or overweight (National Center for Health Statistics, 2018a). This is significant because obesity is a risk factor for early mortality and many chronic diseases, such as cardiovascular disease, diabetes, and cancer (Lauby-Secretan et al., 2016; Guh et al., 2009; Aune et al., 2016). And it is expensive: The military spends $1.5 billion a year treating obesity-related illness for current and former service members and their families (National Center for Chronic Disease Prevention and Health Promotion, 2019).

For the military, weight status is an important threat to readiness: Service members who are overweight or obese may be unable to function because of related comorbidities, such as diabetes, asthma, hypertension, or persistent musculoskeletal injuries. Furthermore, service members must meet the DoDI 1308.3 standards to deploy (DoDI, 2002). These standards include weight requirements, and, to deploy in violation of the these standards, a waiver is required, slowing the process of deployment (Copp, 2018). Indeed, waiver-related delays have become so problematic as to prompt consideration of revisions to DoDI 1308.3 (Copp, 2018; Watson, 2016; Department of Defense Office of the Assistant Secretary for Health Affairs, 2018).

Body mass index (BMI) was used in the 2018 HRBS to define weight status categories. BMI was calculated from service member–reported height and weight. We calculated BMI according to the standard CDC formula: weight (in kilograms [kg]) divided by height (in meters squared [m^2]; National Center for Health Statistics, 2018a). The CDC criteria were used to categorize the resulting BMI as follows:

- underweight (BMI less than 18.5 kg/m^2)
- normal weight (BMI 18.5–24.9 kg/m^2)
- overweight (BMI 25.0–29.9 kg/m^2)
- obese (BMI 30 or more kg/m^2).

For service members younger than age 20, we used age- and sex-specific definitions set by the CDC (National Center for Health Statistics, 2018a). BMI offers an accessible survey-based estimate of body fat, but research suggests that BMI may yield false positive obesity findings among some service members and overestimate the proportion who fall into this category (Heinrich et al., 2008).

Weight status results are presented in Tables 4.1 through 4.3. Key findings include the following:

- Overall, among service members 20 years of age or older, 33.3 percent met guidelines for normal weight. The HP2020 goal is 33.9 percent (Healthy People, 2020j). This means that the military is almost meeting the HP2020 goal for percentage of normal weight status. This goal is met by 27.7 percent of the general population.
- Among 2018 HRBS respondents age 20 and older, 15.1 percent were classified as obese. The HP2020 goal for obesity in the general population is 30.5 percent or less (Healthy People, 2020k). Among the general population, 31.4 percent were classified as obese (National Center for Health Statistics, 2018b).

Table 4.1
Weight Status, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
HP2020 goals							
Obesity among those age 20+ (HP2020 target: <30.5 percent)	14.0%[c,d] (13.0–15.1)	15.4%[c,d] (13.6–17.1)	7.1%[a,b,d,e] (5.7–8.5)	20.1%[a,b,c,e] (18.2–22.1)	14.7%[c,d] (12.7–16.7)	15.1% (14.2–16.0)	15.1% (14.2–15.9)
Normal weight among those age 20+ (HP2020 target: >33.9 percent)	34.3% (32.9–35.8)	32.7%[c] (30.2–35.2)	38.6%[b,d,e] (35.7–41.4)	30.6%[c] (28.1–33.1)	30.3%[c] (27.7–33.0)	33.4% (32.2–34.6)	33.3% (32.1–34.5)
Weight categories							
Underweight[z]	0.7% (0.4–0.9)	0.6% (0.1–1.2)	0.3% (0.1–0.6)	0.9% (0.2–1.7)	0.5% (0.1–0.9)	0.7% (0.4–0.9)	0.7% (0.4–0.9)
Normal weight	36.5%[c,d] (35.1–38.0)	36.2%[c] (33.6–38.8)	41.8%[a,b,d,e] (38.9–44.7)	32.0%[a,c] (29.5–34.6)	32.9%[c] (30.1–35.6)	36.0% (34.8–37.3)	35.9% (34.7–37.1)
Overweight[z]	49.4% (47.9–50.9)	48.9% (46.3–51.5)	51.1% (48.2–54.0)	47.3% (44.8–49.9)	52.5% (49.7–55.4)	48.9% (47.7–50.2)	49.1% (47.8–50.3)
Obese	13.5%[c,d] (12.5–14.5)	14.3% [c,d] (12.7–16.0)	6.7%[a,b,d,e] (5.3–8.1)	19.7%[a,b,c,e] (17.7–21.6)	14.1%[c,d] (12.2–16.0)	14.4% (13.5–15.2)	14.4% (13.5–15.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- Among service members age 20 and older, we found that a significantly smaller percentage of Marines were obese (7.1 percent), and a significantly larger percentage of Navy service members were obese (20.1 percent) when compared with the Air Force, Army and Coast Guard (Table 4.1). This is consistent with other studies of service members (Rush, LeardMann, and Crum-Cianflone, 2016).
- Among service members age 20 or older, senior enlisted service members (E7–E9) were the most likely to be classified as overweight (58.1 percent) or obese (24 percent), though this difference was only statistically significant when compared with junior enlisted service members (E1–E4; Table 4.2).
- A significantly smaller portion of female service members were obese (10.1 percent versus 15.2 percent of men), and a significantly greater portion were at a normal weight (50.7 percent versus 33 percent of men; Table 4.3). This was inconsistent with the general population, where a greater proportion of women were obese (40.5 percent of women versus 36.5 percent of men; National Center for Health Statistics, 2018b).

Table 4.2
Weight Status, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
HP2020 goals						
Obesity among those age 20+ (HP2020 target: <30.5 percent)	10.5%[b,c,d,f] (9.0–12.0)	20.1%[a,c,e,f] (18.5–21.7)	24.0%[a,b,e,f] (22.0–26.0)	18.3%[a,e] (13.5–23.1)	8.3%[b,c,d,f] (6.8–9.8)	14.1%[a,b,c,e] (12.5–15.6)
Normal weight among those age 20+ (HP2020 target: >33.9 percent)	43.2%[b,c,d,f] (40.7–45.6)	25.8%[a,c,e] (24.1–27.5)	17.7%[a,b,e,f] (15.4–20.0)	25.5%[a,e] (19.5–31.5)	39.0%[b,c,d,f] (36.6–41.5)	28.6%[a,c,e] (26.7–30.6)
Weight categories						
Underweight	1.1%[f] (0.5–1.7)	0.4% (0.2–0.6)	0.2% (0.0–0.4)	0.5% (0.0–1.2)	0.5% (0.2–0.7)	0.3%[a] (0.1–0.5)
Normal weight	48.0%[b,c,d,e,f] (45.6–50.3)	25.8%[a,c,e] (24.1–27.5)	17.7%[a,b,e,f] (15.4–20.0)	25.5%[a,e] (19.5–31.5)	39.0%[a,b,c,d,f] (36.6–41.5)	28.6%[a,c,e] (26.7–30.6)
Overweight	41.5% [b,c,d,e,f] (39.2–43.8)	53.7%[a] (51.7–55.6)	58.1%[a,e] (55.6–60.6)	55.7%[a] (49.1–62.2)	52.2%[a,c] (49.6–54.7)	57.0%[a] (54.8–59.2)
Obese	9.4%[b,c,d,f] (8.1–10.8)	20.1%[a,c,e,f] (18.5–21.7)	24.0%[a,b,e,f] (22.0–26.0)	18.3%[a,e] (13.5–23.1)	8.3%[b,c,d,f] (6.8–9.8)	14.1%[a,b,c,e] (12.5–15.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

- A statistically significantly greater portion of service members 45 years and above were classified as obese, as compared with service members ages 17 through 34 (21.9 percent compared with 8 percent for those ages 17–24 and 15.8 percent for those ages 25–34). Further detail on age differences can be found in Appendix Table D.2.

In terms of comparisons between the 2015 and 2018 HRBSs:

- Overall, service members in the 2018 HRBS were 4 percent less likely than service members in the 2015 HRBS to be at a normal weight (ARR = 0.96, 95-percent CI: 0.94, 0.99) and 7 percent more likely to be obese (ARR = 1.07, 95-percent CI: 1.01, 1.13).
- Compared with the 2015 HRBS, there was one significant within–service branch change in the rate of obesity. Specifically, service members in the Navy were 23 percent more likely to be obese in the 2018 HRBS than in the 2015 HRBS (ARR = 1.23, 95-percent CI: 1.09, 1.37).
- Compared with the 2015 HRBS, there was one significant change in the rate of obesity within pay grade. Senior officers in the 2018 HRBS were 23 percent more likely to be obese than were senior officers in the 2015 HRBS (ARR = 1.23, 95-percent CI: 1.06, 1.43).

Table 4.3
Weight Status, by Gender

	Men	Women
HP2020 goals		
Obesity among those age 20+ (HP2020 target: <30.5 percent)	15.9%[a] (14.9–16.8)	11.0% (9.8–12.3)
Normal weight among those age 20+ (HP2020 target: >33.9 percent)	30.5%[a] (29.1–31.8)	47.8% (45.8–49.8)
Weight categories		
Underweight[z]	0.6% (0.3–0.9)	1.1% (0.7–1.4)
Normal weight	33.0%[a] (31.5–34.4)	50.7% (48.7–52.7)
Overweight	51.2%[a] (49.8–52.7)	38.1% (36.2–40.0)
Obese	15.2%[a] (14.3–16.2)	10.1% (8.9–11.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- Female respondents in the 2018 HRBS were 7 percent less likely than female respondents in the 2015 HRBS to be of normal weight (ARR = 0.93, 95-percent CI: 0.90, 0.97) and 20 percent more likely to be obese (ARR = 1.20, 95-percent CI: 1.07, 1.35).

Physical Activity

A large majority of the U.S. population—75.6 percent—was not meeting the HP2020 goals for physical fitness as of 2018 (National Center for Health Statistics, 2018a). These goals include both aerobic and muscle-strengthening activities. Engaging in regular physical activity has been shown to prevent chronic diseases, such as cardiovascular disease, osteoarthritis, cancer, and depression, and to improve sleep and sense of well-being (Warburton, Nicol, and Bredin, 2006). The HP2020 goal for moderate physical activity (MPA) is for 47.9 percent or more of the general U.S. population to engage in 150 minutes or more a week of MPA or 75 minutes or more of vigorous physical activity (VPA; National Center for Health Statistics, 2018a). The HP2020 goal for VPA is for 31.3 percent or more of the U.S. general population to engage in 300 minutes or more of MPA a week or 150 minutes or more of VPA. Both the 2011 HRBS (Barlas et al., 2013) and the 2015 HRBS (Meadows et al., 2018) showed that active-duty service members had reached or surpassed HP2020 goals for physical activity. This is likely due to the physical fitness requirements in the military and demographic differences between service members and the U.S. population.

The military has fitness standards that are aimed at encouraging physical fitness and body fat standards, including aerobic capacity, muscular strength, muscular endurance, and body fat composition, because physical fitness is essential for a ready force (Army Public Health Center, 2015). Poor physical fitness is associated with injuries and chronic conditions that can adversely impact military readiness (Knapik, 2015; Knapik et al., 2001). These conditions can make it difficult to support physically demanding missions and make it impossible for service members to deploy to remote locations without medical support (Army Public Health Center, 2015). Good physical fitness has also been associated with mental resilience and physical endurance, which are important force readiness characteristics (Crowley et al., 2015; Silverman and Deuster, 2014). In the following section, we describe service member–reported physical fitness levels. Service members were asked to estimate minutes spent on exercise each week and their frequency of strength training. For each measure, we describe the level of physical training overall and by service branch, pay grade, and gender; results by race/ethnicity and age group are available in Appendix D. Where available, we report on comparable percentages from prior HRBSs and the U.S. general population.

Moderate and Vigorous Physical Activity

Tables 4.4 through 4.6 present the percentages of service members who engaged in moderate and vigorous aerobic physical activity weekly, broken down by time engaged in those activities. MPA in our survey was defined as exertion "that raises heart rate and breathing, but you should be able to carry on a conversation comfortably during the activity." VPA in our survey was defined as exertion that is "high enough that you would find it difficult to carry on a conversation during the activity." Both of these measures were altered from the National Health and Nutrition Examination Survey (NHANES; National Center for Health Statistics, 2016).

Key findings include the following:

- There are two HP2020 goals associated with physical activity. The first is for at least 47.9 percent of the adult U.S. population to get 150 or more minutes of MPA or 75 minutes or more of VPA per week (Healthy People, 2020l). Among 2018 HRBS respondents, 71.8 percent reported this level of physical activity. Among the general population, 53.3 percent reported meeting the HP2020 standard (CDC, 2018a). Further detail can be found in Table 4.4.
- The second HP2020 goal is for at least 31.3 percent of the adult U.S. general population to get 300 minutes or more of MPA or 150 minutes or more of VPA per week (Healthy People, 2020m). Among 2018 HRBS respondents, 45.3 percent reported this level of physical activity. This is compared with 37 percent of the general population (National Center for Health Statistics, 2018a). Further detail can be found in Table 4.4.
- In the 2018 HRBS, 36.8 percent of all service members reported engaging in MPA activity less than 150 minutes per week, 40.2 percent reported engaging in 150–299 minutes per week, and 23.0 percent reported engaging in over 300 minutes per week (Table 4.4).
- Across all services, a statistically significantly larger percentage of members of the Army reported that they engaged in 300 minutes or more of MPA compared with the Air Force, Coast Guard, and Navy (Table 4.4).
- Across all pay grades (Table 4.5), a statistically significantly larger percentage of junior enlisted service members (E1–E4) engaged in 300 minutes or more of MPA each week compared with E7–E9, warrant officers, and junior officers.

Table 4.4
Moderate and Vigorous Physical Activity in Past 30 Days, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
HP2020 goals							
MPA for at least 150 mins/week or VPA for at least 75 mins/week (HP2020 target: 47.9%)	69.0%[b,c,d] (67.6–70.4)	80.3%[a,c,d,e] (78.3–82.3)	74.9%[a,b,d,e] (72.4–77.5)	61.3%[a,b,c,e] (58.8–63.8)	68.0%[b,c,d] (65.4–70.6)	71.9% (70.9–73.0)	71.8% (70.8–72.9)
MPA for more than 300 mins/week or VPA for at least 150 mins/week (HP2020 target: 31.3%)	41.8%[b,c,d] (40.3–43.3)	53.2%[a,d,e] (50.6–55.7)	48.2%[a,d,e] (45.3–51.1)	36.9%[a,b,c] (34.3–39.4)	39.6%[b,c] (36.8–42.4)	45.5% (44.3–46.8)	45.3% (44.1–46.6)
MPA							
<150 mins/week	40.7%[b,c,d] (39.2–42.2)	28.8%[a,c,d,e] (26.5–31.1)	34.2%[a,b,d,e] (31.5–36.9)	45.2%[a,b,c,e] (42.7–47.8)	39.8%[b,c,d] (37.0–42.5)	36.7% (35.5–37.9)	36.8% (35.6–37.9)
150–299 mins/week[z]	41.4% (39.9–42.8)	41.3% (38.8–43.8)	39.2% (36.4–42.0)	38.2% (35.7–40.7)	40.3% (37.5–43.1)	40.2% (39.0–41.5)	40.2% (39.0–41.4)
300+ mins/week	18.0%[b,c] (16.8–19.1)	29.9%[a,d,e] (27.4–32.4)	26.6%[a,d,e] (24.0–29.2)	16.6%[b,c] (14.5–18.7)	20.0%[b,c] (17.7–22.3)	23.1% (21.9–24.3)	23.0% (21.9–24.1)
VPA							
<75 mins/week	53.8%[b,d,e] (52.3–55.3)	44.5%[a,c,d,e] (41.9–47.0)	51.1%[b,d,e] (48.2–54.0)	62.1%[a,b,c] (59.5–64.7)	59.2%[a,b,c] (56.5–62.0)	52.2% (50.9–53.4)	52.4% (51.2–53.6)
75–149 mins/week	9.1%[d] (8.2–9.9)	10.0%[d] (8.4–11.6)	8.9% (7.4–10.4)	6.6%[a,b] (5.2–7.9)	7.5% (6.0–8.9)	8.7% (8.0–9.5)	8.7% (8.0–9.4)
150+ mins/week	37.1%[b,d] (35.7–38.6)	45.6%[a,c,d,e] (43.0–48.2)	40.0%[b,d,e] (37.2–42.8)	31.3%[a,b,c] (28.8–33.8)	33.3%[b,c] (30.6–36.0)	39.1% (37.8–40.3)	38.9% (37.7–40.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 4.5
Moderate and Vigorous Physical Activity in Past 30 Days, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
HP2020 goals						
MPA for at least 150 mins/week or VPA for at least 75 mins/week (HP2020 target: 47.9%)[x]	73.4% (71.4–75.4)	70.7% (69.0–72.5)	69.0% (66.6–71.4)	69.4% (63.0–75.9)	72.3% (70.1–74.6)	70.2% (68.2–72.2)
MPA for more than 300 mins/week or VPA for at least 150 mins/week (HP2020 target: 31.3%)	48.0%[c,f] (45.6–50.4)	43.9% (42.0–45.9)	41.4%[a] (39.0–43.8)	41.3% (34.8–47.8)	45.1% (42.5–47.6)	41.8%[a] (39.6–44.0)
MPA						
<150 mins/week	34.1%[c,e,f] (32.0–36.3)	37.1%[f] (35.3–39.0)	39.3%[a] (36.9–41.8)	37.8% (31.2–44.3)	40.3%[a] (37.8–42.8)	42.8%[a,b] (40.7–45.0)
150–299 mins/week[z]	39.7% (37.4–42.0)	40.6% (38.7–42.5)	43.0% (40.6–45.4)	39.0% (32.7–45.3)	39.5% (37.0–41.9)	39.1% (37.0–41.3)
300+ mins/week	26.1%[c,e,f] (23.9–28.4)	22.3%[c,f] (20.5–24.0)	17.7%[a,b] (15.9–19.5)	23.2% (17.6–28.9)	20.2%[a] (18.1–22.3)	18.0%[a,b] (16.3–19.7)
VPA						
<75 mins/week	51.3% (48.9–53.6)	53.3% (51.4–55.3)	55.3%[e] (52.8–57.7)	57.0% (50.5–63.4)	50.0%[c] (47.5–52.6)	53.7% (51.5–55.9)
75–149 mins/week[z]	8.8% (7.4–10.2)	8.3% (7.2–9.4)	7.5% (6.2–8.7)	9.8% (6.1–13.4)	10.2% (8.7–11.8)	9.4% (8.1–10.7)
150+ mins/week[z]	39.9% (37.6–42.3)	38.4% (36.4–40.3)	37.3% (34.9–39.6)	33.3% (27.2–39.3)	39.8% (37.2–42.3)	36.8% (34.7–39.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- A statistically significantly larger percentage of men reported that they engaged in 300 minutes or more of MPA, as compared with women (Table 4.6). This is consistent with trends in the general population (CDC, 2018a).
- Overall, 52.4 percent of service members reported that they engaged in less than 75 minutes per week of VPA, 8.7 percent engaged in 75–149 minutes, and 38.9 percent engaged in more than 150 minutes per week (Table 4.4).
- As shown in Tables 4.4 through 4.6, across all categories, time engaged in VPA largely fell into either the lowest category (less than 75 minutes per week) or the highest category

Table 4.6
Moderate and Vigorous Physical Activity in Past 30 Days, by Gender

	Men	Women
HP2020 goals		
MPA for at least 150 mins/week or VPA for at least 75 mins/week (HP2020 target: 47.9%)	73.3%[a] (72.1–74.5)	64.3% (62.3–66.2)
MPA for more than 300 mins/week or VPA for at least 150 mins/week (HP2020 target: 31.3%)	47.3%[a] (45.9–48.7)	35.6% (33.6–37.5)
MPA		
<150 mins/week	35.3%[a] (34.0–36.6)	44.2% (42.2–46.2)
150–299 mins/week[z]	40.5% (39.1–41.9)	38.8% (36.9–40.7)
300+ mins/week	24.2%[a] (22.9–25.5)	17.0% (15.4–18.6)
VPA		
<75 mins/week	50.3%[a] (48.9–51.7)	62.9% (61.0–64.9)
75–149 mins/week	8.9% [a] (8.1–9.8)	7.6% (6.6–8.6)
150+ mins/week	40.8%[a] (39.4–42.2)	29.5% (27.6–31.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.
[a] Statistically significantly different from women's estimate.
[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

(more than 150 minutes per week). Just 10 percent or less of respondents reported vigorous activity levels in the middle category (75–149 minutes).

- As with MPA, service members in the Army were also more likely than those in other branches to report that they engaged in VPA for more than 150 minutes per week (45.6 percent; Table 4.4).

Table 4.6 shows that men were significantly more likely to report engaging in VPA than women.

In terms of comparisons between the 2015 and 2018 HRBSs:

- Overall, there was a 4-percent increase in service members who reported engaging in MPA activity less than 150 minutes per week (ARR = 1.04, 95-percent CI: 1.01, 1.07) and an 11-percent decrease in service members who reported engaging in MPA 300 or more minutes per week (ARR = 0.89, 95-percent CI: 0.85, 0.94).
- By service branch, for MPA activity of less than 150 minutes per week, there was a 6-percent reported increase in the Air Force (ARR = 1.06, 95-percent CI: 1.01, 1.11) and 7-percent reported increases in both the Navy (ARR = 1.07, 95-percent CI: 1.01, 1.13) and the Coast Guard (ARR = 1.07, 95-percent CI: 1.00, 1.15). Across pay grades, there

was a 7-percent reported increase among E1–E4s (ARR = 1.07, 95-percent CI: 1.00, 1.15) and an 8-percent reported increase among E7–E9s (ARR = 1.08, 95-percent CI: 1.01, 1.16). There was also a 7-percent increase among women (ARR = 1.07, 95-percent CI: 1.02, 1.12).

- For MPA of 300 or more minutes per week, by service branch, there was a 17-percent reported decrease among both Navy (ARR = 0.83, 95-percent CI: 0.74, 0.93) and Coast Guard (ARR = 0.83, 95-percent CI: 0.74, 0.93) service members. Among the different pay grades, there was a 16-percent decrease among E1–E4s (ARR = 0.84, 95-percent CI: 0.77, 0.92) and a 12-percent reported decrease among E5–E6s (ARR = 0.88, 95-percent CI: 0.80, 0.96). Finally, there was a 10-percent reported decrease among men (ARR = 0.90, 95-percent CI: 0.85, 0.95) and a 12-percent reported decrease among women (ARR = 0.88, 95-percent CI: 0.81, 0.96).
- For VPA, overall, there was a 5-percent increase in those who engaged in 75 minutes or less of VPA per week (ARR = 1.05, 95-percent CI: 1.03, 1.08) and an 8-percent decrease in those who reported engaging in 150 minutes or more of VPA per week (ARR = 0.92, 95-percent CI: 0.89, 0.95).
- For moderate VPA (75 minutes or less per week), there was an 8-percent increase among airmen (ARR = 1.08, 95-percent CI: 1.04, 1.12) across surveys, a 5-percent reported increase among soldiers (ARR = 1.05, 95-percent CI: 1.00, 1.10), and a 12-percent reported increase among service members in the Coast Guard (ARR = 1.12, 95-percent CI: 1.07, 1.17). By pay grade, there was a 12-percent reported increase among junior enlisted personnel (ARR = 1.12, 95-percent CI: 1.07, 1.18) and a 7-percent reported increase among E5–E6 service members (ARR = 1.07, 95-percent CI: 1.03, 1.11). Men reported a 6-percent increase (ARR = 1.06, 95-percent CI: 1.03, 1.09), and women reported a 5-percent increase (ARR = 1.05, 95-percent CI: 1.02, 1.08).
- For 150 minutes or more of VPA per week, we observed an 8-percent decrease among both airmen (ARR = 0.92, 95-percent CI: 0.87, 0.97) and soldiers (ARR = 0.92, 95-percent CI: 0.86, 0.97) and a 15-percent decrease among service members in the Coast Guard (ARR = 0.85, 95-percent CI: 0.79, 0.93). There was a 15-percent reported decrease among junior enlisted service members (ARR = 0.85, 95-percent CI: 0.80, 0.91), a 10-percent reported decrease among E5–E6s (ARR = 0.90, 95-percent CI: 0.85, 0.96), and an 8-percent reported decrease among mid-grade officers (ARR = 0.92, 95-percent CI: 0.85, 0.98). Both men and women reported a decrease: 7 percent for men (ARR = 0.93, 95-percent CI: 0.90, 0.96) and 10 percent for women (ARR = 0.90, 95-percent CI: 0.85, 0.95).

Strength Training

Tables 4.7 through 4.9 present the findings for the number of times per week a service member had engaged in strength training over the past 30 days. *Strength training* is defined in our survey as "including using weights or resistance training to increase muscle strength." This was also modified from the NHANES instrument (National Center for Health Statistics, 2016). Key findings include the following:

- The HP2020 goal for strength training is for at least 24.1 percent of Americans to engage in muscle-strengthening exercises two or more days a week (Healthy People, 2020n). Just over one quarter (27.8 percent) of the general population reported meeting this goal in

Table 4.7
Strength Training in the Past 30 Days, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
HP2020 goal							
Muscle-strengthening activities on 3+ days/week (HP2020 target [2+ days/week]: 24.1%)[q]	47.0%[b,c,d] (45.5–48.5)	54.4%[a,d,e] (51.8–56.9)	58.9%[a,d,e] (56.1–61.7)	40.8%[a,b,c] (38.2–43.4)	44.2%[b,c] (41.4–47.0)	49.8% (48.5–51.0)	49.6% (48.4–50.8)
Strength training							
<1 day/week	25.7%[b,c,d,e] (24.4–27.0)	18.7%[a,d,e] (16.8–20.7)	21.5% [a,d,e] (19.1–23.9)	35.4%[a,b,c,e] (33.0–37.8)	29.8%[a,b,c,d] (27.3–32.4)	25.1% (24.0–26.1)	25.2% (24.2–26.2)
1–2 days/week	27.3%[c] (26.0–28.6)	26.9%[c] (24.7–29.1)	19.6%[a,b,e] (17.4–21.8)	23.8% (21.6–26.0)	25.9%[c] (23.4–28.4)	25.2% (24.1–26.2)	25.2% (24.2–26.2)
3+ days/week	47.0%[b,c,d] (45.5–48.5)	54.4%[a,d,e] (51.8–56.9)	58.9%[a,d,e] (56.1–61.7)	40.8%[a,b,c] (38.2–43.4)	44.2%[b,c] (41.4–47.0)	49.8% (48.5–51.0)	49.6% (48.4–50.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[q] The HP2020 goal is for two or more days per week, but the HRBS measure cannot be disaggregated this way. Instead, it represents strength training of three or more days per week, which thus underestimates the percentage of service members meeting the HP2020 goal.

2017 (CDC, 2018a). Roughly half (49.6 percent) of service members reported engaging in three or more days a week of muscle-strengthening activities in the 2018 HRBS. Because the HRBS response options do not allow us to directly compare with the HP2020 goal of two or more days per week, we are likely underestimating the percentage of service members meeting the HP2020 goal (Table 4.7).

- Roughly one-quarter of service members engaged in less than one day a week of strength training, and another quarter engaged in one or two days of strength training per week (Table 4.7).
- Table 4.7 shows that a statistically significantly larger portion of Army and Marine Corps service members engaged in strength training three or more days a week as compared with the other branches (54.4 and 58.9 percent, respectively). And service members in the Navy were significantly more likely to engage in strength training for less than one day per week, as compared with the other branches (35.4 percent). This mirrors the trends in VPA, where a statistically significantly larger percentage of service members in the Navy reported engaging in 75 minutes or less per week.
- Table 4.8 shows an inverse relationship between rank and frequency of strength training. A statistically significantly smaller percentage of senior officers (39.1 percent) engaged in strength training three or more days per week when compared with enlisted ranks

Table 4.8
Strength Training in Past 30 Days, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
HP2020 goal						
Muscle-strengthening activities on 3+ days/week (HP2020 target [2+ days/week]: 24.1%)[q]	52.9%[c,e,f] (50.6–55.2)	50.3%[c,f] (48.4–52.3)	44.1%[a,b,f] (41.7–46.5)	46.4% (39.9–52.9)	45.9%[a,f] (43.4–48.5)	39.1%[a,b,c,e] (36.9–41.2)
Strength training						
<1 day/week	23.7%[c,f] (21.8–25.6)	25.7%[f] (24.0–27.3)	28.7%[a,e] (26.4–31.1)	29.1% (22.7–35.5)	23.2%[c,f] (21.1–25.4)	29.9%[a,b,e] (27.8–31.9)
1–2 days/week	23.4%[e,f] (21.4–25.4)	24.0% [e,f] (22.4–25.7)	27.2% (25.1–29.3)	24.5% (18.9–30.0)	30.8%[a,b] (28.5–33.2)	31.1%[a,b] (29.0–33.1)
3+ days/week	52.9%[c,e,f] (50.6–55.2)	50.3%[c,f] (48.4–52.3)	44.1%[a,b,f] (41.7–46.5)	46.4% (39.9–52.9)	45.9%[a,f] (43.4–48.5)	39.1%[a,b,c,e] (36.9–41.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[q] The HP2020 goal is for two or more days per week, but the HRBS measure cannot be disaggregated this way. Instead, it represents strength training of three or more days per week, which thus underestimates the percentage of service members meeting the HP2020 goal.

(52.9 percent among E1–E4, 50.3 percent among E5–E6, and 44.1 percent among E7–E9). An identical trend was shown in the 2015 HRBS.

- Table 4.9 shows that a statistically significantly larger percentage of men engaged in strength training three or more days a week compared with women (51.9 and 37.9, respectively).
- Appendix Table D.5 shows that non-Hispanic white service members were the least likely to engage in strength training three days a week out of all racial/ethnic groups, but this finding is only statistically significant when compared with Hispanic service members.
- The two oldest age groups (35–44 years and 45 and older) were statistically significantly less likely to report strength training three or more days a week than the two younger age groups.

In terms of comparisons between the 2015 and 2018 HRBSs:

- Overall, there was a 7-percent decrease in strength training three or more days a week (ARR = 0.93, 95-percent CI: 0.90, 0.97) and a 4-percent increase in strength training less than one day a week (ARR = 1.04, 95-percent CI: 1.02, 1.07).

Table 4.9
Strength Training in Past 30 Days, by Gender

	Men	Women
HP2020 goal		
Muscle-strengthening activities on 3+ days/week (HP2020 target [2+ days/week]: 24.1%)[q]	51.9%[a] (50.5–53.3)	37.9% (36.0–39.9)
Strength training		
<1 day/week	23.5%[a] (22.4–24.7)	33.7% (31.8–35.6)
1-2 days/week	24.6%[a] (23.4–25.8)	28.3% (26.5–30.1)
3+ days/week	51.9%[a] (50.5–53.3)	37.9% (36.0–39.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[q] The HP2020 goal is for two or more days per week, but the HRBS measure cannot be disaggregated this way. Instead, it represents strength training of three or more days per week, which thus underestimates the percentage of service members meeting the HP2020 goal.

- For strength training three or more days per week, by service branches, there was a 22-percent decrease among Army service members (ARR = 0.78, 95-percent CI: 0.71, 0.85), an 18-percent reported decrease among Marine Corps service members (ARR = 0.82, 95-percent CI: 0.74, 0.91), and a 7-percent reported decrease among Navy service members (ARR = 0.93, 95-percent CI: 0.88, 0.99). By pay grade, there was a 26-percent decrease among warrant officers (ARR = 0.74, 95-percent CI: 0.62, 0.89), a 13-percent decrease among O1–O3s (ARR = 0.87, 95-percent CI: 0.80, 0.95), and a 9-percent decrease among O4–O6s (ARR = 0.91, 95-percent CI: 0.85, 0.99). There was a 9-percent decrease among men (ARR = 0.91, 95-percent CI: 0.87, 0.95).
- For strength training less than one day per week, by service branch, there was a 12-percent increase among Army service members (ARR = 1.12, 95-percent CI: 1.06, 1.18) and a 13-percent increase among Marine Corps service members (ARR = 1.13, 95-percent CI: 1.06, 1.20). By pay grade, there was an 8-percent increase among E7–E9s (ARR = 1.08, 95-percent CI: 1.01, 1.16), a 30-percent increase among warrant officers (ARR = 1.30, 95-percent CI: 1.14, 1.47), a 7-percent increase among O1–O3s (ARR = 1.07, 95-percent CI: 1.01, 1.14) and a 9-percent increase among O4–O6s (ARR = 1.09, 95-percent CI: 1.01, 1.17). There was a 5-percent increase among men (ARR = 1.05, 95-percent CI: 1.02, 1.08).

Screen Time

Screen time, which we defined as time spent looking at a desktop or laptop computer, television, smartphone, tablet (e.g., iPad, Kindle), or other handheld device or gaming system, is generally a sedentary behavior (Carson, Staiano, and Katzmarzyk, 2015). Sedentary behavior in relation to screen time is associated with an elevated risk of obesity and mortality (Thorp et al., 2011). Evidence also shows that sedentary behavior associated with screen time is a risk factor for many cardiometabolic diseases and mortality, independent of time spent exercising—meaning that adverse health effects were observed in people who exercised but who also engaged in excessive screen time (Owen et al., 2010; Stamatakis, Hamer, and Dunstan, 2011). Prospective longitudinal research shows that every hour of increase in television viewing is associated with an increased hazard of all-cause mortality and cardiovascular death (Wijndaele et al., 2010). Furthermore, higher levels of screen time are associated with depression among adults (Madhav, Sherchand, and Sherchan, 2017). Chronic diseases, such as cardiometabolic disease, and mental illness, such as depression, are a leading cause of disability and threaten the readiness of troops to deploy (DoD, 2017). Service members with chronic conditions may be unable to engage in more physically demanding missions, and they cannot be deployed to remote locations with limited medical support (Army Public Health Center, 2015).

The 2018 HRBS asked service members how many hours, on average, were spent each day using a screen for activities other than work or school over the last 30 days. This question differed from the 2015 HRBS, which only asked respondents how many hours per day they played electronic games outside of work or school. For each measure, we describe the level of self-reported screen time overall and by service branch, pay grade, and gender in Tables 4.10 through 4.12; results by race/ethnicity and age group are available in Appendix D. Key findings include the following:

- Overall, 66.8 percent of service members reported spending one to four hours per day looking at screens, and 27.2 percent reported spending five or more hours per day looking at screens.

Table 4.10
Hours per Day of Screen Time, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
<1 hour per day[z]	5.7% (5.0–6.3)	6.5% (5.3–7.6)	5.8% (4.3–7.2)	5.7% (4.5–6.8)	7.3% (6.0–8.6)	6.0% (5.4–6.5)	6.0% (5.5–6.5)
1–4 hours per day[z]	68.7% (67.3–70.1)	66.2% (63.7–68.8)	65.2% (62.4–68.0)	66.2% (63.7–68.7)	69.8% (67.2–72.5)	66.7% (65.5–67.9)	66.8% (65.6–68.0)
5+ hours per day[z]	25.6% (24.3–26.9)	27.3% (24.8–29.7)	29.0%[e] (26.4–31.6)	28.1%[e] (25.7–30.6)	22.9%[c,d] (20.4–25.4)	27.3% (26.2–28.5)	27.2% (26.0–28.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 4.11
Hours per Day of Screen Time, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
<1 hour per day	4.3%[c,d,f] (3.3–5.2)	6.3%[d,f] (5.3–7.3)	8.6%[a,e,f] (7.3–9.8)	12.8%[a,b,e] (8.0–17.6)	5.5%[c,d,f] (4.4–6.5)	11.6%[a,b,c,e] (10.2–13.0)
1–4 hours per day	62.9%[c,e,f] (60.6–65.2)	66.4%[e,f] (64.4–68.3)	69.5%[a,e,f] (67.0–71.9)	65.6%[e,f] (59.2–72.0)	76.5%[a,b,c,d] (74.3–78.7)	75.4%[a,b,c,d] (73.5–77.3)
5+ hours per day	32.8%[b,c,d,e,f] (30.6–35.0)	27.3%[a,c,e,f] (25.5–29.1)	22.0%[a,b,f] (19.6–24.3)	21.6%[a,f] (16.3–27.0)	18.1%[a,b,f] (16.0–20.1)	13.0%[a,b,c,d,e] (11.5–14.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 4.12
Hours per Day of Screen Time, by Gender

	Men	Women
<1 hour per day[z]	6.0% (5.4–6.6)	6.0% (5.1–6.9)
1–4 hours per day[z]	66.8% (65.4–68.2)	66.8% (64.9–68.8)
5+ hours per day[z]	27.2% (25.9–28.5)	27.2% (25.3–29.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$)

- Individuals in the Coast Guard were the least likely to spend five hours a day or more on screens (22.9 percent), and this was statistically significantly different from the Marine Corps and Navy (Table 4.10). Those in the Marine Corps were the most likely (29.0 percent) to spend at least five hours per day on screens, but this was only statistically significantly different from the Coast Guard.
- Table 4.11 shows that senior officers were the least likely of all the pay grade groups to report engaging in five or more hours of screen time per day (13.0 percent). In contrast, junior enlisted service members were the most likely to report engaging in five hours or more of screen time per day (32.8 percent). The differences between these groups was statistically significant.
- There was no significant difference in the reported use of screens by gender (Table 4.12).
- 17- to 24-year-olds and white service members were statistically significantly more likely to report engaging in five or more hours of screen time compared with all other age groups (34.7 percent). Full details of these findings can be found in Appendix Table D.8.

Annual Physical Assessment

Routine medical exams are used to identify asymptomatic illnesses, provide early intervention, and encourage healthy behavior (Merenstein, Daumit, and Powe, 2006). These exams have been shown to save lives through early detection of cancer and chronic conditions and to save money (Goede et al., 2015; Birtwistle and Earnshaw, 2014). The military places such importance on routine medical care that it requires an annual face-to-face medical assessment (Defense Health Agency, 2016). These exams, called PHAs, are used to evaluate force readiness (Defense Health Agency, 2016). The Army has placed an emphasis on the importance of being compliant with these regulations because failure to do so has harmed the readiness of service members: In 2014, the most recently available data, 17 percent of Army service members were not deployable within 72 hours because of failure to comply with the annual medical exam requirements. Of these, almost half had a condition that would take more than 30 days to resolve (Army Public Health Center, 2015).

The 2018 HRBS asked participants whether they had received a routine medical checkup in the previous 12 months. A routine checkup was defined as a general physical exam, not an exam for a specific injury, illness, or condition. In Tables 4.13 through 4.15, we present the overall percentage of service members who reported receiving an physical exam in the past 12 months and the percentages by service branch, pay grade, and gender; results by race/ethnicity and age group are available in Appendix D. Key findings are below:

- Overall, 70.3 percent of service members reported receiving a routine medical checkup in the previous year (Table 4.13). These findings indicate that not all service members are receiving the required annual exam.
- Members of the Coast Guard were the most likely to report having had a routine medical checkup in the past year (83.8 percent), and service members from the Air Force were the least likely to have reported having had their routine medical checkup in the past year (62.8 percent; Table 4.13).
- Senior officers were significantly more likely than other pay grades to report having had a routine medical checkup in the last year (82.1 percent; Table 4.14).
- There was no significant difference in the percentages of men and women who reported receiving a routine checkup in the past year (Table 4.15).

Table 4.13
Past-Year Routine Medical Checkup, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Routine checkup in past year	62.8%[b,c,d,e] (61.4–64.3)	71.7%[a,e] (69.2–74.2)	69.3%[a,e] (66.5–72.1)	74.4%[a,e] (71.9–76.8)	83.8%[a,b,c,d] (81.6–86.0)	69.8% (68.6–71.0)	70.3% (69.1–71.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 4.14
Past-Year Routine Medical Checkup, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Routine check-up in past year	63.6%[b,c,d,e,f] (61.3–65.9)	72.7%[a,f] (70.9–74.4)	76.9% [a,f] (74.5–79.3)	79.2%[a] (73.7–84.7)	75.8% [a,f] (73.5–78.1)	82.1%[a,b,c,e] (80.3–83.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 4.15
Past-Year Routine Medical Checkup, by Gender

	Men	Women
Routine checkup in past year[z]	70.2% (68.8–71.5)	70.7% (68.8–72.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- Hispanic service members were significantly less likely than non-Hispanic white service members to report having had a routine medical checkup in the last year (66.4 percent versus 72.1 percent). More details can be found in Appendix Table D.9.

In terms of comparisons between the 2015 and 2018 HRBSs:

- Overall, there was a 10-percent reported decrease in the percentage of service members who reported receiving a past-year routine medical checkup (ARR = 0.90, 95-percent CI: 0.89, 0.91).
- Every service branch had a decrease in the percentage of individuals who reported having had an annual checkup in the past 12 months: There was an 18-percent decrease in the Air Force (ARR = 0.82, 95-percent CI: 0.80, 0.84), an 8-percent decrease in both the Army (ARR = 0.92, 95-percent CI: 0.90, 0.94) and Marine Corps (ARR = 0.92, 95-percent CI: 0.90, 0.95), a 5-percent decrease in the Navy (ARR = 0.95, 95-percent CI: 0.93, 0.97), and a 6-percent decrease in the Coast Guard (ARR = 0.94, 95-percent CI: 0.92, 0.96).
- There was a reported decrease in the percentage of service members who reported receiving an annual checkup in the past year within every pay grade, except among warrant officers. There was a 17-percent decrease among E1–E4s (ARR = 0.83, 95-percent CI: 0.81, 0.86), a 12-percent decrease among E5–E6s, (ARR = 0.88, 95-percent CI: 0.86, 0.90), an 8-percent decrease among both E7–E9s (ARR = 0.92, 95-percent CI: 0.90, 0.95) and O1–O3s (ARR = 0.92, 95-percent CI: 0.89, 0.94), and a 5-percent decrease among O4–O6s (ARR = 0.95, 95-percent CI: 0.93, 0.97).

- By gender, there was a 9-percent decrease among men (ARR = 0.91, 95-percent CI: 0.90, 0.92) and an 11-percent decrease among women (ARR = 0.89, 95-percent CI: 0.87, 0.90).

Sleep Health

According to the 2018 National Health Interview Survey (NHIS), over two-thirds of Americans (67.5 percent) got seven or more hours of sleep per night, but the full data have not been publicly released yet (Healthy People, 2020q) According to HP2020, sufficient sleep is categorized as at least seven hours in a 24-hour period among U.S. adults age 22 and over and eight hours for adults between the ages of 18 and 21. The HP2020 goal for sufficient sleep is 72.8 percent of the adult population (Healthy People, 2020p). Lack of sufficient sleep is associated with daytime sleepiness, fatigue, diabetes, cardiovascular disease, obesity, and depression (Kasasbeh, Chi, and Krishnaswamy, 2006; Knutson et al., 2006; Taheri, 2006; Zimmerman et al., 2006). In the United States, 18.8 percent of adults report suffering from insomnia, and 12.7 percent report excessive daytime sleepiness (Ford et al., 2015).

Sleep disorders are commonly diagnosed among military populations; these disorders include sleep apnea, insomnia, behaviorally induced insufficient sleep syndrome, and snoring (Mysliwiec et al., 2013). Research also found that 18 percent of service members used sleep medications to manage their inability to sleep (Troxel et al., 2015). Sleep disturbances are often associated with common conditions among service members, such as PTSD, traumatic brain injury (TBI), depression, and anxiety (Bramoweth and Germain, 2013). Sleep problems are particularly problematic for force readiness because not only is lack of sleep associated with aforementioned chronic illness and mental illness, but it can also impact the ability to assess and appropriately respond to threats in combat (Army Public Health Center, 2015). Research also shows that lack of sleep impacts aerobic capacity, muscular endurance, and "military-specific performance" (Grandou et al., 2019). Lack of sleep has also been shown to lead to lower self-rated health scores, lost work days, lower odds of deployment, higher odds of early discharge from military service, and more health care utilization among military populations (Seelig et al., 2016).

Respondents in the 2018 HRBS were asked how much sleep they got on average in a 24-hour period over the last 30 days, the quality of that sleep, how sleep impacted their energy levels, and any medications they took to aid with sleep. For each measure, we describe the results by service branch, pay grade, and gender; results by race/ethnicity and age group are available in Appendix D. Where available, we report on comparable percentages from prior HRBSs and the U.S. general population.

Average Daily Sleep Amount

Respondents in the 2018 HRBS were asked how many hours of sleep they got on average over a 24-hour period in the last 30 days.[1] Key findings are below, and tabular results are presented in Tables 4.16 through 4.18:

[1] We could not compare the results from the 2015 HRBS with those of the 2018 HRBS because the two sleep measures were different. In 2015, respondents were asked separately about weekday and weekend sleep. In the 2018 HRBS, respon-

Table 4.16
Past 30 Days Average Daily Hours of Sleep, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
HP2020 goal							
8 hours per 24-hour period for those 18–21 years of age, 7 hours per 24-hour period for those older than 21 (HP2020 target: 72.8%)	43.8%[b,c,d] (42.3–45.3)	29.5%[a,e] (27.2–31.8)	27.3%[a,e] (24.8–29.8)	30.6%[a,e] (28.3–32.9)	42.4%[b,c,d] (39.6–45.1)	33.0% (31.9–34.2)	33.3% (32.2–34.4)
Hours of sleep per 24-hour period							
≤ 4 hours	6.2%[b,c,d] (5.4–6.9)	12.1%[a,e] (10.3–13.8)	13.3% [a,e] (11.3–15.3)	11.2% [a,e] (9.5–13.0)	5.2%[b,c,d] (4.1–6.4)	10.6% (9.7–11.4)	10.4% (9.6–11.2)
5–6 hours	47.7%[b,c,d] (46.2–49.2)	55.2% [a,e] (52.6–57.8)	56.1% [a,e] (53.2–58.9)	56.2% [a,e] (53.6–58.8)	49.5%[b,c,d] (46.7–52.3)	53.7% (52.4–55.0)	53.6% (52.3–54.8)
7+ hours	46.2%[b,c,d] (44.7–47.7)	32.7% [a,e] (30.3–35.2)	30.7% [a,e] (28.0–33.3)	32.6% [a,e] (30.2–35.0)	45.3%[b,c,d] (42.5–48.1)	35.7% (34.6–36.9)	36.0% (34.9–37.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

- Overall, just 33 percent of service members met the HP2020 standards for sufficient sleep. The HP2020 goal is 72.8 percent (Healthy People, 2020p). The result for service members is also a far smaller percentage than the general public: 68.3 of Americans got sufficient sleep, in accordance with the HP2020 definition (CDC, 2015c).
- Service members in the Marine Corps (13.3 percent) were significantly more likely than service members in the Air Force (6.2 percent) and Coast Guard (5.2 percent) to report getting an average of four hours or less of sleep per night over the past 30 days. Marine Corps service members were also significantly less likely than Air Force and Coast Guard service members to report sufficient sleep according to the HP2020 definition (27.3 percent, 43.8 percent, and 42.4 percent, respectively; Table 4.16).
- Officers were significantly more likely than all enlisted pay grade groups to report getting an average of seven or more hours of sleep per night over the past 30 days (37.5 percent for E1–E4, 30.8 percent for E5–E6, 26.1 percent for E7–E9, and 35.8 percent for W1–W5 versus 50.1 percent for O1–O3 and 43.7 percent for O4–O6). Junior officers were significantly more likely than mid-grade officers to report getting at least seven hours of sleep on an average night in the past 30 days. Junior officers were also significantly more likely

dents were asked about an average 24-hour period with no reference to the type of day. Furthermore, the 2018 survey also asked about average sleep over the past 30 days; the 2015 survey did not specify a time period.

Table 4.17
Past 30 Days Average Daily Hours of Sleep, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
HP2020 goal						
8 hours per 24-hour period for those 18–21 years of age, 7 hours per 24-hour period for those older than 21 (HP2020 target: 72.8%)	31.1%[c,e,f] (29.0–33.2)	30.8%[c,e,f] (29.1–32.6)	26.1%[a,b,d,e,f] (24.0–28.1)	35.8%[c,e] (29.3–42.3)	50.0%[a,b,c,d,f] (47.5–52.6)	43.7%[a,b,c,e] (41.5–45.9)
Hours of sleep per 24-hour period						
≤ 4 hours	11.7%[e,f] (10.0–13.3)	11.7% [e,f] (10.4–13.1)	12.6% [e,f] (11.1–14.1)	8.7% [e,f] (4.9–12.5)	3.5%[a,b,c,d] (2.6–4.3)	3.8%[a,b,c,d] (3.0–4.6)
5–6 hours	50.8%[b,c] (48.5–53.2)	57.4%[a,e,f] (55.5–59.4)	61.3%[a,e,f] (59.0–63.6)	55.4% (48.8–62.1)	46.5%[b,c,f] (43.9–49.0)	52.5%[b,c,e] (50.3–54.7)
7+ hours	37.5%[b,c,e,f] (35.3–39.7)	30.8%[a,c,e,f] (29.1–32.6)	26.1%[a,b,d,e,f] (24.0–28.1)	35.8%[c,e] (29.3–42.3)	50.1%[a,b,c,d,f] (47.5–52.6)	43.7%[a,b,c,e] (41.5–45.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 4.18
Past 30 Days Average Daily Hours of Sleep, by Gender

	Men	Women
HP2020 goal		
8 hours per 24-hour period for those 18–21 years of age, 7 hours per 24-hour period for those older than 21 (HP2020 target: 72.8%)	32.7%[a] (31.4–33.9)	36.5% (34.6–38.4)
Hours of sleep per 24-hour period		
≤ 4 hours[z]	10.6% (9.6–11.5)	9.4% (8.3–10.6)
5–6 hours	54.1%[a] (52.7–55.5)	50.7% (48.7–52.8)
7+ hours	35.3%[a] (34.0–36.6)	39.8% (37.9–41.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

to report sufficient sleep (50 percent) according to the HP2020 goals, compared with all other ranks (26.1 percent to 43.7 percent; Table 4.17).
- Women were significantly more likely than men to report an average of at least seven hours of sleep a night over the past 30 days (39.8 percent and 35.3 percent, respectively). Women were also significantly more likely to report getting sufficient sleep by the HP2020 standards than men (36.5 percent and 32.7 percent, respectively; Table 4.18).
- Non-Hispanic black respondents were significantly less likely than all other races (except those categorized as "other") to report getting seven hours of sleep or more a night. Full details of these findings are in Appendix Table D.11.

Sleep Quality

Respondents were asked how they would rate their sleep (very good to very bad) over the last 30 days. No standard definitions of "good" or "bad" were provided. Key findings are below, and full details are in Tables 4.19 through 4.21.

- Overall, 9.2 percent of service members rated their sleep as very good, and 6.1 percent rated their sleep as very bad (Table 4.19). An additional 29.7 percent rated their sleep as fairly bad.
- Significantly fewer service members in the Air Force rated their sleep as very bad or fairly bad compared with all other services except the Coast Guard.
- A significantly larger percentage of officers rated their sleep as very good or fairly good as compared with enlisted service members (Table 4.20). Officers also got significantly more sleep, which may account for their higher ratings of quality sleep (Table 4.17).
- There were no significant differences in self-reported quality of sleep by gender (Table 4.21) or by race/ethnicity or age group (Appendix Tables D.13 and D.14).

Table 4.19
Sleep Quality in Past 30 Days, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Very good	11.8%[b,c,d] (10.8–12.8)	8.5%[a] (7.1–9.8)	7.9%[a] (6.3–9.5)	8.5%[a] (6.9–10.1)	9.8% (8.1–11.5)	9.2% (8.5–9.9)	9.2% (8.5–9.9)
Fairly good	59.4%[b,c,d] (57.9–60.9)	53.5%[a,e] (50.9–56.1)	52.0% [a,e] (49.1–54.9)	53.7% [a,e] (51.1–56.3)	60.3%[b,c,d] (57.6–63.1)	54.8% (53.6–56.1)	55.0% (53.8–56.2)
Fairly bad	25.0%[b,c,d] (23.7–26.3)	31.3%[a,e] (28.9–33.7)	33.5%[a,e] (30.7–36.2)	30.4%[a,e] (28.1–32.8)	25.7%[b,c,d] (23.2–28.1)	29.8% (28.7–31.0)	29.7% (28.6–30.8)
Very bad	3.8%[b,c,d] (3.2–4.4)	6.7%[a] (5.4–8.0)	6.7%[a] (5.3–8.0)	7.4%[a,e] (5.8–9.0)	4.2%[d] (2.9–5.6)	6.2% (5.5–6.8)	6.1% (5.4–6.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 4.20
Sleep Quality in Past 30 Days, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Very good	9.5%[c,e,f] (8.1–10.8)	7.4%[e,f] (6.3–8.4)	6.5%[a,e,f] (5.4–7.6)	7.5% (3.2–11.9)	14.5%[a,b,c] (12.7–16.4)	12.6%[a,b,c] (11.1–14.0)
Fairly good	54.2%[e,f] (51.8–56.5)	53.8%[e,f] (51.8–55.7)	50.9% [e,f] (48.5–53.4)	49.2% [e,f] (42.6–55.8)	63.0%[a,b,c,d] (60.5–65.4)	61.2%[a,b,c,d] (59.0–63.3)
Fairly bad	29.7%[c,e,f] (27.5–31.8)	32.0% [e,f] (30.1–33.8)	35.3% [a,e,f] (32.9–37.8)	37.4% [e,f] (31.0–43.8)	20.4%[a,b,c,d] (18.4–22.4)	23.5%[a,b,c,d] (21.7–25.4)
Very bad	6.7%[e,f] (5.4–8.0)	6.9% [e,f] (5.8–8.0)	7.2% [e,f] (6.1–8.4)	5.9%[e] (2.5–9.3)	2.1%[a,b,c,d] (1.5–2.7)	2.8%[a,b,c] (2.1–3.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 4.21
Sleep Quality in Past 30 Days, by Gender

	Men	Women
Very good[z]	9.3% (8.5–10.1)	9.0% (7.9–10.0)
Fairly good[z]	55.1% (53.6–56.5)	54.6% (52.6–56.6)
Fairly bad[z]	29.5% (28.2–30.8)	30.4% (28.6–32.3)
Very bad[z]	6.1% (5.4–6.9)	6.0% (5.0–6.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Lack of Energy Due to Poor Sleep

Service members were asked to rate how much they were bothered by a lack of energy due to poor sleep over the past week. Responses ranged from not bothered at all to severely bothered. Key findings are below, and detailed findings can be found in Tables 4.22 through 4.24.

- Overall, 27.5 percent of service members reported being severely or moderately bothered by a lack of energy due to poor sleep over the past week (Table 4.22). This is more than double the rate of the general public: In 2012, 12.7 percent of the general public reported excessive daytime sleepiness due to lack of sleep (Ford et al., 2015).

Table 4.22
Lack of Energy Due to Poor Sleep in the Past Week, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Moderate to severe lack of energy	19.2%[b,c,d] (18.1–20.4)	29.4%[a,e] (27.0–31.7)	30.8% [a,e] (28.0–33.5)	31.7% [a,e] (29.2–34.2)	21.9%[b,c,d] (19.5–24.3)	27.6% (26.5–28.8)	27.5% (26.3–28.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 4.23
Lack of Energy Due to Poor Sleep in the Past Week, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Moderate to severe lack of energy	28.7%[e,f] (26.5–30.9)	28.6% [e,f] (26.8–30.3)	32.5% [e,f] (30.0–34.9)	26.5% (20.7–32.4)	18.9%[a,b,c] (17.0–20.8)	20.1%[a,b,c] (18.3–21.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 4.24
Lack of Energy Due to Poor Sleep in the Past Week, by Gender

	Men	Women
Moderate to severe lack of energy	26.6%[a] (25.3–27.9)	31.8% (29.9–33.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

- Service members in the Air Force were significantly less likely to report being bothered by a lack of sleep compared with other services, except the Coast Guard.
- Enlisted service members were more likely than officers to report being moderately to severely bothered by a lack of energy due to sleep loss in the past week (Table 4.23).
- Women were significantly more likely than men to report being bothered by moderate to severe lack of energy due to poor sleep in the past week (Table 4.24).
- There were no significant reported differences by race/ethnicity or age group. Full details are in Appendix Tables D.15 and D.16.

In terms of comparisons between the 2015 and 2018 HRBSs:

- Overall, there was a 6-percent decrease in those having a lack of energy due to poor sleep (ARR = 0.94, 95-percent CI: 0.90, 0.98).
- Within the service branches, only in the Army was there a significant difference in the percentage of service members who reported a decrease in lack of energy due to poor sleep across surveys. There was a 10-percent decrease in 2018 compared with 2015 (ARR = 0.90, 95-percent CI: 0.84, 0.97).
- Among E1–E4s, there was a 16-percent decrease in reported lack of energy due to poor sleep (ARR = 0.84, 95-percent CI: 0.77, 0.91), and among E5–E6s there was a 9-percent decrease (ARR = 0.91, 95-percent CI: 0.84, 0.98).
- There was a 13-percent decrease in the percentage of women who reported lack of energy due to poor sleep (ARR = 0.87, 95-percent CI: 0.82, 0.92).

Use of Medications to Sleep

Respondents were asked how often they used over-the-counter (OTC) or prescription medications to assist with sleep over the past 30 days. Response options ranged from not at all during the past 30 days to daily. Detailed findings are presented in Tables 4.25 through 4.27, and key findings are below:

- Overall, 10.8 percent of service members reported using OTC or prescription medications to sleep occasionally (i.e., less than once per week or one to two times per week) over the past 30 days, and 8.2 percent reported using these medications frequently (i.e., three or more times per week in the past 30 days; Table 4.31).
- Excluding those who reported occasional use of less than once per week and those who reported never using medications to help with sleep, 13.1 percent of service members used sleep medications at least once per week (CI = 12.3, 13.9; results not in table).

Table 4.25
Use of Sleep Medication in Past 30 Days, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Never (not in past 30 days)	82.1% (81.0–83.2)	79.7%[c,e] (77.7–81.8)	83.8%[b,d] (81.8–85.9)	79.6%[c,e] (77.5–81.6)	84.8%[b,d] (82.8–86.7)	80.9% (79.9–81.8)	81.0% (80.1–81.9)
Occasionally (less than once per week, 1–2 times per week)	10.8% (9.9–11.7)	10.6% (9.0–12.2)	9.3% (7.7–10.8)	12.4%[e] (10.7–14.0)	8.7%[d] (7.2–10.2)	10.9% (10.1–11.7)	10.8% (10.1–11.6)
Frequently (3 or more times per week)	7.1%[b] (6.4–7.9)	9.7%[a,e] (8.2–11.1)	6.9% (5.5–8.4)	8.1% (6.8–9.4)	6.5%[b] (5.2–7.8)	8.2% (7.6–8.9)	8.2% (7.5–8.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 4.26
Use of Sleep Medication in the Past 30 Days, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Never (not in past 30 days)	82.2%[c] (80.4–84.0)	79.7%[e] (78.2–81.3)	76.4%[a,e,f] (74.1–78.8)	77.8% (72.1–83.5)	84.0%[b,c] (82.3–85.6)	81.9%[c] (80.3–83.6)
Occasionally (less than once per week, 1–2 times per week)[z]	10.6% (9.2–12.0)	11.3% (10.1–12.6)	11.2% (9.0–13.3)	9.8% (6.0–13.6)	10.5% (9.1–11.9)	10.4% (9.0–11.7)
Frequently (3 or more times per week)	7.2%[c] (6.0–8.4)	8.9%[c,e] (7.8–10.0)	12.4%[a,b,e,f] (10.9–13.9)	12.4%[e] (7.6–17.2)	5.6%[b,c,d] (4.6–6.6)	7.7%[c] (6.6–8.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 4.27
Use of Sleep Medication in the Past 30 Days, by Gender

	Men	Women
Never (not past 30 days)	82.3%[a] (81.2–83.4)	74.4% (72.7–76.2)
Occasionally (less than once per week, 1–2 times per week)	10.1%[a] (9.2–11.0)	14.4% (13.0–15.9)
Frequently (3 or more times per week)	7.6%[a] (6.9–8.3)	11.1% (9.9–12.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

- A significantly larger percentage of service members in the Army (9.7 percent) reported using sleep medications three or more times a week over the past 30 days compared with service members in the Air Force and Coast Guard (7.1 and 6.5 percent, respectively; Table 4.25).
- Significantly more senior enlisted service members than service members in other pay grade groups (except warrant officers) reported using sleep medications three or more times per week over the past 30 days (Table 4.26).
- Significantly more women than men used sleep medications three or more times per week over the past 30 days (Table 4.27).
- There were no significant differences by race/ethnicity or age group. Full details are available in Appendix Tables D.17 and D.18.

Use of Substances to Stay Awake

Energy supplements, in the form of caffeinated beverages, OTC medication, and prescription medications, have been shown to be an ergogenic aid for endurance and to assist with anaerobic activities (Ballard, Wellborn-Kim, and Clauson, 2010; Kazemi et al., 2009; Ganio et al., 2009). However, they can also have negative consequences. Consumption of caffeine-containing drinks is associated with sleep disruptions and sleeping less than four hours per night (Lieberman et al., 2012). Population-level research shows that 15 percent of Americans reported having used a caffeinated energy drink in the previous 30 days (Lin et al., 2016). Energy drinks are also more likely to be used by younger, male service members (Lieberman et al., 2012; Stephens et al., 2014). In a sample of active-duty service members, over half reported using an energy drink in the past 30 days (53 percent), and 19 percent reported using an energy shot in the past 30 days. The most common reasons for consumption were to improve mental alertness (61 percent), mental endurance (29 percent), and physical endurance (20 percent). However, over half (65 percent) of those who reported using energy drinks or shots also reported side effects, such as palpitations, restlessness, and trouble sleeping (Stephens et al., 2014). Another study found that, among infantry soldiers seven months postdeployment, high use of energy drinks (two or more a day) was associated with mental health problems, aggressive behaviors, and fatigue (Toblin et al., 2018).

The 2018 HRBS asked participants to report frequency of past-30-day use of several substances to stay awake: energy drinks, other caffeinated beverages (e.g., tea, coffee), OTC medications, and prescription medications. In Tables 4.28 through 4.30, we present overall results for each measure, as well as results by service branch, pay grade, and gender; results by race/ethnicity and age group are available in Appendix D. Key findings include the following:

- Overall, service members reported using energy drinks routinely: 29.8 percent reported using them one to two times per week over the past 30 days, and 16.5 percent reported using them three or more times per week over the past 30 days (Table 4.28). In 2014, just 15 percent of the general population reported using energy drinks at all in the previous 30 days (Lin et al., 2016).
- Use of other caffeinated beverages, like coffee or tea, was also common. Twenty-six percent of service members reported using caffeinated beverages to stay awake one to two times a week over the past 30 days, and 47 percent reported using them three or more times per week (Table 4.28).
- Use of OTC medications to stay awake was relatively rare. Just 2.4 percent of service members reported using them one to two times per week, and 1.2 percent reported using them three or more times a week (Table 4.28).
- Use of prescription medication to stay awake was even rarer, with less than 1 percent of service members using them one to two times a week and 1.7 percent using them three or more times a week (Table 4.28). Few differences existed across service branch (Table 4.28) or pay grade (Table 4.29).
- A significantly larger percentage of service members in the Marine Corps (22.7 percent) reported using energy drinks three or more times a week over the past 30 days than in any other branch of service (Table 4.28). Similarly, significant fewer Marines (43.1 percent) reported never using energy drinks compared with the other service branches.

Table 4.28
Use of Substances to Stay Awake in the Past 30 Days, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Past 30-day use of energy drinks to stay awake							
Never (not in past 30 days)	57.6%[c,d] (56.1–59.1)	55.0%[c,e] (52.4–57.6)	43.1%[a,b,d,e] (40.3–45.9)	53.1%[a,c,e] (50.5–55.7)	61.5%[b,c,d] (58.7–64.4)	53.5% (52.2–54.7)	53.7% (52.5–55.0)
1–2 times per week	28.1%[c] (26.7–29.5)	29.3% (26.9–31.7)	34.2%[a,e] (31.5–37.0)	29.7% (27.2–32.1)	28.3%[c] (25.6–31.0)	29.8% (28.6–31.0)	29.8% (28.6–30.9)
3 or more times per week	14.2%[c,e] (13.1–15.3)	15.6% [c,e] (13.6–17.6)	22.7%[a,b,d,e] (20.2–25.2)	17.3%[c,e] (15.2–19.3)	10.2%[a,b,c,d] (8.4–11.9)	16.7% (15.7–17.7)	16.5% (15.5–17.5)
Past 30-day use of other caffeinated beverages to stay awake							
Never (not in past 30 days)	28.8%[d,e] (27.5–30.2)	29.7%[d,e] (27.2–32.1)	27.2%[d] (24.5–29.9)	21.2%[a,b,c] (19.0–23.5)	22.6%[a,b] (20.2–25.0)	27.0% (25.8–28.1)	26.8% (25.7–28.0)
1–2 times per week[z]	25.8% (24.5–27.2)	26.5% (24.1–28.8)	26.3% (23.7–28.9)	25.5% (23.1–27.9)	20.0% (17.8–22.3)	26.0% (24.9–27.2)	25.9% (24.7–27.0)
3 or more times per week	45.3%[d,e] (43.8–46.8)	43.9%[d,e] (41.3–46.4)	46.5%[d,e] (43.7–49.4)	53.3%[a,b,c] (50.6–55.9)	57.4%[a,b,c] (54.6–60.2)	47.0% (45.7–48.2)	47.3% (46.1–48.5)
Past 30-day use of OTC medications to stay awake							
Never (not in past 30 days)	97.4%[d] (97.0–97.9)	96.5% (95.5–97.4)	96.3% (95.1–97.6)	95.2%[a,e] (94.1–96.4)	98.0%[d] (97.2–98.8)	96.4% (95.9–96.9)	96.4% (96.0–96.9)
1–2 times per week	1.6%[d] (1.2–2.0)	2.2% (1.4–3.0)	2.8% (1.7–3.9)	3.4%[a] (2.4–4.4)	1.6% (0.9–2.4)	2.4% (2.0–2.8)	2.4% (2.0–2.8)
3 or more times per week[z]	1.0% (0.7–1.3)	1.4% (0.8–1.9)	0.9% (0.3–1.4)	1.4% (0.8–1.9)	0.4% (0.1–0.6)	1.2% (0.9–1.5)	1.2% (0.9–1.4)
Past 30-day use of prescription medications to stay awake							
Never	98.3%[b] (97.9–98.7)	96.8%[a,e] (95.9–97.6)	98.0% (97.1–98.9)	97.4%[e] (96.6–98.2)	99.1%[b,d] (98.7–99.6)	97.5% (97.1–97.9)	97.5% (97.2–97.9)
1–2 times per week[z]	0.5% (0.3–0.7)	0.8% (0.3–1.2)	0.9% (0.3–1.5)	0.9% (0.4–1.3)	0.4% (0.0–0.7)	0.8% (0.5–1.0)	0.7% (0.5–1.0)
3 or more times per week	1.2%[b] (0.9–1.5)	2.5%[a,e] (1.7–3.2)	1.1% (0.4–1.8)	1.7%[e] (1.0–2.4)	0.5%[b,d] (0.1–0.9)	1.8% (1.4–2.1)	1.7% (1.4–2.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 4.29
Use of Substances to Stay Awake in the Past 30 Days, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Past 30-day use of energy drinks to stay awake						
Never (not in past 30 days)	49.3%[c,d,e,f] (46.9–51.6)	48.5% [c,d,e,f] (46.5–50.4)	57.9%[a,b,e,f] (55.5–60.3)	66.5%[a,b,f] (60.1–72.9)	65.0%[a,b,c,f] (62.5–67.5)	80.9%[a,b,c,d,e] (79.1–82.7)
1–2 times per week	32.9%[c,e,f] (30.7–35.1)	31.8%[c,e,f] (29.9–33.6)	26.0%[a,b,f] (23.9–28.1)	25.0%[f] (19.4–30.7)	24.8%[a,b,f] (22.6–27.1)	14.3%[a,b,c,d,e] (12.7–15.9)
3 or more times per week	17.8%[e,f] (16.0–19.7)	19.8%[c,d,e,f] (18.2–21.4)	16.1%[b,e,f] (14.3–17.9)	8.5%[b] (4.0–13.0)	10.2%[a,b,c,f] (8.5–11.8)	4.8%[a,b,c,e] (3.8–5.8)
Past 30-day use of other caffeinated beverages to stay awake						
Never (not in past 30 days)	32.0%[b,c,e,f] (29.7–34.2)	24.5%[a] (22.7–26.3)	21.2%[a] (19.3–23.0)	23.2% (17.3–29.0)	20.7%[a] (18.7–22.8)	23.2%[a] (21.4–25.1)
1–2 times per week	30.6%[b,c,d,e,f] (28.4–32.8)	24.8%[a,c,f] (23.1–26.5)	18.8%[a,b,e,f] (16.9–20.6)	20.2%[a] (14.8–25.5)	23.6%[a,c,f] (21.3–25.9)	15.0%[a,b,c,e] (13.4–16.6)
3 or more times per week	37.5%[b,c,d,e,f] (35.2–39.7)	50.7%[a,c,e,f] (48.7–52.7)	60.1%[a,b] (57.7–62.4)	56.6%[a] (50.0–63.2)	55.7%[a,b,f] (53.1–58.2)	61.8%[a,b,e] (59.6–63.9)
Past 30-day use of OTC medications to stay awake						
Never (not in past 30 days)	95.9%[e,f] (95.0–96.9)	96.3%[e,f] (95.5–97.0)	96.5% (95.8–97.3)	97.3% (95.2–99.4)	97.8%[a,b] (97.1–98.5)	98.0%[a,b] (97.3–98.6)
1–2 times per week	3.2%[c,e,f] (2.3–4.0)	2.2% (1.6–2.8)	1.7%[a] (1.2–2.2)	1.0% (0.2–1.7)	1.3%[a] (0.8–1.9)	1.4%[a] (0.8–1.9)
3 or more times per week	0.9% (0.5–1.3)	1.5% (1.0–2.1)	1.8%[f] (1.2–2.3)	1.7% (0.0–3.7)	0.9% (0.5–1.3)	0.7%[c] (0.3–1.0)
Past 30-day use of prescription medications to stay awake						
Never (not in past 30 days)	97.6% (96.9–98.4)	97.3%[e] (96.6–97.9)	96.3%[e,f] (95.4–97.1)	97.7% (96.0–99.4)	98.7%[b,c] (98.2–99.2)	98.3%[c] (97.7–98.9)
1–2 times per week[x]	0.9% (0.5–1.4)	0.7% (0.4–1.0)	0.8% (0.4–1.2)	0.1% (0.0–0.3)	0.3% (0.0–0.5)	0.4% (0.1–0.7)
3 or more times per week	1.4% (0.8–2.0)	2.0% (1.5–2.6)	2.9%[e,f] (2.1–3.7)	2.2% (0.5–3.9)	1.1%[c] (0.6–1.5)	1.3%[c] (0.8–1.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

Table 4.30
Use of Substances to Stay Awake in the Past 30 Days, by Gender

	Men	Women
Past 30-day use of energy drinks to stay awake		
Never (not in past 30 days)	51.0%[a] (49.6–52.4)	67.5% (65.5–69.4)
1–2 times per week	31.1%[a] (29.8–32.4)	23.2% (21.4–24.9)
3 or more times per week	17.9%[a] (16.8–19.1)	9.4% (8.2–10.5)
Past 30-day use of other caffeinated beverages to stay awake		
Never (not in past 30 days)[z]	27.0% (25.7–28.3)	25.9% (24.0–27.8)
1–2 times per week[z]	25.8% (24.5–27.1)	26.2% (24.4–28.0)
3 or more times per week[z]	47.2% (45.8–48.6)	47.9% (45.9–49.9)
Past 30-day use of OTC medications to stay awake		
Never (not in past 30 days)[z]	96.4% (95.9–97.0)	96.5% (95.6–97.3)
1–2 times per week[z]	2.4% (1.9–2.8)	2.5% (1.8–3.2)
3 or more times per week[z]	1.2% (0.9–1.5)	1.0% (0.6–1.4)
Past 30-day use of prescription medications to stay awake		
Never (not in past 30 days)[z]	97.6% (97.1–98.0)	97.4% (96.7–98.1)
1–2 times per week[z]	0.7% (0.5–0.9)	1.0% (0.4–1.5)
3 or more times per week[z]	1.7% (1.4–2.1)	1.6% (1.2–2.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- A significantly larger percentage of service members in the Navy and Coast Guard reported using other caffeinated beverages three or more times a week over the past 30 days than did service members in the Army, Air Force, and Marine Corps (Table 4.28).
- Senior officers were significantly more likely to report never having used energy drinks in the past 30 days than were all other pay grade groups (Table 4.29). Junior enlisted service members were more likely than all other pay grade groups to report using other caffein-

ated beverages to stay awake one to two times in the past week over the past 30 days and were also more likely to report never having used them in the past 30 days.

- Consistent with existing literature (Lieberman et al., 2012; Stephens et al., 2014), men were significantly more likely than women to report using energy drinks both one to two days a week and three or more times a week over the past 30 days (Table 4.30). However, there were no statistically significant differences between reported use of other caffeinated beverages, OTC medications, or prescription medications to stay awake between men and women.
- Few systematic differences across types of substances used to stay awake were found by race/ethnicity (Appendix Table D.19).
- Respondents between the ages of 17 and 24 were significantly more likely than older age groups to use energy drinks to stay awake but less likely than all other age groups to report using caffeinated beverages (Appendix Table D.20).

Summary

This chapter discussed a range of health promotion activities, all of which have the potential to contribute to the overall readiness of the force. Even though service members are required to have an annual routine physical, we found that less than three-quarters had done so. Not having data from such exams can hinder the military's ability to track other health promotion markers, such as weight, physical fitness, chronic conditions, and sleep habits.

The military is essentially meeting the HP2020 goals for normal weight and obesity (Healthy People, 2020j; Healthy People, 2020k); however, the overall rate of obesity in the military increased by roughly 7 percent between the 2015 and 2018 HRBSs, with the increase largely coming from the Navy. Being at a normal weight is critical to mission readiness because not only can extra weight impact the ability of service members to perform their duties, but obesity is also often comorbid with diabetes, asthma, hypertension, and joint pain (Guh et al., 2009; National Institutes of Health, 1998; Heinrich et al., 2008; Army Public Health Center, 2015; Rush, LeardMann, and Crum-Cianflone, 2016).

One possible reason that the military is currently meeting HP2020 weight goals is the prevalence of physical activity among service members. Well over half of service members reported that they engaged in MPA at least 150 minutes per week, and about half engaged in VPA more than 150 minutes per week. Additionally, three-quarters of service members reported engaging in strength training at least one day a week. These results for MPA, VPA, and strength training all surpass the HP2020 goals for physical activity (Healthy People, 2020l; Healthy People, 2020m; Healthy People, 2020n). However, a statistically significant smaller portion of women engaged in all of these activities. Physical fitness is critical to being able to complete many of the tasks associated with personnel readiness (Army Public Health Center, 2015).

Time spent watching a screen, indicative of sedentary behavior, also has the potential to impact readiness, as higher levels of screen time are associated with obesity, mortality, cardiometabolic disease, and depression (Owen et al., 2010; Stamatakis, Hamer, and Dunstan, 2011; Madhav, Sherchand, and Sherchan, 2017; Thorp et al., 2011). We found that junior enlisted service members, who are also the youngest service members, were, on average, more likely to report engaging in five or more hours of screen time per day.

We also found that sleep health is a major concern, and, like physical activity and sedentary behavior, sleep health can have serious implications for both mission readiness and performance. Lack of sleep or poor sleep is associated with adverse mental, physical, and cognitive functioning, including depression, anxiety, PTSD, TBI, accidents and injuries, cardiovascular events, and mortality (Grandou et al., 2019; Kasasbeh, Chi, and Krishnaswamy, 2006; Knutson et al., 2006; Kredlow et al., 2015; Seelig et al., 2016). According to the survey data presented in this chapter, roughly one-third of service members reported getting the recommended seven or more hours of sleep per night, one-quarter rated their sleep as very bad or fairly bad, and one-quarter of respondents reported being severely or moderately bothered by a lack of sleep. Furthermore, nearly one-fifth used sleep medication to help with sleep at least once a week, on average. Conversely, one-third used energy drinks at least once a week, and almost three-quarters used other caffeinated beverages to stay awake in the past 30 days. Use of energy drinks, in particular, was generally more common among younger service members and among enlisted service members. Use of OTC and prescription medications was rare.

CHAPTER FIVE

Substance Use

This chapter details self-reported substance use across the armed forces. We provide some background information and then present percentages of service members consuming alcohol in various patterns, using tobacco in a variety of forms, and using illicit and prescription drugs (including use as prescribed and misuse).

Each section highlights the importance or relevance of the substance use topic to the general population and to the military and then provides an analysis of each topic by service branch. When relevant, we present an analysis of each topic by pay grade and gender. Analyses by race/ethnicity and age group can be found in Appendix D. Key measures used are described in the applicable sections, and additional details about these measures can be found in Appendix C. All analyses demonstrated statistically significant omnibus tests (a Rao-Scott chi-square test for categorical variables and F-tests for continuous variables), unless otherwise noted in the tables. Statistically significant group differences (pairwise comparisons) are presented within each table. However, only those statistically significant differences that the research team's subject-matter experts determined to be substantively meaningful (i.e., those that could be used to change or develop policy or contribute to inequalities in health outcomes across subgroups) are discussed in the text.

Where appropriate, the text compares service members with civilian benchmarks (i.e., HP2020 goals) and/or current prevalence rates among U.S. adults; however, we caution readers that making direct comparisons between the military and civilian populations ignores the fact that the two groups are very different on some sociodemographic characteristics (e.g., gender, age) related to the health outcomes and health behaviors of interest. Readers should also use caution when interpreting comparisons between the 2018 HRBS results and other populations or prior versions of the HRBS because these comparisons are not necessarily statistically significant and could simply reflect sampling variability across the two samples being compared; however, when applicable, the report does compare results between the 2015 and 2018 HRBSs using a regression framework to control for some of the methodological differences related to survey implementation and analysis (see Chapter Two). When interpreting changes across surveys, it is important to keep in mind what the base for that increase is. That is, a 20-percent increase for an outcome with a 2015 prevalence of 2 percent represents a much smaller increase in absolute value than the same percentage increase for an outcome with a 2015 prevalence of 25-percent (0.4 versus 5.0 percent). Thus, extremely large percentage increases (or decreases) across surveys are often substantively small, while the percentage changes appear quite large.

Alcohol

Most American adults have consumed alcohol during their lifetime, and more than half of Americans aged 12 and older have consumed alcohol at least once in the past month (Substance Abuse and Mental Health Services Administration, 2018). Heavy drinking is a leading preventable cause of death both in the United States and worldwide (Gore et al., 2011; National Center for Health Statistics, 2017b; Roerecke and Rehm, 2013) and has been linked to numerous problems, including substance use disorders, occupational problems, relationship difficulties, and poor physical and mental health (Abdul-Rahman et al., 2018; Kranzler and Soyka, 2018; Odlaug et al., 2016). Decades of research with military populations have demonstrated that heavy alcohol use is also problematic in military populations, with both active-duty and separated military populations reporting high rates of alcohol use disorder and resulting negative consequences (Jones and Fear, 2011; Schumm and Chard, 2012; Servies et al., 2012; Teeters et al., 2017). Heavy drinking by military personnel has been linked to substance use disorders, poor health, limitations in role functioning (e.g., not being able to fulfill service requirements or perform job duties), mental health problems, aggressive and violent behaviors, and poor relationship functioning (Ames et al., 2008; Fink et al., 2016; Jacobson et al., 2008; Waller, McGuire, and Dobson, 2015).

This section describes alcohol use among service members, including the percentages of personnel who are binge drinkers and heavy drinkers. It also reports on consequences of drinking, including serious negative consequences from drinking, risky drinking and driving behavior, and alcohol-related productivity loss. Perceptions of the military drinking culture are also described. For each alcohol measure, we report prevalence overall and by service branch, pay grade, and gender; results by race/ethnicity and age group are available in Appendix D. Where available, we report on comparable percentages from prior HRBSs and the U.S. general population.

Binge Drinking and Heavy Drinking

Binge drinking was defined as consuming five or more drinks on the same occasion for men and consuming four or more drinks on the same occasion for women. This definition is consistent with the definition used in the 2018 National Survey on Drug Use and Health (NSDUH; Substance Abuse and Mental Health Services Administration, 2019a) and with the definition used in the 2015 HRBS (Meadows et al., 2018). *Heavy drinking* was defined by reporting binge drinking on at least one or two days a week in the past 30 days (i.e., approximately four or five occasions in the past 30 days). This definition is similar to the heavy drinking definition used by the NSDUH, which is binge drinking on five or more days in the past 30 days. The 2018 HRBS used a slightly lower threshold given the categorical response options presented to service members as compared with the actual number of days in the past 30 days a person engaged in binge drinking on the 2018 NSDUH. This discrepancy in response options should be considered when reviewing the findings comparing heavy drinking rates across the 2018 HRBS and the 2018 NSDUH (Substance Abuse and Mental Health Services Administration, 2019a). To provide another comparable estimate from the NSDUH, we obtained the data from the 2017 NSDUH (2018 data were not available at the time of writing) and calculated a variation of the heavy drinking definition: binge drinking on four or more occasions in the past 30 days. We include comparisons with the 2018 estimates of heavy drinking and both the original 2017 NSDUH definition and our calculated variation definition. The 2018 HRBS

definition of heavy drinking is also similar to the definition used in the 2015 HRBS (Meadows et al., 2018) but is not directly comparable to values presented within the 2015 HRBS report. However, we were able to recalculate 2015 HRBS heavy drinking rates based on the 2018 HRBS definition and response options, which allowed for a direct comparison between 2018 and 2015 HRBS heavy drinking. We present this comparison below.

Tables 5.1 through 5.3 present the percentages of service members who meet criteria for binge drinking and heavy drinking, overall and by service branch, pay grade, and gender. Key findings include the following:

- In the 2018 HRBS, 34.0 percent of all service members reported binge drinking in the past 30 days (Table 5.1).
- In the most recent comparable U.S. general population estimate of adults age 18 and above from the 2018 NSDUH, 26.5 percent of adults reported binge drinking in the past 30 days (Substance Abuse and Mental Health Services Administration, 2019c, Table 2.30B). Some of the disparity between the military and general populations is likely due to the high percentage of men and young adults in the armed forces; both groups are more likely to binge drink within the U.S. general population (Substance Abuse and Mental Health Services Administration, 2019c, Tables 2.30B and 2.32B).

Table 5.1
Alcohol Use in Past 30 Days, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Binge drinking	24.1%[b,c,d,e] (22.8–25.4)	30.5%[a,c,d] (28.1–32.9)	44.9%[a,b,e] (42.0–47.7)	42.7%[a,b,e] (40.2–45.3)	33.9%[a,c,d] (31.2–36.6)	34.0% (32.8–35.3)	34.0% (32.9–35.2)
Heavy drinking	5.0%[b,c,d,e] (4.4–5.7)	8.5%[a,c,d] (6.9–10.0)	15.3%[a,b,e] (13.2–17.3)	13.6%[a,b,e] (11.7–15.5)	7.8%[a,c,d] (6.2–9.3)	9.9% (9.1–10.7)	9.8% (9.0–10.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 5.2
Alcohol Use in Past 30 Days, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Binge drinking	35.2%[f] (33.0–37.5)	34.3%[f] (32.4–36.2)	31.8%[e,f] (29.6–34.0)	30.4% (24.2–36.6)	37.1%[c,f] (34.6–39.6)	24.3%[a,b,c,e] (22.4–26.2)
Heavy drinking	10.8%[e,f] (9.3–12.4)	10.6%[e,f] (9.3–11.9)	9.3%[f] (7.9–10.6)	8.8% (5.1–12.6)	7.1%[a,b,f] (5.8–8.5)	4.8%[a,b,c,e] (3.9–5.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 5.3
Alcohol Use in Past 30 Days, by Gender

	Men	Women
Binge drinking	35.2%[a] (33.8–36.6)	28.2% (26.4–30.1)
Heavy drinking	10.6%[a] (9.7–11.5)	5.9% (4.8–6.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

- The HP2020 target for binge drinking in the general population is for 24.2 percent or less of adults to engage in binge drinking (Healthy People, 2020o), which is well below the 2018 HRBS estimate.
- Across all services, 9.8 percent of personnel reported heavy drinking in the past 30 days (Table 5.1). In the U.S. adult population in 2018, 6.6 percent reported heavy drinking in the past month (Substance Abuse and Mental Health Services Administration, 2019c, Table 2.31B); however, as noted, this is not a direct comparison due to variations in definitions between the 2018 HRBS and the 2018 NSDUH. Using the recalculated variation of the 2017 NSDUH heavy drinking rates, we found that 8.9 percent (CI: 8.4–9.3) of the U.S. adult population in 2017 reported heavy drinking.
- Binge drinking and heavy drinking varied substantially by service branch. Both binge drinking and heavy drinking were highest in the Marine Corps and Navy, with Marines reporting significantly higher rates of both binge drinking and heavy drinking than all other services except the Navy, and the Navy reporting significantly higher rates of binge drinking and heavy drinking than all other services except the Marines. The Air Force had the lowest percentages of binge drinking and heavy drinking (Table 5.1).
- Binge drinking and heavy drinking varied by pay grade. For binge drinking, senior officers (O4–O6) reported significantly lower rates of binge drinking than all other pay grades except warrant officers. Junior officers reported significantly higher rates than senior enlisted personnel. For heavy drinking, senior officers (O4–O6) again reported significantly lower rates of heavy drinking than all other pay grades except warrant officers. Junior enlisted personnel (E1–E4) reported significantly higher rates than junior officers (O1–O3) and senior officers (O4–O6). Noncommissioned officers (NCOs; E5–E6) also reported higher rates of heavy drinking than junior and senior officers. (Table 5.2).
- Binge drinking and heavy drinking were more common among men than among women (Table 5.3). For example, the rate of heavy drinking was nearly double among men than among women.
- For age, progressively higher percentages of binge drinking and heavy drinking were present with decreasing age (Appendix Table D.22). For race/ethnicity, there were no significant differences between groups for either binge drinking or heavy drinking (Appendix Table D.21).

In terms of comparisons between the 2015 and 2018 HRBSs:

- The percentage of service members who reported binge drinking at least once in the past 30 days significantly increased between the 2015 and 2018 HRBSs, by roughly 14 percent (ARR = 1.14, 95-percent CI: 1.10, 1.18). The percentage of service members who reported heavy drinking in the past 30 days significantly increased between the 2015 and 2018 HRBSs, by roughly 32 percent (ARR = 1.32, 95-percent CI: 1.21, 1.45).
- Compared with the 2015 HRBS, there were significant within–service branch changes in the rate of binge drinking in the past 30 days. Specifically, the rate of binge drinking significantly increased in the Air Force (ARR = 1.17, 95-percent CI: 1.08, 1.27), Marine Corps (ARR: 1.12, 95-percent CI: 1.04, 1.21), Navy (ARR = 1.20, 95-percent CI: 1.12, 1.29), and Coast Guard (ARR = 1.10, 95-percent CI: 1.01, 1.19). The change in the Army did not reach statistical significance (ARR = 1.08, 95-percent CI: 1.00, 1.18). For heavy drinking, there were significant within–service branch changes between the 2015 and 2018 HRBSs. Specifically, the rate of heavy drinking significantly increased in the Air Force (ARR = 1.44, 95-percent CI: 1.14, 1.81), Marine Corps (ARR: 1.32, 95-percent CI: 1.10, 1.59), Navy (ARR = 1.46, 95-percent CI: 1.23, 1.75), and Coast Guard (ARR = 1.42, 95-percent CI: 1.14, 1.77). The change in the Army did not reach statistical significance (ARR = 1.03, 95-percent CI: 0.85, 1.25).
- Compared with the 2015 HRBS, there were significant changes in the rates of binge drinking for service members within each of the pay grades except for junior enlisted personnel (E1–E4; ARR = 1.05; 95-percent CI: 0.97, 1.13) and warrant officers (ARR = 1.17; 95-percent CI: 0.98, 1.39). All other pay grades significantly increased on binge drinking: NCOs by 15 percent (ARR = 1.15; 95-percent CI: 1.07, 1.24), senior NCOs by 33 percent (ARR = 1.33; 95-percent CI: 1.22, 1.46), junior officers by 9 percent (ARR = 1.20; 95-percent CI: 1.01, 1.18), and senior officers by 12 percent (ARR = 1.12; 95-percent CI: 1.02, 1.23). There were also significant changes in the rates of heavy drinking for service members within each of the pay grades except for junior enlisted personnel (E1–E4; ARR = 1.09; 95-percent CI: 0.92, 1.30). All other pay grades significantly increased on heavy drinking: NCOs by 40 percent (ARR = 1.40; 95-percent CI: 1.16, 1.67), senior NCOs by 59 percent (ARR = 1.59; 95-percent CI: 1.29, 1.97), warrant officers by 55 percent (ARR = 1.55; 95-percent CI: 1.05, 2.30), junior officers by 29 percent (ARR = 1.29; 95-percent CI: 1.03, 1.61), and senior officers by 29 percent (ARR = 1.29; 95-percent CI: 1.01, 1.65).
- Binge drinking increased for both men and women when compared with the 2015 HRBS. Men increased by 12 percent (ARR = 1.12; 95-percent CI: 1.08, 1.17), and women increased by 18 percent (ARR = 1.18; 95-percent CI: 1.10, 1.26). Heavy drinking also increased for both men and women when compared with the 2015 HRBS. Men increased by 33 percent (ARR = 1.33; 95-percent CI: 1.20, 1.47), and women increased by 30 percent (ARR = 1.30; 95-percent CI: 1.08, 1.56).

Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking

Tables 5.4 through 5.6 display the percentages of personnel overall and in various subgroups who reported any serious consequences from drinking, any risky drinking and drinking behaviors, and any alcohol-related job productivity loss. *Any alcohol consequences* was defined as expe-

Table 5.4
Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any alcohol consequences	3.7%[b,c,d] (3.1–4.2)	5.7%[a,c] (4.4–6.9)	10.4%[a,b,e] (8.5–12.3)	7.4%[a,e] (6.0–8.9)	4.6%[c,d] (3.3–5.9)	6.3% (5.7–7.0)	6.2% (5.6–6.9)
Risky drinking and driving behavior	2.9%[b,d,e] (2.4–3.4)	5.4%[a] (4.1–6.8)	4.4% (3.2–5.7)	6.1%[a] (4.7–7.5)	5.7%[a] (4.2–7.1)	4.8% (4.2–5.5)	4.9% (4.3–5.5)
Any productivity loss from drinking	2.8%[b,c,d] (2.3–3.3)	5.2%[a,c] (4.0–6.4)	9.6%[a,b,e] (7.8–11.3)	7.3%[a,e] (6.0–8.7)	3.5%[c,d] (2.6–4.5)	5.8% (5.1–6.4)	5.7% (5.1–6.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 5.5
Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any alcohol consequences	8.4%[b,c,e,f] (7.1–9.7)	5.6%[a,c,f] (4.7–6.6)	3.5%[a,b] (2.6–4.3)	4.0% (0.5–7.6)	4.4%[a] (3.4–5.4)	2.7%[a,b] (2.0–3.4)
Risky drinking and driving behavior	5.8%[f] (4.5–7.0)	4.7% (3.8–5.6)	3.9% (3.0–4.7)	2.5% (1.0–4.0)	3.6% (2.8–4.5)	3.6%[a] (2.8–4.5)
Any productivity loss from drinking[z]	6.4% (5.2–7.6)	5.4% (4.5–6.4)	4.7% (3.7–5.7)	4.2% (1.9–6.5)	5.5% (4.3–6.6)	4.7% (3.7–5.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

rience of any of ten assessed alcohol-related consequences: finding it harder to handle problems because of drinking, receiving military punishment because of drinking, being arrested because of drinking (not driving related), getting a lower score on an efficiency or performance report due to drinking, hitting a spouse of significant other after drinking, getting into a fight when drinking, engaging in regretted sexual activity, being arrested for driving under the influence of alcohol, being hurt in an accident because of drinking, or causing an accident because of drinking. This measure is not directly comparable to the 2015 HRBS (Meadows et al., 2018) because the consequences assessed were modified. *Any risky drinking and driving*

Table 5.6
Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Gender

	Men	Women
Any alcohol consequences	6.0%[a] (5.3–6.7)	7.7% (6.4–8.9)
Risky drinking and driving behavior[z]	4.8% (4.1–5.5)	5.2% (4.3–6.1)
Any productivity loss from drinking	6.0%[a] (5.3–6.7)	4.2% (3.4–5.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

was defined as engaging in past-year driving behavior when either the service member was driving and had too much to drink or when the service member was the passenger while someone else who had too much to drink was driving a car or other vehicle. This measure is also not directly comparable to the 2015 HRBS. *Any productivity loss from drinking* was defined in the same way as it was on the 2015 HRBS and therefore is comparable across surveys. Productivity was assessed with six items: getting hurt on the job due to drinking, being late for work or leaving work early because of drinking (including a hangover or illness caused by drinking), not coming to work at all due to drinking (including a hangover or illness or accident caused by drinking), working at a lower performance level due to drinking, being drunk while working, and reporting to work drunk after being off duty. Key findings from all active component respondents include the following:

- In the 2018 HRBS, 6.2 percent of service members experienced one or more serious consequences from drinking (Table 5.4).
- The percentage of personnel reporting any risky drinking and driving behavior in the past year was 4.9 percent (Table 5.4).
- Across the services, 5.7 percent reported work-related productivity loss from alcohol use (Table 5.4).
- For all three of these negative outcomes associated with drinking, significant differences emerged between the services (Table 5.4). The Marine Corps reported significantly higher rates of alcohol consequences than all other services except the Navy, with rates more than double those from the Air Force and Coast Guard. For risky drinking and driving behavior, the Air Force had the lowest rates, with significantly less risky drinking and driving compared with the Army, Navy, and Coast Guard. The Marine Corps also reported the highest rate of productivity loss due to drinking, with significantly higher rates than the Air Force, Army, and Coast Guard, but not the Navy. The rates of productivity loss among both Marine Corps and Navy personnel were double the rates from the Air Force and Coast Guard.
- Junior enlisted (E1–E4) service members experienced the highest rates of any serious alcohol consequences (Table 5.5). They also reported higher rates of drinking and driving

behavior compared with senior officers (O4–O6). There were no significant differences in the rates of productivity loss across the pay grades.
- Men and women reported similar rates of risky drinking and driving behaviors, but women had higher rates of serious alcohol consequences than men did, while men had higher rates of productivity loss due to drinking than women did (Table 5.6).
- Younger service members had higher rates on all three alcohol consequences factors than did older service members (Appendix Table D.24). There were few observed differences between percentages of service members from different racial/ethnic groups on the experience of negative outcomes from drinking (Appendix Table D.23). The exception was non-Hispanic Asian service members, who reported lower rates of serious alcohol consequences and risky drinking and driving behaviors compared with most other racial/ethnic groups.

In terms of comparisons between the 2015 and 2018 HRBSs:

- The percentage of service members who reported work-related productivity loss from alcohol use on the 2018 HRBS was not significantly different from the 2015 HRBS rate.
- There were no significant differences in rates of productivity loss due to drinking between the 2015 and 2018 HRBSs by service branch, pay grade, or gender.

Military Drinking Culture

Tables 5.7 through 5.9 display service members' perceptions of military alcohol culture. *Military culture supportive of drinking* was defined as agreement with at least one of four statements related to finding it hard to fit in with one's command if they do not drink, belief that drinking is part of being in one's unit, belief that everyone is encouraged to drink at social events, and belief that leaders are tolerant of drunkenness when personnel are off duty. This scale is not directly comparable to the 2015 HRBS (Meadows et al., 2018) because the items and response scale were modified. Key findings include the following:

- More than one-quarter (28.2 percent) of all service members agreed with at least one of the statements that military culture was supportive of drinking (Table 5.7).
- Agreement that military culture was supportive of drinking varied by service branch (Table 5.7). Perceptions of the military culture as supportive of drinking were most

Table 5.7
Perception of Military Drinking Culture, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Military culture supportive of drinking	27.3%[c,e] (26.0–28.7)	26.8%[c,e] (24.3–29.2)	34.0%[a,b,e] (31.3–36.8)	29.0%[e] (26.5–31.5)	19.1%[a,b,c,d] (16.7–21.4)	28.5% (27.3–29.7)	28.2% (27.1–29.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 5.8
Perception of Military Drinking Culture, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Military culture supportive of drinking	35.2%[b,c,d,f] (32.9–37.4)	24.5%[a,c,e,f] (22.7–26.2)	15.0%[a,b,e] (13.3–16.6)	15.7%[a,e] (9.9–21.4)	31.6%[b,c,d,f] (29.2–34.0)	17.2%[a,b,e] (15.5–19.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 5.9
Perception of Military Drinking Culture, by Gender

	Men	Women
Military culture supportive of drinking	28.8%[a] (27.5–30.1)	25.3% (23.5–27.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

common among Marines, who agreed with the statements at significantly higher rates than all other branches except the Navy. Perceptions of the military culture as supportive of drinking were least common among Coast Guard personnel, who reported a significantly lower rate of agreement than all other service branches.

- Junior enlisted service members (E1–E4) were the most likely to see military culture as supportive of drinking (Table 5.8). However, similar rates of agreement that military culture supported drinking were observed among junior enlisted service members and junior officers (O1–O3). Both junior enlisted service members and junior officers reported rates of agreement that military culture was supportive of drinking about double those of other pay grades (i.e., E7–E9, W1–W5, and O4–O6).
- Women were less likely than men to see military culture as supportive of drinking (Table 5.9).
- Younger service members were substantially more likely to see the military culture as supportive of drinking (Appendix Table D.26). Non-Hispanic white service members and service members from racial/ethnic groups categorized as "other" reported the highest agreement that military culture was supportive of drinking, with non-Hispanic Asian service members being the least likely to report such agreement (Appendix Table D.25).

Tobacco

Tobacco use is the largest cause of preventable disease and death in the United States (National Center for Chronic Disease Prevention and Health Promotion Office on Smoking and Health, 2014). Although rates of smoking have declined over the past decades, smoking remains the cause of 87 percent of lung cancer deaths, one-third of cancer deaths, and more than three-quarters of the cases of chronic obstructive pulmonary disease (National Center for Chronic Disease Prevention and Health Promotion Office on Smoking and Health, 2014; Wang et al., 2018). Smoking also has an adverse effect on overall health and quality of life, and the Surgeon General has called for the elimination of the use of combustible tobacco products (National Center for Chronic Disease Prevention and Health Promotion Office on Smoking and Health, 2014). Though use of smokeless tobacco generally receives less attention, it has also been associated with increased risk of cancer and stroke (Sinha et al., 2018), and use of smokeless tobacco is more common among military service members (Peterson, Severson, et al., 2007). Secondhand smoke presents concerns as well, including heart disease and lung cancer (Barnoya and Glantz, 2005; Kim, Ko, et al., 2018). Traditional tobacco products are not the only concern. The use of e-cigarettes has increased rapidly in the past several years, and although the long-term risks are unknown, there is mounting evidence that their use may increase risk of cardiovascular and lung disease (Glantz and Bareham, 2018). E-cigarette use is also most common among young adults (Schoenborn and Gindi, 2015), who make up a large proportion of the active component.

This section presents data on current (past 30 days) use of cigarettes, e-cigarettes, cigars, smokeless tobacco, and pipes or hookahs. We present information on differences in prevalence by service branch and other demographic groups. We also present data on smoking cessation attempts. Given the increasing use of e-cigarettes (Glantz and Bareham, 2018), we also provide data regarding reasons for use of e-cigarettes.

Cigarette, E-Cigarette, Cigar, and Smokeless Tobacco Use

Tables 5.10 through 5.12 show the percentages of service members who currently smoke cigarettes, e-cigarettes, and cigars; use a pipe or hookah to smoke tobacco; and use smokeless tobacco. Key findings include the following:

- Across all services, 18.4 percent of service members were current cigarette smokers (Table 5.10). HP2020 set a target of 12.0 percent for cigarette smoking among U.S. adults (Healthy People, 2020s); in 2017, 14.1 percent of U.S. adults reported currently smoking cigarettes (CDC, 2018b).
- An estimated 16.2 percent of service members were current users of e-cigarettes (Table 5.10). Although HP2020 has not set a target for use of e-cigarettes, data from the 2017 Behavioral Risk Factor Surveillance System (BRFSS) suggest that 4.6 percent of U.S. adults are current e-cigarette smokers (CDC, 2017). This suggests that e-cigarette use is much higher among active component service members than among the general population.
- In 2018, 10.0 percent of service members were current cigar smokers (Table 5.10). HP2020 set a target of 0.3 percent for use of cigars (Healthy People, 2020u), and 3.8 percent of U.S. adults currently smoke cigars (Wang et al., 2018). The rate of cigar use among service members is substantially higher among service members than among the general popula-

Table 5.10
Current Tobacco Use, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Current cigarette smoking	11.9%[b,c,d] (10.9–13.0)	18.0%[a,c] (15.9–20.2)	27.7%[a,b,d,e] (24.9–30.4)	20.4%[a,c,e] (18.2–22.7)	14.0%[c,d] (12.0–16.1)	18.5% (17.4–19.6)	18.4% (17.3–19.4)
Current e-cigarette use	14.9%[c] (13.7–16.0)	13.9%[c] (11.7–16.1)	22.6%[a,b,d,e] (19.8–25.4)	17.4%[c] (15.1–19.7)	14.9%[c] (12.6–17.2)	16.3% (15.2–17.4)	16.2% (15.2–17.3)
Current cigar smoking	7.1%[c,d,e] (6.3–7.9)	8.6%[c,d] (7.1–10.1)	14.1%[a,b] (12.1–16.1)	12.2%[a,b] (10.3–14.0)	10.8%[a] (8.9–12.6)	9.9% (9.1–10.7)	10.0% (9.2–10.7)
Current smokeless tobacco use	8.6%[b,c,d,e] (7.7–9.5)	14.7%[a,c] (12.7–16.8)	19.8%[a,b,d,e] (17.3–22.3)	12.8%[a,c] (10.8–14.8)	11.8%[a,c] (9.9–13.8)	13.4% (12.4–14.4)	13.4% (12.4–14.3)
Current pipe or hookah smoker	5.5% (4.8–6.2)	3.6%[c,d] (2.6–4.6)	6.7%[b] (5.1–8.3)	6.3%[b] (4.8–7.8)	4.2% (2.8–5.6)	5.2% (4.6–5.8)	5.2% (4.6–5.7)
Any current tobacco or nicotine use[1]	31.2%[b,c,d] (29.7–32.6)	36.2%[a,c] (33.6–38.7)	49.0%[a,b,d,e] (46.1–51.9)	40.6%[a,c] (38.0–43.3)	35.4%[c] (32.6–38.2)	37.9% (36.6–39.2)	37.8% (36.6–39.0)
Any current tobacco or nicotine smoking[2]	27.2%[c,d] (25.9–28.6)	29.9%[c,d] (27.4–32.4)	42.7%[a,b,d,e] (39.8–45.6)	36.1%[a,b,c,e] (33.5–38.8)	30.0%[c,d] (27.3–32.7)	32.6% (31.4–33.9)	32.6% (31.3–33.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[1] Includes cigarettes, e-cigarettes, cigars, pipes, hookahs, and smokeless tobacco.

[2] Includes cigarettes, e-cigarettes, cigars, pipes, and hookahs; excludes smokeless tobacco.

tion and exceeds the HP2020 target. In addition, 5.2 percent of service members in the 2018 HRBS reported smoking pipes or hookahs (Table 5.10). The 2015 HRBS did not measure current use of pipes or hookahs. Though HP2020 has not established a target for smoking pipes or hookahs, data from the NHIS indicate that approximately 1.0 percent of U.S. adults currently use a pipe or hookah to smoke tobacco (Wang et al., 2018).

- An estimated 13.4 percent of service members currently use smokeless tobacco (Table 5.10). Though the rate of smokeless tobacco use has remained similar among service members, it is substantially higher among service members than among the general population. HP2020 set a target of 0.2 percent for use of smokeless tobacco among adults (Healthy People, 2020t); in 2017, 2.1 percent of adults reported currently using smokeless tobacco (Wang et al., 2018).
- In total, 37.8 percent of service members were current users of any of the tobacco or nicotine products assessed in the 2018 HRBS (i.e., cigarettes, e-cigarettes, cigars, pipe or hookah, and smokeless). NHIS data suggest that the rate in the general population is 19.3 percent. Though these rates are not directly comparable due to differences in methodology and population, they suggest higher rates of tobacco use among service members.

Table 5.11
Current Tobacco Use, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Current cigarette smoking	23.2%[c,d,e,f] (21.1–25.3)	20.5%[c,d,e,f] (18.9–22.1)	14.8%[a,b,e,f] (13.1–16.5)	8.5%[a,b,f] (5.2–11.8)	6.0%[a,b,c,f] (4.8–7.3)	3.7%[a,b,c,d,e] (2.8–4.5)
Current e-cigarette use	26.5%[b,c,d,e,f] (24.4–28.7)	12.9%[a,c,d,e,f] (11.5–14.2)	6.8%[a,b,e,f] (5.6–8.0)	3.6%[a,b,f] (1.2–6.0)	3.5%[a,b,c,f] (2.6–4.5)	1.0%[a,b,c,d,e] (0.6–1.4)
Current cigar smoking	11.2%[f] (9.6–12.7)	9.1% (7.9–10.2)	8.6% (7.3–9.9)	8.6% (5.0–12.1)	10.3% (8.8–11.9)	7.7%[a] (6.5–8.9)
Current smokeless tobacco use	14.6%[e,f] (12.7–16.5)	14.4%[e,f] (12.9–15.9)	13.7%[e,f] (12.0–15.4)	11.2%[f] (6.8–15.6)	10.0%[a,b,c,f] (8.3–11.6)	5.7%[a,b,c,d,e] (4.7–6.8)
Current pipe or hookah smoker	6.7%[c,d,e,f] (5.5–7.9)	5.3%[c,d,f] (4.5–6.2)	2.6%[a,b] (1.9–3.3)	1.4%[a,b] (0.2–2.7)	3.5%[a,f] (2.6–4.5)	1.8%[a,b,e] (1.2–2.4)
Any current tobacco or nicotine use[1]	44.2%[c,d,e,f] (41.8–46.6)	39.8%[c,d,e,f] (37.8–41.7)	34.8%[a,b,d,e,f] (32.5–37.1)	24.2%[a,b,c,f] (18.7–29.7)	23.9%[a,b,c,f] (21.7–26.1)	15.8%[a,b,c,d,e] (14.2–17.5)
Any current tobacco or nicotine smoking[2]	40.7%[b,c,d,e,f] (38.4–43.1)	33.3%[a,c,d,e,f] (31.4–35.1)	26.3%[a,b,d,e,f] (24.2–28.4)	17.4%[a,b,c] (12.8–22.0)	17.6%[a,b,c,f] (15.6–19.5)	11.7%[a,b,c,e] (10.3–13.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[1] Includes cigarettes, e-cigarettes, cigars, pipes, hookahs, and smokeless tobacco.

[2] Includes cigarettes, e-cigarettes, cigars, pipes, and hookahs; excludes smokeless tobacco.

Several differences by service branch (Table 5.10) and pay grade group (Table 5.11) emerged. Key findings include the following:

- Members of the Marine Corps were more likely to be current cigarette smokers, e-cigarette smokers, and smokeless tobacco users than were members of all other branches (Table 5.10). The lowest rates of current cigarette, cigar, and smokeless tobacco use were observed in the Air Force.
- Junior enlisted service members had significantly higher rates of current cigarette smoking, and enlisted service members reported higher rates of cigarette smoking and smokeless tobacco use than officers (Table 5.11). Junior enlisted service members were also substantially more likely than others to smoke e-cigarettes, with rates of use more than double the rates for the next highest group (E5–E6). In addition, younger service members had higher rates of use than all other age groups for cigarettes, e-cigarettes, smokeless tobacco, and pipe or hookah use, with lower rates observed across increasing age groups (Appendix Table D.28).

Table 5.12
Current Tobacco Use, by Gender

	Men	Women
Current cigarette smoking	19.5%[a] (18.3–20.7)	12.8% (11.5–14.1)
Current e-cigarette use	17.1%[a] (15.8–18.3)	12.0% (10.5–13.5)
Current cigar smoking	11.0%[a] (10.1–11.9)	4.6% (3.8–5.4)
Current smokeless tobacco use	15.7%[a] (14.5–16.8)	2.0% (1.5–2.6)
Current pipe or hookah smoker[z]	5.1% (4.4–5.7)	5.6% (4.6–6.6)
Any current tobacco or nicotine use[1]	40.4%[a] (39.0–41.8)	24.8% (23.0–26.6)
Any current tobacco or nicotine smoking[2]	34.3%[a] (32.9–35.7)	24.0% (22.3–25.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] Includes cigarettes, e-cigarettes, cigars, pipes, hookahs, and smokeless tobacco.

[2] Includes cigarettes, e-cigarettes, cigars, pipes, and hookahs; excludes smokeless tobacco.

- Men were more likely to smoke cigarettes, e-cigarettes, and cigars and to use smokeless tobacco (Table 5.12). As in the 2015 HRBS, this difference was most pronounced for use of smokeless tobacco, with the rate of use nearly eight times higher among men.
- There were fewer differences with respect to race/ethnicity (Appendix Table D.27); however, white service members were more likely to be current smokeless tobacco users than non-Hispanic black, Hispanic, and non-Hispanic Asian service members (Appendix Table D.27).

In terms of comparisons between the 2015 and 2018 HRBSs:

- The percentage of service members who reported current cigarette smoking significantly increased between the 2015 and 2018 surveys, by roughly 7 percent (ARR = 1.07, 95-percent CI: 1.01, 1.14). However, none of the within–service branch or within–pay grade group differences between surveys reached statistical significance. The difference in current smoking status among male service members was significantly higher in 2018 as compared with 2015 by roughly 11 percent (ARR = 1.11, 95-percent CI: 1.03, 1.20); the difference between survey years was not statistically significant for female service members.
- The percentage of service members who reported smoking e-cigarettes significantly increased between the 2015 and 2018 surveys, by roughly 20 percent (ARR = 1.20,

95-percent CI: 1.11, 1.29). There were significant within–service branch changes in the rate of e-cigarette use across HRBSs. The rate significantly increased in the Air Force (ARR = 1.30, 95-percent CI: 1.13, 1.49), Marine Corps (ARR = 1.27, 95-percent CI: 1.05, 1.53), and Coast Guard (ARR = 1.25, 95-percent CI: 1.05, 1.48). The changes in the Army (ARR = 1.03, 95-percent CI: 0.85, 1.25) and Navy (ARR = 1.10, 95-percent CI: 0.93, 1.30) were not statistically significant. There were also significant increases for junior enlisted service members (E1–E4; ARR = 1.33, 95-percent CI: 1.19, 1.48) and junior officers (O1–O3; ARR = 1.39, 95-percent CI: 1.01, 1.92). Finally, there were statistically significant increases among both men (ARR = 1.21, 95-percent CI: 1.10, 1.32) and women (ARR = 1.18, 95-percent CI: 1.04, 1.35).

- The percentage of service members who reported smoking pipes or hookahs significantly increased between the 2015 and 2018 surveys, by roughly 19 percent (ARR = 1.19, 95-percent CI: 1.05, 1.35). Regarding within–service branch changes, the rate increased by roughly 37 percent in the Air Force (ARR = 1.37, 95-percent CI: 1.09, 1.72); the difference between survey years was not statistically significant for other branches. Regarding pay grade, there were significant increases in pipe or hookah smoking for E5–E6 (ARR = 1.33, 95-percent CI 1.04, 1.68), E7–E9 (ARR = 1.53, 95-percent CI: 1.04, 2.26), and O1–O3 (ARR = 1.40, 95-percent CI = 1.02, 1.92). Finally, there was a statistically significant increase among women (ARR = 1.35, 95-percent CI: 1.10, 1.66), though the difference between survey years was not significant among men.
- There was no statistically significant change in the overall percentage of service members who reported smokeless tobacco use between the 2015 and 2018 surveys.

Smoking Cessation

In the 2018 HRBS, 46.5 percent of current smokers attempted to quit smoking (see Tables 5.13 through 5.15). There were no significant differences with respect to service branch, gender, or age (see Tables 5.13, 5.15, Appendix Table D.30). Junior and mid-level enlisted service members (E1–E6) were nearly twice as likely to have attempted quitting than junior officers (Table 5.14), and non-Hispanic black service members had significantly more quit attempts than non-Hispanic white or Hispanic service members (60.0 percent; Appendix Table D.29).

Table 5.13
Past-Year Smoking Cessation Attempts Among Current Smokers, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Attempted to quit smoking[z]	40.1% (35.6–44.6)	47.0% (40.2–53.8)	49.7% (43.5–55.8)	47.2% (40.8–53.5)	44.7% (36.8–52.7)	46.5% (43.2–49.8)	46.5% (43.2–49.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 5.14
Past-Year Smoking Cessation Attempts Among Current Smokers, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Attempted to quit smoking	47.3%[e] (42.1–52.5)	49.2%[e] (44.7–53.6)	39.4% (33.4–45.5)	NR (30.5–70.6)	26.4%[a,b] (16.4–36.3)	33.8% (22.8–44.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses. NR = not reportable.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[e] Statistically significantly different from O1–O3 estimate.

Table 5.15
Past-Year Smoking Cessation Attempts Among Current Smokers, by Gender

	Men	Women
Attempted to quit smoking[z]	46.5% (42.9–50.1)	46.1% (40.5–51.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Reasons for Use of E-Cigarettes

As e-cigarettes have become more prevalent, there has been increasing interest in understanding the factors that contribute to their use. The 2018 HRBS explored three potential reasons why service members use e-cigarettes. Key findings include the following:

- Among current e-cigarette users, 33.3 percent reported that they used e-cigarettes because e-cigarettes were healthier than smoking cigarettes (Table 5.16). There were no significant differences in this reason by service branch, pay grade, or age (Tables 5.16, and 5.17, Appendix Table D.32). However, men were nearly twice as likely to endorse this statement than women (Table 5.18).
- An estimated 30.8 percent reported using e-cigarettes to help them quit smoking cigarettes (Table 5.16). This was especially the case among more-senior enlisted, men, and older service members (Tables 5.17 and 5.18, Appendix Table D.32).
- Men were more likely than women to report that they used e-cigarettes because they could be used in places where cigarette smoking was not allowed (Table 5.18).
- A study of e-cigarette use in U.S. adults found that 30 percent used them to quit or cut back on smoking, 29 percent believed them to be less harmful than smoking cigarettes, and 23 percent tried them because they could be used in places where smoking was not allowed (Pepper et al., 2014). These data suggest that military service members are using e-cigarettes for similar reasons.

Table 5.16
Reasons for E-Cigarette Use, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Perceived to be healthier than smoking cigarettes[z]	35.6% (32.0–39.1)	31.9% (24.9–39.0)	32.9% (26.5–39.3)	33.7% (27.2–40.2)	28.9% (22.2–35.5)	33.4% (30.3–36.6)	33.3% (30.2–36.4)
Used to help quit smoking cigarettes[z]	30.0% (26.6–33.4)	29.8% (23.0–36.5)	32.5% (26.3–38.7)	31.2% (25.2–37.2)	32.1% (25.2–39.1)	30.7% (27.7–33.7)	30.8% (27.8–33.7)
Able to use in places where cigarette smoking is not allowed[x]	24.1% (20.9–27.3)	24.0% (17.5–30.5)	32.5% (26.4–38.6)	33.4% (27.0–39.8)	23.1% (16.7–29.5)	28.2% (25.2–31.2)	28.0% (25.1–31.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 5.17
Reasons for E-Cigarette Use, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Perceived to be healthier than smoking cigarettes[x]	31.7% (27.5–35.8)	37.6% (32.7–42.6)	37.4% (29.8–45.1)	NR (22.4–80.1)	29.9% (19.2–40.6)	14.6% (3.2–26.0)
Used to help quit smoking cigarettes	25.1%[b,c] (21.3–28.8)	44.0%[a,e] (38.9–49.1)	54.4%[a,e] (46.4–62.3)	NR (31.9–86.6)	16.5%[b,c] (8.9–24.1)	NR (11.4–41.5)
Able to use in places where cigarette smoking is not allowed[z]	27.9% (23.9–31.8)	28.5% (23.9–33.1)	24.7% (17.8–31.6)	NR (3.7–57.0)	34.9% (24.1–45.8)	19.7% (6.6–32.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 5.18
Reasons for E-Cigarette Use, by Gender

	Men	Women
Perceived to be healthier than smoking cigarettes	35.6%[a] (32.2–39.1)	18.2% (14.4–22.1)
Used to help quit smoking cigarettes	32.2%[a] (28.9–35.5)	21.8% (17.5–26.1)
Able to use in places where cigarette smoking is not allowed	29.7%[a] (26.4–33.1)	17.3% (13.5–21.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

Marijuana Use and Drug Use

This section describes both past-12-month and past-30-day use among all service members for several types of drugs: marijuana (cannabis, hashish), synthetic cannabis, inhalants to get high, synthetic stimulants, nonprescription cough or cold medicine, nonprescription anabolic steroids, and drugs other than marijuana and synthetic cannabis (cocaine [including crack], lysergic acid diethylamide [LSD], phencyclidine [PCP], 3,4-methylenedioxy-methamphetamine [MDMA, commonly called ecstasy], methamphetamine, heroin, and gamma hydroxybutyrate [GHB]). We separated out drug categories to make these comparable to the 2015 HRBS (Meadows et al., 2018). Thus, *use of drugs in the past 12 months* was defined by endorsement of any of the following five categories of drugs in the past year: marijuana, synthetic cannabis, inhalants to get high, synthetic stimulants, and other illegal drugs. *Use of drugs in the past 30 days* was defined by endorsement of any of these five categories of drugs in the past 30 days. *Any cough medicine use in the past 12 months* was defined as any use of nonprescription cough or cold medicine in the past year. These drug use categories were comparable to the 2015 HRBS (Meadows et al., 2018); however, low prevalence rates made these statistical models difficult to run, and, therefore, they were not included in this report. *Any steroid use in the past 12 months* was defined as any use of nonprescription anabolic steroids in the past year. Past year use of nonprescription anabolic steroids, however, was not comparable to the 2015 HRBS (Meadows et al., 2018), which asked about "prescription anabolic steroid" use. There were very few service members who reported nonprescription cough or cold medicine use in the past 30 days (n = 21) and even fewer service members who reported use of nonprescription anabolic steroids (n = 8), which precluded us from making meaningful comparisons across service branches, pay grade, gender, age, and race/ethnicity. Thus, these past-30-day use rates were not included in the tables.

Given the higher prevalence rates of marijuana in the general population as compared with use of other drugs (Substance Abuse and Mental Health Services Administration, 2019a), we then separated out *marijuana and synthetic cannabis in the past 12 months* and *past-12-month drug use besides marijuana and synthetic cannabis* (i.e., inhalants, synthetic stimulants, and other illegal drugs), as well as *marijuana and synthetic cannabis in the past 30 days* and *past-30-day drug use besides marijuana and synthetic cannabis*. Marijuana and synthetic cannabis use in the past 12 months and past 30 days were comparable to the 2015 HRBS (Meadows et al.,

2018), though they were not directly comparable to the 2018 NSDUH due to the NSDUH not including synthetic cannabis (Substance Abuse and Mental Health Services Administration, 2019a). Similarly, use of drugs other than marijuana and synthetic cannabis for both the past 12 months and the past 30 days was directly comparable to the 2015 HRBS (Meadows et al., 2018) but not to the NSDUH (Substance Abuse and Mental Health Services Administration, 2019a). Note that due to low prevalence rates for drug use outcomes, we do not present subgroup results for these outcomes. All past-12-month and past-30-day prevalence rates are among all service members.

Any Drug Use in the Past 12 Months

Tables 5.19 through 5.21 detail past-12-month use of drugs. Key findings for any drug use (i.e., any use of marijuana, synthetic cannabis, inhalants, synthetic stimulants, and drugs other than marijuana and synthetic cannabis) include the following:

- In the 2018 HRBS, 1.3 percent of service members reported use of any drugs in the past year (Table 5.19).
- Marine Corps personnel reported the highest rate of any past-12-month drug use, with 2.5 percent of these service members reporting drug use (Table 5.19). The Marine Corps rate was significantly higher than the Air Force and the Coast Guard rates. The Navy also reported significantly higher rates than the Air Force.
- The highest percentage of self-reported drug use was among junior enlisted personnel (E1–E4; Table 5.20). Junior enlisted personnel reported significantly higher rates of drug use than all other pay grades. Junior officers reported higher rates of drug use than senior officers (O4–O6).
- Men and women reported similar rates of drug use in the past 12 months (Table 5.21).
- Younger service members reported higher rates of drug use compared with older service members (Appendix Table D.34). There were no significantly differences between rates of drug use by race/ethnicity (Appendix Table D.33).

In terms of comparisons between the 2015 and 2018 HRBSs:

- The percentage of service members on the 2018 HRBS who reported use of any drugs in the past 12 months was not significantly different from the percentage who reported any drug use on the 2015 HRBS.

Past-12-Month Use of Nonprescription Cough or Cold Medicine and Nonprescription Anabolic Steroids

Tables 5.19 through 5.21 detail past-12-month use of nonprescription cough or cold medicine to get high and past-12-month use of nonprescription anabolic steroids. Key findings for these outcomes include the following:

- In the 2018 HRBS, 0.4 percent of service members reported use of any nonprescription cough or cold medicine in the past year, while 0.2 percent reported any use of nonprescription anabolic steroids (Table 5.19).
- Marine Corps personnel reported significantly higher use of any nonprescription cough or cold medicine in the past year compared with the Air Force (Table 5.19). There were

Table 5.19
Past-12-Month Drug Use, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any past-12-month drug use	0.4%[c,d] (0.2–0.6)	1.1% (0.5–1.8)	2.5%[a,e] (1.2–3.8)	1.7%[a] (0.7–2.8)	0.8%[c] (0.3–1.3)	1.3% (0.9–1.7)	1.3% (0.9–1.7)
Any past-12-month use of nonprescription cough or cold medicine to get high	0.2%[c] (0.1–0.3)	0.4% (0.1–0.7)	1.2%[a] (0.3–2.0)	0.3% (0.1–0.6)	0.2% (0.0–0.4)	0.4% (0.3–0.6)	0.4% (0.3–0.6)
Any past-12-month nonprescription anabolic steroid use[z]	0.03% (0.0–0.1)	0.1% (0.0–0.2)	0.3% (0.0–0.8)	0.4% (0.0–0.8)	0.1% (0.0–0.3)	0.2% (0.0–0.3)	0.2% (0.0–0.3)
Any past-12-month marijuana or synthetic cannabis use	0.3%[c,d] (0.1–0.5)	0.8% (0.2–1.4)	1.6%[a] (0.5–2.6)	1.4%[a] (0.5–2.4)	0.6% (0.2–1.0)	1.0% (0.6–1.3)	0.9% (0.6–1.3)
Any past-12-month drug use, excluding marijuana and synthetic cannabis	0.2%[c,d] (0.1–0.3)	0.7% (0.1–1.2)	2.1%[a,e] (0.8–3.3)	1.1%[a] (0.2–1.9)	0.3%[c] (0.0–0.6)	0.9% (0.5–1.2)	0.8% (0.5–1.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

no significant differences between service branches for use of nonprescription anabolic steroids.

- There were no significant differences observed between pay grades for use of nonprescription cough or cold medicine and use of nonprescription anabolic steroids in the past 12 months (Table 5.20).
- Men and women reported similar rates of nonprescription cough or cold medicine use in the past 12 months, but men reported significantly higher rates of nonprescription anabolic steroids than women (Table 5.21).
- There were no differences in rates of nonprescription cough or cold medicine use or use of nonprescription anabolic steroids by age group (Appendix Table D.34) or by race/ethnicity (Appendix Table D.33).

Table 5.20
Past-12-Month Drug Use, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any past-12-month drug use	2.4%[b,c,e,f] (1.5–3.3)	0.4%[a] (0.2–0.7)	0.6%[a] (0.2–1.0)	0.0% (0.0–1.4)	0.9%[a,f] (0.4–1.4)	0.1%[a,e] (0.0–0.3)
Any past-12-month use of nonprescription cough or cold medicine to get high[z]	0.6% (0.3–0.9)	0.3% (0.0–0.6)	0.5% (0.1–0.8)	0.8% (0.0–2.2)	0.2% (0.0–0.3)	0.2% (0.0–0.3)
Any past-12-month nonprescription anabolic steroid use[z]	0.3% (0.0–0.5)	0.1% (0.0–0.2)	0.2% (0.0–0.5)	0.0% (0.0–1.4)	0.1% (0.0–0.3)	0.1% (0.0–0.1)
Any past-12-month marijuana or synthetic cannabis use	1.8%[b,c,f] (1.0–2.6)	0.3%[a] (0.1–0.5)	0.4%[a] (0.1–0.8)	0.0% (0.0–1.4)	0.7%[f] (0.3–1.1)	0.1%[a,e] (0.0–0.2)
Any past-12-month drug use, excluding marijuana and synthetic cannabis	1.6%[b,c,f] (0.8–2.3)	0.3%[a] (0.1–0.5)	0.3%[a] (0.0–0.6)	0.0% (0.0–1.4)	0.4% (0.0–0.8)	0.1%[a] (0.0–0.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Past-12-Month Marijuana or Synthetic Cannabis Use

Key findings for marijuana and synthetic cannabis use include the following:

- In the 2018 HRBS, 0.9 percent of service members reported use of marijuana or synthetic cannabis in the past 12 months (Table 5.19).
- The Marine Corps and Navy had the highest rates of past-12-month marijuana or synthetic cannabis use (Table 5.19). Both the Marine Corps and Navy had significantly higher rates than the Air Force.
- The highest percentage of marijuana or synthetic cannabis use was among junior enlisted personnel (E1–E4), who had significantly higher usage rates than all other pay grades except junior officers (O1–O3; Table 5.20). Junior officers (O1–O3) had significantly higher rates than senior officers.
- Men and women reported similar rates of marijuana or synthetic cannabis use in the past 12 months (Table 5.21).
- Younger service members reported higher rates of marijuana and synthetic cannabis use compared with older service members (Appendix Table D.34). There were no significantly differences between rates of drug use by race/ethnicity (Appendix Table D.33).

Table 5.21
Past-12-Month Drug Use, by Gender

	Men	Women
Any past-12-month drug use[z]	1.4% (0.9–1.8)	0.8% (0.4–1.3)
Any past-12-month use of nonprescription cough or cold medicine to get high[z]	0.4% (0.2–0.6)	0.5% (0.1–0.8)
Any past-12-month nonprescription anabolic steroid use	0.2%[a] (0.0–0.4)	0.01% (0.0–0.0)
Any past-12-month marijuana or synthetic cannabis use[z]	1.0% (0.6–1.4)	0.8% (0.3–1.2)
Any past-12-month drug use, excluding marijuana and synthetic cannabis	1.0%[a] (0.6–1.4)	0.2% (0.0–0.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

In terms of comparisons between the 2015 and 2018 HRBSs:

- Rates of past-12-month marijuana or synthetic cannabis use in the 2018 HRBS did not significantly differ from rates in the 2015 HRBS.

Past-12-Month Use of Drugs, Excluding Marijuana and Synthetic Cannabis

Key findings for drug use excluding marijuana and synthetic cannabis in the past 12 months include the following:

- In the 2018 HRBS, 0.8 percent of service members reported use of drugs other than marijuana and synthetic cannabis in the past 12 months (Table 5.19).
- The Marine Corps had the highest rate of past-12-month use of drugs other than marijuana and synthetic cannabis, with 2.1 percent of service members reporting such drug use (Table 5.19). The Marine Corps reported significantly higher rates than the Air Force and the Coast Guard. The Navy also reported significantly higher rates of use of drugs other than marijuana and synthetic cannabis compared with the Air Force.
- The highest percentage of use of drugs other than marijuana and synthetic cannabis was among junior enlisted personnel (E1–E4), who reported significantly higher rates of use than most other pay grades, with the exception of junior officers (O1–O3; Table 5.20).
- Men reported significantly higher past-12-month use of drugs other than marijuana and synthetic cannabis than women (Table 5.21).
- Younger service members reported higher rates of use of drugs other than marijuana and synthetic cannabis compared with older service members (Appendix Table D.34). There were no significantly differences between rates of drug use by race/ethnicity (Appendix Table D.33).

In terms of comparisons between the 2015 and 2018 HRBSs:

- Rates of past-12-month use of drugs other than marijuana and synthetic cannabis in the 2018 HRBS did not significantly differ from rates in the 2015 HRBS.

Past-30-Day Use of Any Drugs

Tables 5.22 through 5.24 detail past-30-day use of drugs among all personnel. Key findings for all drugs (i.e., any use of marijuana, synthetic cannabis, inhalants, synthetic stimulants, and drugs other than marijuana and synthetic cannabis) include the following:

- In the 2018 HRBS, 0.5 percent of all service members reported use of drugs in the past 30 days (Table 5.22).
- There were no significant differences in drug use rates across service branches (Table 5.22).
- The highest percentage of drug use was among junior enlisted personnel (E1–E4), who reported higher rates of use than NCOs (E5–E6) and senior officers (O4–O6; Table 5.23).
- Men and women reported similar rates of past-30-day drug use (Table 5.24).
- Younger personnel reported significantly more drug use than older personnel (Appendix Table D.36). There were no significant differences in any past-30-day drug use reported by service members of varying racial/ethnic groups (Appendix Table D.35).

In terms of comparisons between the 2015 and 2018 HRBSs:

- The percentage of service members on the 2018 HRBS who reported use of any drugs in the past 30 days was not significantly different from the percentage who reported any drug use in the 2015 HRBS.

Table 5.22
Past-30-Day Drug Use, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any past-30-day drug use[z]	0.2% (0.1–0.4)	0.3% (0.1–0.6)	1.1% (0.1–2.0)	0.7% (0.0–1.4)	0.2% (0.0–0.4)	0.5% (0.3–0.7)	0.5% (0.3–0.7)
Any past-30-day marijuana or synthetic cannabis use[z]	0.2% (0.0–0.3)	0.2% (0.0–0.4)	0.6% (0.0–1.3)	0.6% (0.0–1.3)	0.2% (0.0–0.4)	0.4% (0.1–0.6)	0.4% (0.1–0.6)
Any past-30-day drug use, excluding marijuana and synthetic cannabis[z]	0.1% (0.0–0.2)	0.2% (0.0–0.4)	0.6% (0.0–1.2)	0.3% (0.0–0.8)	0.1% (0.0–0.3)	0.3% (0.1–0.4)	0.3% (0.1–0.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 5.23
Past-30-Day Drug Use, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any past-30-day drug use	0.8%[b,f] (0.3–1.4)	0.2%[a] (0.0–0.3)	0.3% (0.0–0.6)	0.0% (0.0–1.4)	0.5% (0.1–0.9)	0.1%[a] (0.0–0.1)
Any past-30-day marijuana or synthetic cannabis use	0.6%[b,f] (0.1–1.1)	0.1%[a] (0.0–0.2)	0.3% (0.0–0.6)	0.0% (0.0–1.4)	0.3% (0.0–0.6)	0.02%[a] (0.0–0.1)
Any past-30-day drug use, excluding marijuana and synthetic cannabis[x]	0.4% (0.1–0.8)	0.1% (0.0–0.2)	0.2% (0.0–0.5)	0.0% (0.0–1.4)	0.3% (0.0–0.6)	0.1% (0.0–0.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

Table 5.24
Past-30-Day Drug Use, by Gender

	Men	Women
Any past-30-day drug use[z]	0.5% (0.2–0.8)	0.4% (0.0–0.8)
Any past-30-day marijuana or synthetic cannabis use[z]	0.3% (0.1–0.6)	0.4% (0.0–0.8)
Any past-30-day drug use, excluding marijuana and synthetic cannabis[z]	0.3% (0.1–0.5)	0.1% (0.0–0.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Past-30-Day Marijuana or Synthetic Cannabis Use

Key findings for marijuana and synthetic cannabis use include the following:

- In the 2018 HRBS, 0.4 percent of service members reported use of marijuana or synthetic cannabis in the past 30 days (Table 5.22).
- There were no significant differences in marijuana and synthetic cannabis use rates across service branches (Table 5.22).

- The highest percentage of marijuana and synthetic cannabis use was among junior enlisted personnel (E1–E4), who reported higher rates of use than NCOs (E5–E6) and senior officers (O4–O6; Table 5.23).
- Men and women reported similar rates of past-30-day marijuana and synthetic cannabis use (Table 5.24).
- Younger personnel reported significantly more marijuana and synthetic cannabis use than middle-aged personnel (Appendix Table D.36). There were no significant differences in use rates between service members from different racial/ethnic groups (Appendix Table D.35).

In terms of comparisons between the 2015 and 2018 HRBSs:

- Rates of past-30-day marijuana or synthetic cannabis use in the 2018 HRBS did not significantly differ from rates in the 2015 HRBS.

Past-30-Day Use of Drugs Other Than Marijuana or Synthetic Cannabis

Key findings for use of drugs other than marijuana and synthetic cannabis in the past 30 days include the following:

- In the 2018 HRBS, 0.3 percent of service members reported use of drugs other than marijuana and synthetic cannabis in the past 30 days (Table 5.22).
- There were no significant differences in use rates of drugs other than marijuana and synthetic cannabis across service branches (Table 5.22).
- There were no significant differences in use rates of drugs other than marijuana and synthetic cannabis across pay grades (Table 5.23).
- Men and women reported similar rates of use of drugs other than marijuana and synthetic cannabis in the past 30 days (Table 5.24).
- There were no significant differences between age groups (Appendix Table D.36) or between service members from different racial/ethnic groups (Appendix Table D.35) for use rates of drugs other than marijuana and synthetic cannabis.

In terms of comparisons between the 2015 and 2018 HRBSs:

- Rates of past-30-day use of drugs other than marijuana and synthetic cannabis in the 2018 HRBS did not significantly differ from rates in the 2015 HRBS.

Prescription Drug Use

The next set of tables display use of prescription drugs in the past year. Note that use in these tables includes *any* use and does not take prescription status into account (i.e., whether the service member had a valid prescription to use a specific drug). We focused on use of three specific categories of prescription drugs: stimulants, sedatives, and pain relievers.

A total of 16.8 percent of respondents reported using any prescription drug in the past year (Table 5.25). The prescription drug type used most commonly was pain relievers (12.1 percent), which were used almost twice as much as prescription sedatives and four times as much

Table 5.25
Past-Year Prescription Drug Use, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any prescription drug use	16.2%[b,e] (15.1–17.2)	19.3%[a,c,e] (17.3–21.2)	14.9%[b.e] (13.0–16.9)	15.6%[e] (13.8–17.4)	10.5%[a,b,c,d] (8.9–12.1)	17.0% (16.0–17.9)	16.8% (15.9–17.6)
Prescription stimulants	2.2%[e] (1.8–2.6)	3.3%[e] (2.4–4.2)	2.2%[e] (1.3–3.0)	2.9%[e] (1.9–3.9)	0.5%[a,b,c,d] (0.2–0.8)	2.8% (2.3–3.2)	2.7% (2.3–3.1)
Prescription sedatives	7.1%[c,e] (6.4–7.8)	7.4%[c,e] (6.2–8.6)	4.7%[a,b] (3.8–5.7)	6.7%[e] (5.5–7.8)	3.6%[a,b,d] (2.8–4.5)	6.8% (6.2–7.3)	6.7% (6.1–7.2)
Prescription pain relievers	10.9%[b] (10.0–11.8)	14.4%[a,d,e] (12.6–16.1)	11.6% (9.9–13.4)	10.7%[b] (9.2–12.1)	8.6%[b] (7.1–10.1)	12.2% (11.4–13.0)	12.1% (11.3–12.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

as prescription stimulants (Table 5.25). Data from the 2018 NSDUH indicated that 6.5 percent of adults used prescription stimulants, 18.1 percent used prescription sedatives or tranquilizers, and 33.1 percent used prescription pain relievers in the past year (Substance Abuse and Mental Health Services Administration, 2019c). This suggests lower rates of prescription drug use across categories among active component service members; this difference is especially striking for prescription pain relievers.

Tables 5.25 through 5.27 present use of prescription drugs in the past year for different groups. Key findings include the following:

- The rates of prescription stimulant use in the Coast Guard were lower than in the other service branches (Table 5.25). There were no significant differences by pay grade, gender, age, or race/ethnicity (Table 5.26, Table 5.27, Appendix Tables D.37 and D.38).
- The rate of prescription sedative use in the Coast Guard was lower than rates in the Air Force, Army, and Navy (Table 5.25). A greater percentage of senior enlisted and women used prescription sedatives, as did service members age 35 and older (Tables 5.26, 5.27, Appendix Table D.38).
- The rate of prescription pain reliever use was higher in the Army than in the Air Force, Navy, and Coast Guard, and junior officers were less likely to use prescription pain relievers than other pay grade groups (Tables 5.25 and 5.26). A higher percentage of senior enlisted personnel, women, and service members age 35 and older used pain relievers (Tables 5.26, 5.27, and Appendix Table D.38).

In terms of comparisons between the 2015 and 2018 HRBSs:

- There was no statistically significant difference in the overall percentage of service members who reported using prescription stimulants in the past year between the 2015 and 2018 surveys.

Table 5.26
Past-Year Prescription Drug Use, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any prescription drug use	15.6%[c] (13.9–17.3)	17.3%[c,e] (15.9–18.7)	23.0%[a,b,e,f] (21.1–24.9)	21.2%[e] (16.0–26.4)	13.3%[b,c,d,f] (11.7–14.9)	16.8%[c,e] (15.2–18.4)
Prescription stimulants[z]	2.4% (1.6–3.3)	2.7% (2.1–3.4)	4.1% (3.2–5.1)	2.1% (0.5–3.7)	2.5% (1.8–3.3)	2.3% (1.6–2.9)
Prescription sedatives	4.8%[b,c,f] (3.8–5.7)	8.0%[a,c] (6.9–9.1)	10.5%[a,b,e] (9.2–11.8)	6.1% (3.2–8.9)	6.0%[c] (4.9–7.1)	8.0%[a] (6.8–9.2)
Prescription pain relievers	12.4%[c,e] (10.8–13.9)	11.6%[c,e] (10.4–12.8)	16.8%[a,b,e,f] (15.1–18.5)	16.6%[e] (11.8–21.3)	7.8%[a,b,c,d,f] (6.6–9.1)	10.7%[c,e] (9.4–12.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 5.27
Past-Year Prescription Drug Use, by Gender

	Men	Women
Any prescription drug use	15.9%[a] (14.9–16.9)	21.2% (19.6–22.8)
Prescription stimulants[z]	2.6% (2.1–3.1)	3.1% (2.5–3.8)
Prescription sedatives	6.1%[a] (5.5–6.7)	9.4% (8.3–10.4)
Prescription pain relievers	11.3%[a] (10.5–12.2)	15.7% (14.2–17.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- The percentage of service members who reported using prescription sedatives significantly decreased between the 2015 and 2018 surveys, by approximately 36 percent (ARR = 0.64, 95-percent CI: 0.59, 0.68). There were statistically significant decreases within the Air Force (ARR = 0.62, 95-percent CI: 0.55, 0.71), Army (ARR = 0.61, 95-percent CI: 0.54, 0.70), Marine Corps (ARR = 0.66, 95-percent CI: 0.54, 0.79), Navy (ARR = 0.66, 95-percent CI: 0.57, 0.77), and Coast Guard (ARR = 0.65, 95-percent CI: 0.51, 0.83). Regarding pay grade, there were also statistically significant decreases for E1–E4 (ARR = 0.60, 95-percent CI: 0.49, 0.72), E5–E6 (ARR = 0.63, 95-percent CI: 0.54, 0.72), E7–E9 (ARR = 0.72, 95-percent CI: 0.63, 0.82), W1–W5 (ARR = 0.49, 95-percent CI: 0.34,

0.70), O1–O3 (ARR = 0.62, 95-percent CI: 0.51, 0.75), and O4–O6 (ARR = 0.63, 95-percent CI: 0.54, 0.74). Finally, there were significant decreases among men (ARR = 0.64, 95-percent CI: 0.59, 0.71) and women (ARR = 0.63, 95-percent CI: 0.56, 0.69).

- The percentage of service members who reported using prescription pain relievers also decreased significantly between the 2015 and 2018 surveys, by approximately 38 percent (ARR = 0.62, 95-percent CI: 0.59, 0.65). There were significant decreases within each service branch, including the Air Force (ARR = 0.59, 95-percent CI: 0.53, 0.65), Army (ARR = 0.61, 95-percent CI: 0.55, 0.67), Marine Corps (ARR = 0.65, 95-percent CI: 0.57, 0.75), Navy (ARR = 0.63, 95-percent CI: 0.56, 0.72), and Coast Guard (ARR = 0.65, 95-percent CI: 0.55, 0.76). There were also significant decreases within each of the pay grades: by approximately 40 percent for junior enlisted personnel (E1–E4; ARR = 0.60; 95-percent CI: 0.54, 0.57), by 41 percent for mid-level enlisted personnel (E5–E6; ARR = 0.59, 95-percent CI: 0.53, 0.65), by 31 percent for senior enlisted personnel (E7–E9; ARR = 0.69, 95-percent CI: 0.62, 0.77), by 42 percent for warrant officers (W1–W5; ARR = 0.58, 95-percent CI: 0.45, 0.75), by 41 percent for junior officers (O1–O3; ARR = 0.59, 95-percent CI: 0.51, 0.69), and by 39 percent for senior officers (O4–O6; ARR = 0.61, 95-percent CI: 0.53, 0.70). Finally, there were significant decreases among men (ARR = 0.62, 95-percent CI: 0.58, 0.66) and women (ARR = 0.62, 95-percent CI: 0.57, 0.67).

Prescription Drug Misuse

Table 5.28 shows percentages of service members misusing each of the three prescription drug categories assessed in the 2018 HRBS. In this survey, *misuse* was defined as use of a prescription drug in any way not directed by a doctor, which could include use without a prescription

Table 5.28
Past-Year Prescription Drug Misuse, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any prescription drug misuse	0.7%[b,c] (0.4–0.9)	1.8%[a,e] (1.0–2.5)	1.6%[a,e] (0.8–2.5)	1.5% (0.7–2.4)	0.5%[b,c] (0.2–0.8)	1.4% (1.0–1.8)	1.4% (1.0–1.7)
Prescription stimulant misuse[z]	0.1% (0.0–0.2)	0.6% (0.0–1.1)	0.5% (0.0–1.2)	0.8% (0.0–1.5)	0.1% (0.0–0.3)	0.5% (0.2–0.8)	0.5% (0.2–0.8)
Prescription sedative misuse	0.1%[d] (0.0–0.3)	0.4% (0.1–0.7)	0.3% (0.0–0.5)	0.7%[a] (0.1–1.3)	0.2% (0.0–0.4)	0.4% (0.2–0.6)	0.4% (0.2–0.6)
Prescription pain reliever misuse[z]	0.5% (0.3–0.7)	1.2% (0.6–1.8)	1.1% (0.4–1.7)	0.9% (0.4–1.5)	0.4% (0.1–0.8)	0.9% (0.7–1.2)	0.9% (0.7–1.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

of one's own or using it in greater amounts, more often, or for longer than it was prescribed. Key findings include the following:

- Among active component service members, 1.4 percent misused one or more of the prescription drug types in the past year.
- Though rates of misuse were low (in the absolute sense) across all categories of prescription drugs, prescription pain relievers were misused most often.

Reducing the nonmedical use of pain relievers, stimulants, and sedatives is an objective of HP2020, though specific goals have not yet been identified (Healthy People, 2020r). According to the 2018 NSDUH, 1.9 percent of adults reported misusing stimulants, 2.1 percent reporting misusing sedatives, and 3.7 percent reported misusing pain relievers in the past year (Substance Abuse and Mental Health Services Administration, 2019c). These data suggest that rates of misuse of stimulants and pain relievers were somewhat lower among active component service members than in the general population. The 2015 HRBS assessed prescription drug misuse differently, separately reporting on use of a drug without a valid prescription and using more of a drug than prescribed. Therefore, we cannot directly compare results from the 2018 and 2015 surveys.

Tables 5.28 through 5.30 show overall rates of prescription drug misuse by service branch and other demographics. Key findings include the following:

- Rates of prescription drug misuse in the Army and Marine Corps were higher than rates in the Air Force or Coast Guard (Table 5.28). However, there were no significant differences across service branches with respect to misuse of stimulants or pain relievers. Rates of sedative misuse were higher in the Navy than in the Air Force.

Table 5.29
Past-Year Prescription Drug Misuse, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any prescription drug misuse[z]	1.8% (1.0–2.5)	1.1% (0.7–1.4)	1.2% (0.7–1.7)	1.6% (0.0–3.5)	1.1% (0.5–1.8)	0.6% (0.3–1.0)
Prescription stimulant misuse	0.9%[b,c,f] (0.2–1.5)	0.2%[a] (0.0–0.3)	0.1%[a] (0.0–0.2)	0.1% (0.0–0.4)	0.3% (0.0–0.6)	0.1%[a] (0.0–0.3)
Prescription sedative misuse[z]	0.5% (0.1–0.8)	0.3% (0.1–0.5)	0.5% (0.2–0.7)	0.2% (0.0–0.6)	0.4% (0.1–0.7)	0.3% (0.1–0.5)
Prescription pain reliever misuse[z]	1.1% (0.6–1.7)	0.8% (0.5–1.1)	1.0% (0.6–1.5)	1.5% (0.0–3.4)	0.6% (0.0–1.1)	0.3% (0.1–0.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 5.30
Past-Year Prescription Drug Misuse, by Gender

	Men	Women
Any prescription drug misuse[z]	1.4% (1.0–1.8)	1.2% (0.8–1.7)
Prescription stimulant misuse[z]	0.5% (0.2–0.8)	0.3% (0.0–0.5)
Prescription sedative misuse[z]	0.4% (0.2–0.6)	0.4% (0.1–0.7)
Prescription pain reliever misuse[z]	0.9% (0.6–1.2)	0.9% (0.5–1.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- Junior enlisted and younger service members were more likely than others to misuse stimulants (Tables 5.29 and Appendix Table D.40).
- There were no statistically significant differences in prescription drug misuse by gender (Table 5.30).

Summary

An estimated 34.0 percent of service members reported binge drinking, which was defined as consuming at least five drinks on the same occasion at least once in the past 30 days for men or at least four drinks on the same occasion at least once in the past 30 days for women. An estimated 9.8 percent of service members were current heavy drinkers, which was defined as binge drinking on at least one or two days a week in the past 30 days. These rates were higher than the rates in the 2015 HRBS and higher than estimates in the general population of adults, although heavy drinking was defined slightly differently in the general population survey. An estimated 6.2 percent of service members experienced one or more serious consequences from drinking, with 4.9 percent reporting any risky drinking and driving behavior (i.e., as the driver or as the passenger), and 5.7 percent reported work-related productivity loss from alcohol use, such as working at a lower performance level because of drinking and reporting to work drunk after being off duty. It was generally the case that drinking behavior and problems resulting from drinking were most prevalent in the Marine Corps and Navy, among junior enlisted personnel, and among men. Such findings have implications for military readiness and for targeted prevention and intervention efforts to help reduce drinking behavior and associated consequences. Notably, however, 28.2 percent of all service members agreed with at least one of the statements that military culture was supportive of drinking, which, again, was highest among Marines, Navy, junior enlisted, and male personnel. Prevention and intervention efforts would likely need to address military culture at a systemic level to see any change in behavior, especially among these groups at higher risk.

An estimated 37.8 percent of service members currently use tobacco in some form. This rate is much higher than estimated rates of current tobacco use in the general population. Moreover, rates of cigarette smoking increased compared with the 2015 HRBS. Given that the downstream health consequences of tobacco use are substantial, reducing tobacco use in service members remains an important goal. In addition, current e-cigarette use significantly increased compared with the 2015 HRBS. Given mounting evidence of adverse health consequences, understanding the factors that contribute to e-cigarette use in service members is important. Our findings suggest that the reasons for e-cigarette use among service members are similar to those in the general population and include perceptions of e-cigarettes as healthier and use of e-cigarettes to help quit smoking. As research accumulates related to e-cigarette cessation among civilians, there may be opportunities to implement similar interventions for service members.

Drug use rates among military personnel were estimated to be low, with 1.3 percent of service members reporting use of any drugs in the past 12 months and 0.5 percent reporting use of any drugs in the past 30 days. As with alcohol, it was generally the case that higher rates of past-12-month drug use were seen among Marines, Navy personnel, junior enlisted personnel, and men. Few differences were observed between groups for past-30-day use, likely due to generally low reported rates overall. Rates of drug use were not directly comparable to the general population of adults; however, comparisons of any drug use, marijuana or synthetic cannabis use, and use of drugs other than marijuana or synthetic cannabis did not significantly differ between the 2018 and 2015 HRBSs. In addition, rates of marijuana or synthetic cannabis use were just about 1 percent (0.9 percent). Although many states have legalized recreational marijuana for sale, possession, and growth since the last HRBS in 2015, which essentially has removed the criminal penalties for use in those states, the drug is still illegal for such recreational purposes in the military, and service members can still face serious consequences if they are using marijuana. Therefore, efforts to address prevention of marijuana use are needed across the services to help service members avoid serious consequences.

Regarding prescription drugs, results suggest overall lower rates of past-year use of stimulants, sedatives, and pain relievers among service members compared with civilians, as well as lower rates of misuse. However, members of the Army and Marine Corps reported greater rates of prescription drug misuse, and junior enlisted and younger service members had higher rates of stimulant misuse. Therefore, ongoing monitoring of prescription drug availability and use in these groups may be warranted.

CHAPTER SIX

Mental and Emotional Health

This chapter presents the results of a detailed analysis on the social, emotional, and mental health of active component service members, including mental health indicators (e.g., serious psychological distress and PTSD), social and emotional factors associated with mental health (e.g., anger or aggression, unwanted sexual contact, and physical assault), suicide ideation and suicide attempts, and problematic gambling behaviors. Additionally, the chapter presents results on use of mental health services, unmet need for mental health treatment, and reasons why service members did not receive care when they believed they needed it or had high levels of distress that might have benefited from treatment.

Each section highlights the importance or relevance of the mental health topic to the general population and to the military and then provides an analysis of each topic by service branch. When relevant, we present analyses by pay grade and gender. Analyses by race/ethnicity and age group can be found in Appendix D. Key measures used are described in the applicable section, and additional details about these measures may be found in Appendix C. All analyses demonstrated statistically significant omnibus tests (a Rao-Scott chi-square test for categorical variables and F-tests for continuous variables), unless otherwise noted in the tables. Statistically significant group differences (pairwise comparisons) are presented within each table. However, only those statistically significant differences that the research team's subject-matter experts determined to be substantively meaningful (i.e., those that could be used to change or develop policy or that contributed to inequalities in health outcomes across subgroups) are discussed in the text. When interpreting the findings of this chapter, note that social, emotional, and mental health findings are based on self-reported symptoms and behaviors. These are assessed using previously validated screening instruments, but they do not represent clinical diagnoses per se.

Where appropriate, the text compares service members with civilian benchmarks (i.e., HP2020 goals) and/or current prevalence rates among U.S. adults; however, we caution readers that making direct comparisons between the military and civilian populations ignores the fact that the two groups are very different on some sociodemographic characteristics (e.g., gender, age) related to the health outcomes and health behaviors of interest. Readers should also use caution when interpreting comparisons between the 2018 HRBS results and other populations or prior versions of the HRBS because these comparisons are not necessarily statistically significant and could simply reflect sampling variability across the two samples being compared; however, when applicable, the report does compare results between the 2015 and 2018 HRBSs using a regression framework to control for some of the methodological differences related to survey implementation and analysis (see Chapter Two). When interpreting changes across surveys, it is important to keep in mind what the base for that increase is. That is, a 20-percent

increase for an outcome with a 2015 prevalence of 2 percent represents a much smaller increase in absolute value than a 20-percent increase for an outcome with a 2015 prevalence of 25 percent (0.4 versus 5.0 percent). Thus, extremely large percentage increases (or decreases) across surveys are often substantively small.

Mental Health Status

Serious Psychological Distress

Overall mental health status was assessed using the K6 (Kessler, Barker, et al., 2003), a commonly used measure of nonspecific serious psychological distress. The K6 is designed to distinguish between distress that indicates the presence of a psychiatric disorder that a clinician would recognize and treat and distress that is commonly experienced but not suggestive of a clinical condition. The K6 is nonspecific in the sense that it does not provide a diagnosis but indicates the likely presence of a clinical condition and problems severe enough to cause possible impairments in social, occupational, and other domains of functioning (Kessler, Barker, et al., 2003; Kessler, Berglund, et al., 2004). The NSDUH estimates that approximately 10.8 percent of U.S. adults ages 18 and older reported past-year serious psychological distress (Center for Behavioral Health Statistics and Quality, 2013). Data from the NSDUH and other studies of the general population (e.g., NHIS, BRFSS, Medical Expenditure Panel Survey) suggest that between 2.9 percent and 5.2 percent of U.S. adults reported serious psychological distress in the past month (Center for Behavioral Health Statistics and Quality, 2018). In the 2018 HRBS, mental health status was assessed for the past 30 days and for the worst month of the past year. Scores of 13 or higher on the K6 indicate serious psychological distress and discriminate highly between individuals with and without a clinical diagnosis of serious mental illness in the general population (Kessler, Barker, et al., 2003). Respondents with sum scores greater than or equal to 13 were categorized as having serious psychological distress. Given changes in measurement between the 2015 and 2018 HRBSs, direct comparisons of serious psychological distress cannot be made.

Key findings from the 2018 HRBS include the following:

- Across all service branches, 16.4 percent (CI: 15.5–17.4) of service members reported serious psychological distress in the past year, and 9.6 percent (CI: 8.7–10.4) reported serious psychological distress in the past 30 days (Table 6.1). These rates of serious psychological distress are higher than those observed in the general population (i.e., 2.9 percent to 5.2 percent in the past month; Center for Behavioral Health Statistics and Quality, 2018).
- The 2018 HRBS prevalences of past-year and past-month serious psychological distress were statistically significantly different across service branches (Table 6.1). Patterns were similar for both past-year and past-month distress, such that rates were higher in the Army (17.0 percent for past year; 9.7 percent for past month), Navy (21.2 percent for past year; 12.8 percent for past month), and Marine Corps (19.6 percent for past year; 12.8 percent for past month) compared with the Coast Guard (10.6 percent for past year; 6.0 percent for past month) and Air Force (9.8 percent for past year; 4.7 percent for past month).
- Enlisted service members had higher rates of past-year and past-month serious psychological distress compared with junior, mid-grade, and senior officers (Table 6.2).

Table 6.1
Serious Psychological Distress, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Past-month serious psychological distress (K6 score ≥13)	4.7%[b,c,d] (4.1–5.3)	9.7%[a,e] (8.0–11.3)	12.8%[a,e] (10.7–14.8)	12.8% [a,e] (10.9–14.7)	6.0% [b,c,d] (4.4–7.6)	9.7% (8.8–10.5)	9.6% (8.7–10.4)
Past-year serious psychological distress (K6 score ≥13)	9.8% [b,c,d] (8.9–10.7)	17.0%[a,e] (14.9–19.1)	19.6% [a,e] (17.1–22.0)	21.2% [a,e] (19.0–23.4)	10.6% [b,c,d] (8.8–12.5)	16.6% (15.6–17.7)	16.4% (15.5–17.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.2
Serious Psychological Distress, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Past-month serious psychological distress (K6 score ≥13)	12.7%[b,c,d,e,f] (11.1–14.4)	9.4% [a,c,e,f] (8.2–10.7)	6.1% [a,b,f] (5.0–7.1)	5.1% [a] (2.0–8.1)	4.8%[a,b,f] (3.7–5.9)	2.8% [a,b,c,e] (2.1–3.5)
Past-year serious psychological distress (K6 score ≥13)	20.6% [b,c,d,e,f] (18.6–22.5)	16.3% [a,e,f] (14.8–17.8)	13.5% [a,f] (11.3–15.7)	10.5% [a] (6.2–14.7)	9.8% [a,b,f] (8.4–11.3)	6.3% [a,b,c,e] (5.2–7.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

- Women had a significantly higher prevalence of past-year and past-month serious psychological distress (21.9 percent for past year; 12.0 percent for past month) than men (15.4 percent for past year; 9.1 percent for past month; Table 6.3). The higher prevalence of psychological distress among women than men is also commonly found in studies of civilian populations (Weissman et al., 2015).
- There were differences in rates of past-year and past-month serious psychological distress by age group, such that younger service members (i.e., ages 17 to 24) had *higher* rates of serious psychological distress compared with older service members (Appendix Table D.42).

Table 6.3
Serious Psychological Distress, by Gender

	Men	Women
Past-month serious psychological distress (K6 score ≥13)	9.1%[a] (8.1–10.0)	12.0% (10.6–13.4)
Past-year serious psychological distress (K6 score ≥13)	15.4% [a] (14.2–16.5)	21.9% (20.1–23.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

Posttraumatic Stress Disorder

A majority of individuals experience one or more psychological traumas in their lifetime (Atwoli et al., 2015; Benjet et al., 2016). Although most individuals who experience traumatic events do not develop PTSD (Atwoli et al., 2015), individuals who do develop PTSD could experience significant functional impairments (Kessler, 2000). PTSD is also associated with greater health care utilization, medical morbidity, and risky health behaviors, such as tobacco and heavy alcohol use (Hoge, Terhakopian, et al., 2007; Schnurr, 2015). Studies of the general population suggest that approximately 7 percent (CI: 6.2–7.8) of U.S. adults met criteria for PTSD at some point in their lives, and 3.5 percent (CI: 2.9–4.1) met criteria in the past year (Kessler, Berglund, et al., 2004). Psychological trauma is a well-known hazard associated with military service, particularly combat experiences. Estimates of PTSD prevalence in military samples vary widely in relation to the sample's exposure to combat (Ramchand, Rudavsky, et al., 2015; Ramchand, Schell, et al., 2010; Sundin et al., 2010). PTSD can lead to considerable suffering and impairment for individuals afflicted by this condition and contributes to military attrition, absenteeism, misconduct, and sick call visits (Hoge, Terhakopian, et al., 2007; Hoge, Grossman, et al., 2014).

The 2018 HRBS measured PTSD using the Primary Care PTSD Screen for DSM-5 (PC-PTSD-5; Prins et al., 2016), a brief screening measure for PTSD. Respondents are first asked whether they have experienced a traumatic event in their lifetime. If yes, they are asked whether in the past 30 days they have experienced five symptoms that correspond to cardinal symptoms of PTSD (nightmares, re-experiencing the event, and/or intrusive thoughts about the event; avoidance; hypervigilance; emotion numbness; persistent feelings of guilt or blame surrounding the event). Past research has shown that the Primary Care PTSD Screen (on which the PC-PTSD-5 is based) performs similarly to longer PTSD screening measures (e.g., the 17-item PTSD Checklist–Civilian [PCL-C]; Bliese et al., 2008). A preliminary validation study conducted with a sample of 398 veterans also showed that the PC-PTSD-5 had excellent predictive utility with respect to clinical diagnosis of PTSD (Prins et al., 2016). We chose a cutpoint of three or higher to indicate probable PTSD, which has been shown to be optimally sensitive to probable PTSD in prior studies (Prins et al., 2016). Because the 2015 HRBS used a different measure to assess PTSD (the PCL-C; Weathers et al., 1993), direct comparisons with the 2018 HRBS cannot be made.

Key findings from the 2018 HRBS for PTSD include the following:

- Across all services, 11.5 percent (CI: 10.8–12.3) of service members reported probable PTSD, a figure lower than the estimated 13 to 18 percent observed following recent combat deployments (Hoge, Castro, et al., 2004; Tanielian and Jaycox, 2008).
- The 2018 HRBS distribution of probable PTSD was statistically significantly different across service branches (Table 6.4). Similar to rates of serious psychological distress, rates of PTSD were highest in the Army (12.8 percent), Navy (12.6 percent), and Marine Corps (15.1 percent), compared with the Coast Guard (8.5 percent) and Air Force (6.9 percent).
- Enlisted service members and warrant officers tended to show higher rates of probable PTSD compared with junior, mid-grade, and senior officers (Table 6.5).
- Women had a significantly higher prevalence of probable PTSD (16.0 percent) than men (10.6 percent; Table 6.6), which is consistent with findings from the general population.
- Unlike the pattern observed for serious psychological distress, younger service members (i.e., ages 17 to 34) had *lower* rates of probable PTSD compared with older service members (ages 35 and older; Appendix Table D.44). This may be attributable to increased exposure to traumatic events associated with combat among older service members, who reported more combat deployments than their younger counterparts (see Chapter Ten). Of note, rates of probable PTSD observed among individuals ages 35–44 (16.5 percent) and ages 45+ (17.4 percent) were consistent with the estimated rates of PTSD (13 to 18 percent) observed among service members following combat deployments (Hoge, Castro, et al., 2004; Tanielian and Jaycox, 2008).

Table 6.4
Probable PTSD, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Probable PTSD (PC-PTSD-5 score ≥3)	6.9% [b,c,d] (6.2–7.6)	12.8% [a,e] (11.3–14.4)	15.1% [a,e] (13.2–17.0)	12.6% [a,e] (10.9–14.3)	8.5% [b,c,d] (7.0–9.9)	11.6% (10.9–12.4)	11.5% (10.8–12.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.5
Probable PTSD, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Probable PTSD (PC-PTSD-5 score ≥3)	10.0% [b,c,d,e] (8.6–11.4)	13.2% [a,c,e,f] (11.8–14.5)	20.4% [a,b,e,f] (18.5–22.2)	16.5% [a,e,f] (11.8–21.2)	5.4% [a,b,c,d,f] (4.4–6.4)	9.3% [b,c,d,e] (8.1–10.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 6.6
Probable PTSD, by Gender

	Men	Women
Probable PTSD (PC-PTSD-5 score ≥3)	10.6%[a] (9.8–11.5)	16.0% (14.6–17.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

Social and Emotional Factors Associated with Mental Health

We turn now to social and emotional factors that are associated with mental health, including angry or aggressive behavior, unwanted sexual contact, and physical assault. Detailed descriptions of each measure can be found in Appendix C.

Anger and Aggression

Anger and aggression are frequently reported among combat veterans (Jakupcak et al., 2007; Killgore et al., 2008). Angry or aggressive behavior can result in military personnel physically harming themselves or others, can lead to domestic violence and other illegal acts, and could affect military readiness (Killgore et al., 2008; Thomas et al., 2010). Identifying levels of angry or aggressive behavior among military service members might identify needs for policy or programmatic responses. To assess levels of aggressive behavior in the 2018 HRBS, respondents were asked to report how often in the past 30 days they had engaged in the following behaviors: got angry at someone and yelled or shouted; got angry with someone and kicked, slammed, or punched something; made a violent threat; or fought or hit someone (Thomas et al., 2010). These items were also included in the 2015 HRBS.

Key findings in the 2018 HRBS include the following:

- Nearly half (49.1 percent, CI: 47.9–50.3) of active component service members reported at least one of the four angry or aggressive behaviors in the past 30 days, and 7.1 percent (6.5–7.7) reported a recent recurrent pattern of these behaviors (one or more of the four behaviors occurring five or more times in the past 30 days; Table 6.7).
- Angry or aggressive behaviors varied significantly across service branches, such that rates of any aggressive behaviors were highest among the Army (51.8 percent), Marine Corps (56.2 percent), and Navy (55.7 percent) and lower among the Coast Guard (45.4 percent) and Air Force (35.1 percent).
- The percentage of service members reporting recurrent angry or aggressive behavior was highest in the Marine Corps (11.7 percent), followed by the Navy (8.0 percent) and Army (7.3 percent), and lowest among the Coast Guard (4.9 percent) and Air Force (3.5 percent; Table 6.7).
- Rates of angry or aggressive behaviors varied across pay grades. Patterns differed slightly for any aggressive behaviors and recurrent angry or aggressive behaviors, but more-senior enlisted service members tended to demonstrate the highest rates of both any past-month angry or aggressive behaviors (59.8 percent) and recurrent angry or aggressive behaviors (10.2 percent) compared with peers in other pay grades (Table 6.8).

Table 6.7
Angry and Aggressive Behaviors, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any angry or aggressive behavior in past 30 days	35.1%[b,c,d,e] (33.7–36.5)	51.8%[a,e] (49.2–54.4)	56.2% [a,e] (53.3–59.1)	55.7% [a,e] (53.1–58.2)	45.4% [a,b,c,d] (42.6–48.2)	49.2% (48.0–50.5)	49.1% (47.9–50.3)
Angry or aggressive behavior 5+ times in past 30 days	3.5% [b,c,d] (3.0–4.0)	7.3% [a,c] (6.0–8.6)	11.7%[a,b,d,e] (9.7–13.6)	8.0%[a,c,e] (6.7–9.4)	4.9%[c,d] (3.4–6.4)	7.2% (6.5–7.8)	7.1% (6.5–7.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.8
Angry and Aggressive Behaviors, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any angry or aggressive behavior in past 30 days	45.6% [b,c,e,f] (43.3–48.0)	53.3% [a,c,e] (51.4–55.3)	59.8% [a,b,e,f] (57.5–62.1)	50.2%[e] (43.6–56.8)	39.6% [a,b,c,d,f] (37.2–42.1)	51.1%[a,c,e] (48.9–53.3)
Angry or aggressive behavior 5+ times in past 30 days	6.8%[c,e] (5.6–8.0)	7.8%[e] (6.7–8.9)	10.2%[a,e,f] (8.8–11.6)	8.3%[e] (4.3–12.4)	3.4%[a,b,c,d,f] (2.4–4.3)	6.6%[c,e] (5.5–7.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

- Men and women did not differ with respect to rates of any angry or aggressive behaviors or recurrent angry or aggressive behaviors (Table 6.9).
- Hispanic service members showed the lowest rates of any or recurrent angry or aggressive behavior compared with other racial/ethnic groups and were statistically significantly less likely to engage in any angry or aggressive behaviors than non-Hispanic white and black peers (see Appendix Table D.45).

In terms of comparisons between the 2015 and 2018 HRBSs:

- Across all service members, any angry or aggressive behavior in the past 30 days increased between the 2015 and 2018 HRBSs by approximately 7 percent (ARR = 1.07; 95-percent CI: 1.04, 1.09). Rates of recurrent angry or aggressive behavior did not significantly change (ARR = 0.99; 95-percent CI 0.90, 1.08).

Table 6.9
Angry and Aggressive Behaviors, by Gender

	Men	Women
Any angry or aggressive behavior in past 30 days[z]	48.9% (47.5–50.3)	50.0% (48.0–52.0)
Angry or aggressive behavior 5+ times in past 30 days[z]	7.1% (6.4–7.8)	7.1% (5.9–8.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- Compared with the 2015 HRBS, there were significant within–service branch changes in rates of any angry or aggressive behavior, with increases observed in the Air Force (ARR = 1.11, 95-percent CI: 1.04, 1.18), Navy (ARR: 1.06, 95-percent CI: 1.01, 1.12), and Coast Guard (ARR = 1.13, 95-percent CI: 1.06, 1.20). Changes in the Army (ARR = 1.02, 95-percent CI: 0.97, 1.07) and Marine Corps (ARR = 1.03, 95-percent CI: 0.98, 1.09) did not reach statistical significance. There were no significant within–service branch changes for recurrent angry or aggressive behavior.
- Compared with the 2015 HRBS, there were significant increases in the rates of any angry or aggressive behavior for service members within each of the pay grades except for junior enlisted personnel (ARR = 0.99; 95-percent CI: 0.93, 1.05), mid-grade enlisted personnel (E5–E6; ARR = 1.02; 95-percent CI 0.97, 1.06), and warrant officers (ARR = 0.99; 95-percent CI: 0.88, 1.11). All other pay grades showed significant increases: senior enlisted personnel (E7–E9) by 11 percent (ARR = 1.11; 95-percent CI: 1.06, 1.17), junior officers by 11 percent (ARR = 1.11; 95-percent CI: 1.04, 1.19), and senior officers by 15 percent (ARR = 1.15; 95-percent CI: 1.09, 1.22). There were significant changes in rates of recurrent angry or aggressive behaviors within pay grade as well, although patterns were slightly different: Rates decreased for mid-grade enlisted personnel (E5–E6; ARR = 0.74; 95-percent CI: 0.62, 0.88), increased among senior enlisted personnel (E7–E9; ARR = 1.26; 95-percent CI: 1.04, 1.53), and increased among senior officers (ARR = 1.32; 95-percent CI: 1.06, 1.64); there were no significant changes in rates of recurrent angry or aggressive behavior for junior enlisted personnel (ARR = 0.81; 95-percent CI: 0.66, 1.00), warrant officers (ARR=1.14; 95-percent CI: 0.73, 1.77), or junior officers (ARR = 0.99; 95-percent CI: 0.72, 1.34).
- Rates of any angry or aggressive behaviors increased among men by 9 percent (ARR = 1.09; 95-percent CI: 1.05, 1.12) but did not significantly change among women (ARR = 1.03; 95-percent CI: 0.99, 1.07) when compared with the 2015 HRBS. Rates of recurrent angry or aggressive behaviors did not change among men or women compared with the 2015 HRBS.

Unwanted Sexual Contact

The experience of a sexual assault has potentially severe consequences for the victim, as well as costs for institutions and society more broadly (Smith et al., 2018; Lang et al., 2003; Peterson, DeGue, et al., 2017). In the general population in the United States, over 40 percent of women

and approximately one in five men have experienced contact sexual violence (i.e., rape, being made to penetrate someone else, sexual coercion, or unwanted sexual contact) in their lifetime (Smith et al., 2018). The HP2020 initiative lists reducing sexual violence—including rape or attempted rape as well as abusive sexual contact other than rape or attempted rape—as a developmental objective. Negative consequences for victims can include immediate physical harm (from the assault itself), increased risks of sexually transmitted infections (STIs), pregnancy, mental health problems (such as PTSD), and chronic health problems (Stein et al., 2004; Suris and Lind, 2008; Jina and Thomas, 2013; Frayne et al., 1999; Resnick et al., 2007; Suris et al., 2007). Past research among civilian samples has shown that, following a sexual assault, outpatient medical visits increased by over 50 percent, and increased utilization persisted for at least three years (Koss, 1993). Available data also suggest that military service members who experience sexual assault suffer from a range of significant problems (see Turchik and Wilson, 2010; Weaver and Clum, 1995; Stander and Thomsen, 2016).

In addition to its potential consequences on individuals' functioning, unwanted sexual contact experienced by military service members is important to assess because it can negatively affect retention, recruitment, and readiness. Similar to the 2015 HRBS, the 2018 HRBS assessed respondents' experiences of unwanted sexual contact, which is a broad category that includes sexual assault and other unwanted touching of a sexual nature. Items were modified from those used in the 2015 HRBS to focus exclusively on experiences that had occurred since joining the military and during the past 12 months (lifetime experience of unwanted sexual contact is no longer asked) and to more clearly define unwanted sexual contact. Specifically, the 2018 HRBS survey item asks respondents about "times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration." As such, a direct comparison with the 2015 HRBS results cannot be made. Similarly, direct comparisons with other civilian and military surveys, such as the WGRA, are not appropriate given differences in question wording.

The 2018 HRBS found that, among all active component service members, 9.6 percent (CI: 9.0–10.2) indicated experiencing any unwanted sexual contact since joining the military and 2.5 percent (CI: 2.1–2.9) indicated experiencing any unwanted sexual contact in the past 12 months (Table 6.10). Other key findings from the 2018 HRBS include the following:

- There were some statistically significant differences in responses about unwanted sexual contact across service branches, such that rates of any unwanted sexual contact since joining the military were significantly higher in the Navy (11.7 percent) than in the Air Force (8.2 percent) and Army (9.1 percent). With respect to unwanted sexual contact in the past 12 months, rates were higher among the Marine Corps (3.9 percent) and Navy (3.0 percent) compared with other branches (Table 6.10).
- Rates of unwanted sexual contact also differed by pay grade, such that rates of unwanted sexual contact in the past 12 months were significantly higher among junior enlisted service members (4.3 percent) compared with all other pay grades (Table 6.11).
- Women indicated experiencing substantially higher rates of unwanted sexual content than men. Specifically, rates of unwanted sexual contact since joining the military were more than six times higher among women (31.6 percent) compared with men (5.2 percent). Similarly, women indicated experiencing unwanted sexual contact in the past 12 months at rates nearly eight times higher (9.1 percent) than those experienced by men (1.2 percent; Table 6.12).

Table 6.10
Unwanted Sexual Contact, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Unwanted sexual contact since joining the military	8.2%[d] (7.5–8.9)	9.1%[d] (7.8–10.3)	9.4% (7.9–11.0)	11.7%[a,b] (10.3–13.0)	10.0% (8.5–11.6)	9.6% (8.9–10.2)	9.6% (9.0–10.2)
Unwanted sexual contact in the past 12 months	1.9%[c,d] (1.5–2.2)	2.1% (1.4–2.8)	3.9%[a,e] (2.7–5.1)	3.0%[a] (2.2–3.8)	1.5%[c] (0.8–2.2)	2.5% (2.2–2.9)	2.5% (2.1–2.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses. The exact question wording in the 2018 HRBS is "The next question is about unwanted sexual contact, meaning times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration. Since joining the military, have you ever experienced unwanted sexual contact?" and "Did this unwanted sexual contact occur in the past 12 months?"

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.11
Unwanted Sexual Contact, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Unwanted sexual contact since joining the military	8.6%[b] (7.5–9.7)	11.5%[a,e,f] (10.3–12.6)	10.0% (8.8–11.2)	8.1% (5.1–11.1)	8.6%[b] (7.5–9.8)	8.0%[b] (7.0–9.1)
Unwanted sexual contact in the past 12 months	4.3%[b,c,d,e,f] (3.5–5.1)	1.5%[a,f] (1.0–1.9)	0.7%[a] (0.4–1.1)	0.2%[a] (0.0–0.4)	1.5%[a,f] (1.0–2.1)	0.4%[a,b,e] (0.2–0.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses. The exact question wording in the 2018 HRBS is "The next question is about unwanted sexual contact, meaning times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration. Since joining the military, have you ever experienced unwanted sexual contact?" and "Did this unwanted sexual contact occur in the past 12 months?"

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

- There were also significant differences in rates of unwanted sexual contact by age, such that younger service members (ages 17 to 24) had significantly higher rates of unwanted sexual contact in the past 12 months (4.4 percent) than older service members (see Appendix Table D.48). This is also consistent with findings from the general population, which suggest that youths and young adults under the age of 25 are at higher risk for sexual violence than individuals ages 25 and older (Smith et al., 2018; Breiding et al., 2015).

Table 6.12
Unwanted Sexual Contact, by Gender

	Men	Women
Unwanted sexual contact since joining the military	5.2%[a] (4.6–5.7)	31.6% (29.7–33.4)
Unwanted sexual contact in the past 12 months	1.2%[a] (0.9–1.5)	9.1% (7.7–10.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses. The exact question wording in the 2018 HRBS is "The next question is about unwanted sexual contact, meaning times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration. Since joining the military, have you ever experienced unwanted sexual contact?" and "Did this unwanted sexual contact occur in the past 12 months?"

[a] Statistically significantly different from women's estimate.

Physical Assault

Physical assault is associated with a range of negative consequences, including PTSD and other psychological problems (Scarpa, 2003; Rademaker et al., 2008). Experiencing physical assault is common among the general population, with nearly 2.9 million individuals aged 12 and older in the United States reporting one or more violent victimizations in the past year as of 2016 (Morgan and Kena, 2018). Reducing physical assaults from 21.3 per 1,000 people (baseline data in 2008) to 19.2 per 1,000 people is an HP2020 objective (Healthy People, 2020f). As reported in the 2015 HRBS, lifetime experiences of physical assault or abuse are also common among service members, with more than one in ten respondents endorsing a lifetime history of physical abuse; notably, a large majority of service members' physical assaults occurred before the age of 18 and thus occurred before they entered the military (Meadows et al., 2018). Items in the 2018 HRBS were refined from those used in the 2015 HRBS to focus exclusively on experiences that have occurred since joining the military and during the past 12 months (lifetime experience of physical abuse is no longer asked). These items, with their focus on experiences during military service tenure, have implications for policy or other interventions to address service members' experiences of physical abuse in the context of their military service.

Overall, the data indicate that relatively few military personnel had experienced a physical assault while in the military or in the past year: 5.3 percent (CI: 4.8–5.8) of service members responded that they had experienced a physical assault since joining the military, and 1.1 percent (CI: 0.8–1.4) indicated experiencing a physical assault within the past 12 months. By comparison, in the general population, approximately 1.7 percent of individuals ages 12 and older indicated experiencing a physical assault in the past year (Morgan and Kena, 2018). As detailed below, responses indicating physical assault varied significantly in relation to service member characteristics. Key findings from the 2018 HRBS include the following:

- There were statistically significant differences across service branches, such that rates of physical assault since joining the military were significantly higher among the Marine Corps (9.1 percent) compared with all other branches; similarly, rates of physical assault in the past year were highest in the Marine Corps (2.1 percent) and lowest in the Air Force (0.7 percent; Table 6.13).

- Rates of physical assault also differed by pay grade. With respect to physical assault since joining the military, senior enlisted service members (8.6 percent) and warrant officers (9.0 percent) tended to indicate that they had experienced higher rates compared with other pay grades, and junior officers indicated that they had experienced the lowest rates (2.7 percent). A different pattern emerged for physical assault in the past year, such that junior enlisted service members endorsed significantly higher rates (1.7 percent) compared with other pay grades (Table 6.14).
- Compared with men, women indicated experiencing significantly higher rates of physical assault since joining the military (4.8 percent versus 7.9 percent) and in the past year (0.9 percent versus 2.2 percent; Table 6.15).

Table 6.13
Physical Assault, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Physically assaulted since joining the military	3.2%[b,c,d] (2.7–3.7)	5.5%[a,c,e] (4.4–6.5)	9.1%[a,b,d,e] (7.4–10.8)	5.3%[a,c,e] (4.5–6.2)	3.3%[b,c,d] (2.4–4.2)	5.4% (4.9–5.9)	5.3% (4.8–5.8)
Physically assaulted in the past 12 months	0.7%[c] (0.4–0.9)	1.1% (0.5–1.7)	2.1%[a] (1.3–2.9)	1.0% (0.5–1.4)	0.8% (0.2–1.3)	1.1% (0.8–1.4)	1.1% (0.8–1.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.14
Physical Assault, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Physically assaulted since joining the military	4.5%[c,e] (3.5–5.4)	6.1%[c,e] (5.2–7.0)	8.6%[a,b,e,f] (7.4–9.8)	9.0%[e] (4.5–13.5)	2.7%[a,b,c,d,f] (2.0–3.4)	5.7%[c,e] (4.7–6.8)
Physically assaulted in the past 12 months	1.7%[b,c,e,f] (1.2–2.3)	0.9%[a,e] (0.6–1.2)	0.6%[a] (0.3–0.9)	0.1% (0.0–0.3)	0.2% [a,b] (0.1–0.4)	0.4%[a] (0.1–0.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 6.15
Physical Assault, by Gender

	Men	Women
Physically assaulted since joining the military	4.8%[a] (4.2–5.4)	7.9% (6.9–9.0)
Physically assaulted in the past 12 months	0.9%[a] (0.6–1.2)	2.2% (1.7–2.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

Suicide

Reduction in the suicide rate is one of the mental health status improvement goals of HP2020. Specifically, HP2020 set the goal of a 10-percent reduction in the suicide rate relative to the 2007 rate of 11.3 suicides per 100,000 population (i.e., a reduction to 10.2 suicides per 100,000 population; Healthy People, 2020g). However, suicide rates in the United States have consistently risen over the past two decades (Stone et al., 2018). According to the most recent CDC data, there was a 33-percent increase in the national age-adjusted suicide rate between 1999, when there were 10.5 suicides per 100,000 population, and 2017, when there were 14.0 suicides per 100,000 population (Curtin and Hedegaard, 2019).

Recent reports of increased rates of suicide among active-duty military personnel (e.g., Ramchand, Acosta, et al., 2011) have garnered considerable attention and have spurred significant investments by DoD, the U.S. Department of Veterans Affairs (VA), and external organizations into research and prevention efforts (Ramchand, Eberhart, et al., 2014). Assessing service members' experiences with suicidal ideation and suicide behaviors is critical for informing resource allocation and identifying key targets for prevention programs. Thoughts of suicide are strongly associated with psychological conditions such as depression and can be a precursor to death by suicide (Bryan, Bryan, et al., 2014; Franklin et al., 2017). Although correlations between suicidal ideation and suicide are not particularly strong (Nock et al., 2008; Franklin et al., 2017), suicidal ideation is one of the most common reasons for psychiatric hospitalization (Bowers, 2005), and individuals are likely to have thought about suicide prior to an attempt (Jobes and Joiner, 2019). Suicide attempts are important to measure because, although most attempts do not result in death (Crosby et al., 2011; Han, Kott, et al., 2016), past attempts are robustly associated with future suicide death (Harris and Barraclough, 1997). In addition, treatments for individuals who have attempted suicide can significantly reduce the likelihood of subsequent attempts in civilian samples (Brown et al., 2005; Gysin-Maillart et al., 2016), as well as military personnel (Bryan, Mintz, et al., 2017).

The 2018 used methods consistent with the 2015 HRBS and with methods used in the NSDUH, the primary federal survey for assessing mental health problems in the U.S. general population. Respondents were asked (1) whether they had *seriously thought about* trying to kill themselves in the past 12 months, (2) whether they had *made any plans* to kill themselves in the past 12 months, and (3) whether they *made any attempts* to kill themselves in the past 12 months. Items were modified from the 2015 HRBS to focus exclusively on experiences during the past 12 months and map directly to questions from the NSDUH.

In the 2018 HRBS, 8.3 percent (CI: 7.5–9.0) of all service members endorsed having thoughts of suicide in the past 12 months, 2.7 percent (CI: 2.3–3.2) reported suicide plans, and 1.2 percent (CI: 0.9–1.6) reported a suicide attempt. By comparison, the 2018 NSDUH found that, among adults aged 18 or older in the general population, 4.3 percent endorsed thoughts of suicide, 1.3 percent endorsed suicide plans, and 0.6 percent reported a suicide attempt (Substance Abuse and Mental Health Services Administration, 2019b). Key findings from the 2018 HRBS include the following:

- Prevalence of suicidal ideation, plans, and attempts varied across service branches (Table 6.16). Rates of suicidal ideation were higher among the Army (8.5 percent), Marine Corps (10.1 percent), and Navy (10.8 percent) compared with the Air Force (4.8 percent) and Coast Guard (4.7 percent). Generally similar patterns were observed for differences in rates of suicide plans and attempts across branches (Table 6.16).
- Rates of suicidal ideation, suicide plans, and suicide attempts also varied significantly by pay grade. With respect to suicidal thoughts, junior enlisted service members showed the highest rates (11.3 percent) compared with individuals in other pay grades, and senior officers showed the lowest rates (2.6 percent). Similar patterns were observed for suicide plans, such that rates were highest among the junior enlisted group (3.8 percent) and lowest among senior officers (0.7 percent). Junior enlisted service members also reported the highest rates of suicide attempts in the past 12 months (2.2 percent) compared with other groups (Table 6.17).
- Women reported significantly higher rates of suicidal ideation in the past 12 months (10.1 percent) compared with men (7.9 percent). Similarly, women showed slightly but statistically significantly higher rates of suicide plans in the past 12 months compared with men; however, women and men did not differ significantly with respect to suicide attempts (Table 6.18).
- There were differences with respect to suicidal ideation and behaviors by age group, such that younger service members (ages 17–24) were more likely to endorse suicidal ideation, suicide plans, and suicide attempts in the past 12 months compared with older service members (see Appendix Table D.52). This is consistent with age-related patterns observed

Table 6.16
Suicide, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Suicidal ideation, past 12 months	4.8%[b,c,d] (4.1–5.4)	8.5%[a,e] (6.9–10.1)	10.1%[a,e] (8.3–11.9)	10.8%[a,e] (9.0–12.6)	4.7%[b,c,d] (3.2–6.2)	8.4% (7.6–9.2)	8.3% (7.5–9.0)
Suicide plan, past 12 months	1.6%[c,d] (1.2–1.9)	2.4% (1.6–3.2)	4.2%[a] (3.0–5.4)	3.7%[a] (2.7–4.7)	1.6% (0.5–2.7)	2.8% (2.3–3.2)	2.7% (2.3–3.2)
Suicide attempt, past 12 months	0.6%[c,d] (0.4–0.9)	1.4%[e] (0.7–2.2)	1.6%[a,e] (0.8–2.4)	1.6%[a,e] (0.8–2.3)	0.2%[b,c,d] (0.0–0.4)	1.3% (0.9–1.6)	1.2% (0.9–1.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.17
Suicide, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Suicidal ideation, past 12 months	11.3%[b,c,e,f] (9.7–12.8)	7.1%[a,e,f] (6.1–8.2)	6.3%[a,f] (4.2–8.3)	5.4% (2.3–8.5)	4.8%[a,b,f] (3.8–5.8)	2.6%[a,b,c,e] (1.9–3.3)
Suicidal plan, past 12 months	3.8%[b,c,e,f] (2.9–4.7)	2.3%[a,f] (1.8–2.9)	1.9%[a,f] (1.3–2.5)	2.7% (0.2–5.1)	1.6%[a] (1.0–2.2)	0.7%[a,b,c] (0.4–1.0)
Suicidal attempt, past 12 months	2.2%[b,c,e,f] (1.5–3.0)	0.7%[a] (0.4–0.9)	0.4%[a] (0.2–0.7)	0.2% (0.0–0.7)	0.3%[a] (0.1–0.6)	0.3%[a] (0.1–0.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 6.18
Suicide, by Gender

	Men	Women
Suicidal ideation, past 12 months	7.9%[a] (7.0–8.8)	10.1% (8.8–11.5)
Suicidal plan, past 12 months	2.6%[a] (2.1–3.0)	3.6% (2.7–4.4)
Suicidal attempt, past 12 months[z]	1.2% (0.8–1.5)	1.7% (1.0–2.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

among the general population (Substance Abuse and Mental Health Services Administration, 2019b).

Both the 2015 and 2018 HRBS asked about suicidal thoughts and suicide attempts in the past 12 months. In terms of comparisons between the 2015 and 2018 HRBSs:

- Across all service members, prevalence of suicidal ideation in the past year increased between the 2015 and 2018 HRBSs, by approximately 31 percent (ARR = 1.31, 95-percent CI: 1.19, 1.46).
- Compared with the 2015 HRBS, there were significant within–service branch changes in rates of past-year suicidal ideation, with increases observed in the Air Force (ARR = 1.42, 95-percent CI: 1.12, 1.79), Marine Corps (ARR: 1.32, 95-percent CI: 1.04, 1.69), and Navy (ARR = 1.49, 95-percent CI: 1.20, 1.86). The changes in the Army (ARR = 1.13, 95-percent CI: 0.92, 1.38) and Coast Guard (ARR = 1.26, 95-percent CI: 0.94, 1.69) did not reach statistical significance.

- Compared with the 2015 HRBS, there were significant increases in the rates of suicidal ideation for service members within each of the pay grades except for junior enlisted personnel (ARR 1.20; 95-percent CI: 1.00, 1.45), warrant officers (ARR 1.38; 95-percent CI: 0.78, 2.43), and senior officers (ARR 1.15; 95-percent CI: 0.82, 1.60). All other pay grades showed significant increases in rates of suicidal ideation: mid-grade enlisted personnel (E5–E6) by 41 percent (ARR = 1.41; 95-percent CI: 1.15, 1.72), E7–E9 by 43 percent (ARR = 1.43; 95-percent CI: 1.09, 1.88), and junior officers by 38 percent (ARR = 1.38; 95-percent CI: 1.07, 1.79).
- Rates of suicidal ideation in the past year significantly increased for both men and women as compared with the 2015 HRBS. Rates among men increased by 33 percent (ARR = 1.33; 95-percent CI: 1.15, 1.53), and among women they increased by 30 percent (ARR = 1.30; 95-percent CI: 1.11, 1.52).
- Prevalence of suicide attempts in the past 12 months did not change across the 2015 and 2018 HRBSs (ARR = 0.96; 95-percent CI: 0.74, 1.34).

Problematic Gambling

Many forms of gambling, including lottery tickets, casino games, internet poker, and sports betting, have become increasingly accessible and legal in the United States (St-Pierre et al., 2014). The widening availability of gambling raises concerns about problem gambling, a general term used to describe gambling behavior that results in adverse consequences for an individual, and gambling disorder, a psychiatric disorder characterized by loss of control over gambling behavior and serious functional impairments. *Gambling disorder* is defined in the Diagnostic and Statistical Manual of Mental Disorders, version 5 (DSM-5; American Psychiatric Association, 2013), as "persistent and recurrent problematic gambling behavior leading to clinically significant impairment or distress." To meet diagnostic criteria for gambling disorder, a person must have at least four out of nine symptoms, which include needing to gamble with increasingly large amounts of money, repeated unsuccessful attempts to stop gambling, lying to conceal one's gambling behavior, and preoccupation with thoughts of gambling. Both problem gambling and gambling disorder are associated with other problem behaviors and adverse life events, including substance use (Peters et al., 2015), psychiatric comorbidity (Stefanovics, Potenza, and Pietrzak, 2017), partner violence (Afifi et al., 2010), and suicidal behaviors (Moghaddam et al., 2015).

Concern with problem gambling and gambling disorder in the military has been raised by evidence that service members are at high risk (Steenbergh et al., 2008; Levy and Tracy, 2018). In addition, a recent report by the Government Accountability Office recommended that DoD included screening questions for gambling disorder in existing, systematic data collection efforts (e.g., PHA, HRBS; U.S. Government Accountability Office, 2017). In response to these concerns, the 2018 NDAA mandated screening of active-duty service members for gambling disorder.[1] Specifically, the law states that "the Secretary of Defense shall incorporate medical screening questions specific to gambling disorder into the Annual Periodic Health Assessments of members of the Armed Forces conducted by the Department of Defense during

[1] H.R. 5515, John S. McCain National Defense Authorization Act for Fiscal Year 2019.

the one-year period beginning 180 days after the date of the enactment of this Act." At the time of this report, implementation of this new policy was ongoing.

In the 2018 HRBS, problem gambling was assessed using the Lie-Bet screening questionnaire, which consists of two items, one about lying ("lie to people important to you about how much you gambled") and one item about betting ("feeling a need to bet more and more money"; Johnson et al., 1997). Methodological studies of the Lie-Bet questionnaire have found it to be a valid instrument for identifying problem gambling and gambling disorder (Johnson, Hamer, and Nora, 1998; Dowling et al., 2018). In this report, we refer to people who screen positive on the Lie-Bet questionnaire as having a gambling problem, but it should be understood that there is a wide range of severity among this group, with many also meeting more-stringent criteria for gambling disorder.

- The prevalence of gambling problems in the total active component population was 1.6 percent (CI: 1.3, 1.9; Table 6.19). This is lower than an estimate of the prevalence of problem gambling in the U.S. civilian population conducted in the early 2000s of 2.3 percent (Kessler, Hwang, et al., 2008). The prevalences in the Navy and Marine Corps were significantly higher than in the Air Force.
- Problem gambling was significantly more prevalent among enlisted ranks than among O4–O6 (Table 6.20).
- Men was more likely to have problem gambling than women. Studies in the civilian population also found higher prevalences of problem gambling among men than women (Blanco et al., 2006; Table 6.21).
- Problem gambling was significantly more prevalent among Asian service members than among all other racial/ethnic groups (Appendix Table D.53), though we caution that small sample sizes increase the uncertainty of this estimate. The prevalence among Asian

Table 6.19
Past-Year Gambling Problem, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Past-year gambling problem (positive Lie-Bet screen)	0.9%[c,d] (0.6–1.2)	1.7% (1.1–2.3)	1.9%[a] (1.2–2.6)	1.9%[a] (1.3–2.6)	1.2% (0.5–1.9)	1.6% (1.3–1.9)	1.6% (1.3–1.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.
[a] Statistically significantly different from Air Force estimate.
[c] Statistically significantly different from Marine Corps estimate.
[d] Statistically significantly different from Navy estimate.

Table 6.20
Past-Year Gambling Problem, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Past-year gambling problem (positive Lie-Bet screen)	1.5%[f] (1.0–2.0)	1.9%[f] (1.4–2.5)	1.8%[f] (1.2–2.4)	1.3% (0.2–2.4)	1.2% (0.6–1.8)	0.4%[a,b,c] (0.1–0.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.
[a] Statistically significantly different from E1–E4 estimate.
[b] Statistically significantly different from E5–E6 estimate.
[c] Statistically significantly different from E7–E9 estimate.
[f] Statistically significantly different from O4–O6 estimate.

Table 6.21
Past-Year Gambling Problem, by Gender

	Men	Women
Past-year gambling problem (positive Lie-Bet screen)	1.7%[a] (1.4–2.0)	0.9% (0.5–1.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

service members in the HRBS was 5.3 percent, more than double that of any other racial/ethnic group. This finding contrasts with findings from civilian studies, some of which found lower prevalences of problem gambling among Asian people compared with other racial/ethnic groups and higher prevalences of problem gambling among non-Hispanic black people than among non-Hispanic white people (Volberg, McNamara, and Carris, 2018; Alegria et al., 2009).

Mental Health Services

There is a longstanding concern across military services about low levels of use of mental health services (Hom et al., 2017). Similar concerns regarding the civilian population (Olfson, Blanco, and Marcus, 2016) are reflected in the HP2020 goals of increasing utilization of mental health services by individuals with serious mental illness or major depression (Healthy People, 2020h; Healthy People, 2020i). Although use of mental health services has increased over time, there remains a large proportion of individuals with mental health treatment needs who do not receive treatment (Kim, Thomas, et al., 2010; Quartana et al., 2014). This pattern is not unique to the U.S. military; similar findings have been reported from studies of military samples from the United Kingdom (Iversen et al., 2010) and Canada (Sareen et al., 2007).

In this section, we present results from the HRBS regarding the use of mental health services by service members, examining not only the prevalence of use but also the location, type, and frequency of care. Results regarding prevalence of use are important because they help identify subgroups of service members who may face more-serious barriers to care. The more-detailed data on the care that is received are also important because service members are likely to seek care from a diverse range of providers. Information on patterns of help-seeking across these providers can help allocate resources to ensure that they have the capacity to respond effectively.

The HRBS also collects information on perceived unmet need for mental health treatment and the reasons why people who either perceive a need for treatment or have a high level of psychological distress do not receive mental health treatment. Among the civilian population, research suggests that barriers to care, including stigma, cost, and inconvenience, contribute to low use of mental health services (Mojtabai et al., 2011), and research suggests similar patterns of undertreatment among military service members (Kim, Thomas, et al., 2010). Service members are impacted by the same barriers that affect the general population, such as low perception of need (Hom et al., 2017) and stigma related to mental health treatment (Kim, Thomas, et al., 2010; Quartana et al., 2014). However, service members also face barriers that

are specific to the military context, including practical barriers in scheduling appointments (Kim, Thomas, et al., 2010) and concern that seeking mental health treatment may have a negative impact on one's military career (Hoge, Castro, et al., 2004). Understanding barriers to treatment is important for designing policies to ensure that service members are able to access the care they need.

To address these issues, the 2018 HRBS asked a series of questions designed to investigate the following:

- whether and how much mental health services were used (counseling, therapy, or other mental health treatment)
- what types of providers delivered the services (mental health specialist, general medical doctor, civilian clergyperson or military chaplain, support group, other)
- where services were obtained (military health system [MHS] or civilian sector)[2]
- whether mental health services were needed but not received (perceived by self)
- common reasons why service members who perceived a need to receive services did not actually receive them (e.g., lack of transportation, concerns about what others will think)
- whether service members believed that obtaining mental health services would damage their military career.

Mental Health Service Utilization

Tables 6.22 through 6.24 show the percentage of service members who reported using mental health services in the past 12 months from various sources (in both military and civilian health systems). A useful comparison can be drawn between these results and those from the NSDUH. In the 2018 NSDUH, the prevalence of any mental health service use was 15.2 percent among adults age 18 to 25 and 16.1 percent among adults age 26 to 49 (Substance Abuse and Mental Health Services Administration, 2019b). In comparing the HRBS with the NSDUH results, it is important to keep in mind that the NSDUH sample is evenly divided between men and women, while the HRBS sample, reflecting the service member population, is approximately 83 percent men. Because women use mental health services at a higher rate than men (Han, Olfson, et al., 2017), we would expect the prevalence of service use to be higher in the NSDUH than in the HRBS.

Key findings regarding use of mental health services in the HRBS include the following:

- Overall, 25.5 percent (CI: 24.4, 26.5) of service members reported using any mental health services (Table 6.22). This proportion is higher than that found in the general population in the NSDUH.
- Use of any mental health service varies significantly across service branches, with the Army, Marine Corps, and Navy all having significantly higher use than the Air Force and the Coast Guard (Table 6.22).
- Receipt of mental health services was more common from specialty mental health providers (18.2 percent, CI: 17.2, 19.1) than from general medical providers (13.4 percent, CI: 12.6, 14.3). This pattern is different from that in the general population, where the

[2] The survey did not differentiate between care from a civilian provider that is and is not covered by TRICARE (i.e., purchased care).

Table 6.22
Past-Year Mental Health Service Utilization, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any mental health service use	20.3%[b,c,d] (19.1–21.5)	28.7%[a,e] (26.4–31.1)	24.9%[a,e] (22.4–27.4)	27.0%[a,e] (24.7–29.4)	19.3%[b,c,d] (17.2–21.5)	25.7% (24.6–26.8)	25.5% (24.4–26.5)
Saw mental health provider	14.6%[b,d] (13.6–15.6)	21.5%[a,e] (19.4–23.5)	17.3%[e] (15.1–19.5)	18.3%[a,e] (16.4–20.3)	12.4%[b,c,d] (10.7–14.2)	18.4% (17.4–19.3)	18.2% (17.2–19.1)
Saw general medical provider	9.5%[b,c,d,e] (8.7–10.4)	15.9%[a,e] (14.1–17.8)	13.2%[a] (11.3–15.2)	14.0%[a] (12.1–15.9)	12.1%[a,b] (10.4–13.9)	13.5% (12.6–14.4)	13.4% (12.6–14.3)
Any mental health services from specialty mental health or medical provider	17.9%[b,d] (16.7–19.0)	25.9%[a,c,e] (23.6–28.1)	21.2%[b,e] (18.9–23.5)	23.4%[a,e] (21.2–25.6)	16.6%[b,c,d] (14.6–18.6)	22.6% (21.5–23.6)	22.4% (21.4–23.4)
Saw clergy, chaplain, or pastor	6.1%[b,c,d] (5.4–6.8)	8.5%[a] (7.1–10.0)	10.3%[a,e] (8.3–12.3)	10.8%[a,e] (8.9–12.6)	6.5%[c,d] (5.1–7.9)	8.7% (8.0–9.5)	8.7% (7.9–9.4)
Only saw clergy (no medical provider)[z]	2.5% (2.0–2.9)	2.9% (2.0–3.8)	3.7% (2.6–4.8)	3.7% (2.5–4.8)	2.7% (1.8–3.7)	3.1% (2.6–3.6)	3.1% (2.6–3.5)
Mental health services at a military facility (excluding clergy)	14.8%[b,c,d,e] (13.7–15.8)	20.9%[a,e] (18.9–22.9)	18.1%[a,e] (15.9–20.3)	19.2%[a,e] (17.1–21.2)	10.9%[a,b,c,d] (9.2–12.5)	18.5% (17.6–19.5)	18.3% (17.4–19.2)
Mental health services at a VA facility (excluding clergy)[z]	0.6% (0.4–0.8)	1.5% (0.9–2.1)	1.7% (0.8–2.6)	1.3% (0.5–2.1)	0.7% (0.3–1.1)	1.2% (0.9–1.6)	1.2% (0.9–1.5)
Mental health services at a civilian facility (excluding clergy)	3.5%[d,e] (3.0–4.1)	4.3%[e] (3.4–5.1)	4.1%[e] (2.9–5.2)	5.6%[a,e] (4.4–6.8)	9.8%[a,b,c,d] (8.2–11.4)	4.4% (3.9–4.9)	4.6% (4.1–5.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

majority of individuals who receive mental health care receive that care exclusively from general medical providers (Olfson et al., 2019).

- The percentage of service members who consulted a clergy member for a mental health problem but did not receive any medical care for a mental health problem was 3.1 percent (CI: 2.6, 3.5). This percentage did not differ across service branches. This finding is similar to a study of recently deployed service members, 5 percent of whom reported receiving mental health care from nonproviders, a category that includes clergy members and other nonprofessionals, such as fellow service members (Kim, Toblin, et al., 2016).
- The percentage of service members who received mental health services at a military health facility (18.3 percent, CI: 17.4, 19.2) was higher than that receiving mental health

Table 6.23
Past-Year Mental Health Service Utilization, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any mental health service use	25.7%[c,e,f] (23.6–27.8)	26.4%[e,f] (24.7–28.1)	30.4%[a,e,f] (28.0–32.8)	25.9% (20.2–31.6)	19.8%[a,b,c] (17.9–21.8)	20.8%[a,b,c] (19.0–22.6)
Saw mental health provider	18.0%[c,e,f] (16.2–19.8)	19.6%[e,f] (18.1–21.2)	22.9%[a,e,f] (20.5–25.2)	17.8% (12.9–22.7)	12.6%[a,b,c] (11.1–14.2)	14.2%[a,b,c] (12.7–15.7)
Saw general medical provider	13.2%[c,e] (11.5–14.8)	13.8%[c,e,f] (12.5–15.1)	19.3%[a,b,e,f] (17.0–21.6)	18.9%[e,f] (13.8–23.9)	8.8%[a,b,c,d] (7.3–10.2)	10.4%[b,c,d] (9.1–11.7)
Any mental health services from specialty mental health or medical provider	22.0%[c,e,f] (20.0–24.0)	24.0%[c,e,f] (22.4–25.7)	28.5%[a,b,e,f] (26.1–30.9)	24.5%[e] (19.0–30.1)	16.2%[a,b,c,d] (14.4–18.1)	17.4%[a,b,c] (15.8–19.1)
Saw clergy, chaplain, or pastor	10.7%[b,c,e,f] (9.2–12.3)	7.0%[a] (6.0–7.9)	7.6%[a] (6.4–8.8)	6.4% (3.1–9.7)	7.6%[a] (6.3–8.9)	6.7%[a] (5.6–7.8)
Only saw clergy (no medical provider)	3.7%[c] (2.8–4.7)	2.4% (1.8–2.9)	1.9%[a,e] (1.3–2.5)	1.4% (0.0–2.9)	3.6%[c] (2.7–4.5)	3.3% (2.5–4.2)
Mental health services at a military facility (excluding clergy)	18.2%[c,e,f] (16.4–20.0)	19.7%[e,f] (18.2–21.3)	22.8%[a,e,f] (20.9–24.6)	21.4%[e,f] (16.1–26.7)	12.7%[a,b,c,d] (11.1–14.3)	13.7%[a,b,c,d] (12.2–15.2)
Mental health services at a VA facility (excluding clergy)	1.5%[e,f] (0.8–2.1)	1.3%[f] (0.8–1.9)	1.1% (0.7–1.6)	1.5% (0.0–3.7)	0.4%[a] (0.1–0.7)	0.4%[a,b] (0.1–0.7)
Mental health services at a civilian facility (excluding clergy)	3.6%[c,f] (2.8–4.5)	4.7%[c] (3.9–5.4)	6.7%[a,b] (5.5–7.8)	5.8% (2.8–8.8)	5.1% (4.1–6.1)	5.8%[a] (4.8–6.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

services at a VA facility (1.2 percent, CI: 0.9, 1.5) or civilian facility (4.6 percent, CI: 4.1, 5.0). Use of military health facilities was more common than use of civilian health facilities in all branches except for the Coast Guard, where roughly similar proportions used military health facilities (10.9 percent, CI: 9.2, 12.5) and civilian health facilities (9.8 percent, CI 8.2, 11.4).

- Use of any mental health services was lower among officers than among enlisted personnel (Table 6.23). This pattern was consistent across all locations and types of mental health services, with the exception of services at a civilian health facility.
- Use of any mental health services was lower among men (23.5 percent, CI: 22.3, 24.8) than women (35.1 percent, CI: 33.2, 37.0; Table 6.24). This was true for all locations and

Table 6.24
Past-Year Mental Health Service Utilization, by Gender

	Men	Women
Any mental health service use	23.5%[a] (22.3–24.8)	35.1% (33.2–37.0)
Saw mental health provider	16.7%[a] (15.6–17.7)	25.7% (24.0–27.5)
Saw general medical provider	12.4%[a] (11.4–13.4)	18.6% (17.0–20.1)
Any mental health services from specialty mental health or medical provider	20.6%[a] (19.4–21.8)	31.4% (29.6–33.3)
Saw clergy, chaplain, or pastor	8.2%[a] (7.4–9.1)	10.9% (9.6–12.2)
Only saw clergy (no medical provider)[z]	2.9% (2.4–3.5)	3.7% (2.8–4.6)
Mental health services at a military facility (excluding clergy)	16.6%[a] (15.5–17.7)	26.7% (25.0–28.5)
Mental health services at a VA facility (excluding clergy)[z]	1.2% (0.9–1.6)	1.1% (0.7–1.6)
Mental health services at a civilian facility (excluding clergy)	4.1%[a] (3.6–4.6)	6.8% (5.8–7.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

types of mental health services, with the exceptions of seeing only a clergy member and use of VA services, where there were no differences between men and women. As noted, in the civilian population, women use general health care and mental health care services more commonly than men (Olfson et al., 2019; Bertakis et al., 2000).

- There were few differences across racial/ethnic groups in use of mental health services (Appendix Table D.55). Compared with non-Hispanic black service members, Hispanic service members were less likely to use any mental health services and less likely to receive mental health care in a military facility. This finding is strikingly different from findings in the civilian population, where minority groups were less likely to use mental health services than white people (Cook et al., 2018).
- Use of mental health services was higher among those over 35 years of age than among those under 35 years of age (Appendix Table D.56).

In terms of differences between the 2015 and 2018 HRBSs:

- Overall, there was no difference across surveys in the percentage of service members who used mental health services in the past year.
- There was a significant increase of about 14 percent in service use between 2015 and 2018 in the Coast Guard (ARR = 1.14, 95-percent CI: 1.02, 1.28). No significant trends in service use were found for the other service branches.

There were no significant trends in use of mental health services within pay grade groups or by gender.

Tables 6.25 through 6.27 present results regarding use of medications for mental health treatment. In the civilian population, about 12.2 percent of adults age 18 and over reported using a prescription medication for a mental health problem in the past year, making medication the most commonly received form of mental health treatment (Substance Abuse and Mental Health Services Administration, 2019b).

- Just under 9 percent (8.5 percent, CI: 7.8, 9.1) of service members reported use of a medication for a mental health condition in the past year (Table 6.25). The proportion was highest in the Army and lowest in the Air Force.

Table 6.25
Past-Year Mental Health Medication Use, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Use of medications for a mental health problem	6.7%[b] (6.0–7.4)	10.1%[a,e] (8.6–11.6)	7.3% (6.0–8.7)	8.6% (7.2–10.0)	7.1%[b] (5.8–8.5)	8.5% (7.8–9.2)	8.5% (7.8–9.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.26
Past-Year Mental Health Medication Use, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Use of medications for a mental health problem	7.7%[c] (6.4–8.9)	9.6%[e] (8.4–10.8)	12.0%[a,e,f] (10.6–13.4)	8.6% (5.1–12.2)	5.5%[b,c] (4.5–6.6)	7.6%[c] (6.4–8.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 6.27
Past-Year Mental Health Medication Use, by Gender

	Men	Women
Use of medications for a mental health problem	7.5%[a] (6.7–8.2)	13.4% (12.2–14.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

- The percentage reporting use of medication for a mental health condition was higher among E7–E9 pay grades than other pay grades (Table 6.26). E1–E4 pay grades and officer pay grades were significantly less likely than E7–E9 pay grades to use medication for mental health conditions.
- Men were less likely than women to use medication for mental health conditions (Table 6.27).

In terms of differences between the 2015 and 2018 HRBSs:

- Overall, there was a significant increase of about 8 percent in the use of medication for mental health conditions between 2015 and 2018 (ARR = 1.08, 95-percent CI: 1.00, 1.16).
- While the use of medications increased significantly over this period by 28 percent in the Navy (ARR = 1.28, 95-percent CI: 1.09, 1.51) and 53 percent in the Coast Guard (ARR = 1.53, 95-percent CI: 1.23, 1.89), it decreased significantly by 13 percent in the Army (ARR = 0.87, 95-percent CI: 0.77, 0.99). There were no significant trends in the Air Force (ARR = 1.07, 95-percent CI: 0.92, 1.25) or the Marine Corps (ARR = 1.02, 95-percent CI: 0.83, 1.26).
- Between 2015 and 2018, use of medications for mental health conditions significantly increased by 16 percent among senior enlisted personnel (E7–E9: ARR = 1.16, 95-percent CI: 1.00, 1.34) and 44 percent among senior officers (O4–O6: ARR = 1.44, 95-percent CI: 1.18, 1.75) but decreased significantly by 20 percent among junior enlisted personnel (E1–E4: ARR = 0.80, 95-percent CI: 0.68, 0.95). No significant trends were observed for mid-grade enlisted personnel (E5–E6: ARR = 1.05, 95-percent CI: 0.91, 1.21), warrant officers (W1–W5: ARR = 1.09, 95-percent CI: 0.76, 1.56), or junior officers (O1–O3: ARR = 1.13, 95-percent CI: 0.92, 1.40).
- There were no differences among men and women in the percentages who used medication for a mental health condition across surveys.

Tables 6.28 through 6.30 show results regarding the average number of mental health visits over the past 12 months for respondents who received mental health treatment.

Table 6.28
Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Service Branch

	Air Force n = 1,125	Army n = 1,049	Marine Corps n = 623	Navy n = 893	Coast Guard n = 343	Total N = 4,033
Mean number of mental health visits[z]	11.3 (9.8–12.8)	12.3 (10.6–14.1)	12.7 (10.1–15.4)	11.4 (9.6–13.2)	11.2 (9.2–13.3)	11.9 (11.0–12.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 6.29
Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Pay Grade

	E1–E4 n = 994	E5–E6 n = 1,168	E7–E9 n = 778	W1–W5 n = 490	O1–O3 n = 510	O4–O6 n = 93
Mean number of mental health visits	12.4[f] (10.6–14.3)	12.0[f] (10.7–13.3)	11.2 (10.0–12.5)	11.2 (8.0–14.4)	8.8 (7.5–10.0)	14.7[a,b] (4.4–25.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 6.30
Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Gender

	Men n = 1,635	Women n = 2,398
Mean number of mental health visits[z]	12.6 (11.4–13.8)	11.7 (10.5–12.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- The overall average was about one mental health visit per month (11.9 percent, CI: 11.0, 12.9; Table 6.28). This average did not vary significantly across services.
- Mid-grade officers (O4–O6) had significantly more mental health visits per year on average than junior and mid-grade enlisted personnel (E1–E4 and E5–E6; Table 6.29).
- There were no differences between men and women in the average number of mental health visits per year (Table 6.30).
- There were no differences between racial/ethnic groups or across ages in the average number of mental health visits per year (see Appendix Tables D.59 and D.60).

Perceived Unmet Need for Mental Health Services

One of the ways that unmet need for mental health treatment can be measured is through questions about respondents' own perceptions of their needs. The 2018 HRBS included a question about whether the respondent felt that that he or she needed mental health care in the past 12 months and did not receive it. It is important to note that respondents who endorse this item might have received some care and still thought that they needed more or different care. Tables 6.31 through 6.33 summarize results regarding perceived unmet need for mental health treatment.

- The percentage of all service members reporting unmet need for mental health treatment in the past year was 6.8 percent (CI: 6.2, 7.5; Table 6.31).

Table 6.31
Perceived Unmet Need for Mental Health Services, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Perceived unmet need for mental health services	4.2%[b,c,d] (3.7–4.8)	7.6%[a,e] (6.2–8.9)	6.9%[a] (5.5–8.3)	8.5%[a,e] (6.9–10.1)	4.3%[b,d] (3.1–5.5)	6.9% (6.2–7.6)	6.8% (6.2–7.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.32
Perceived Unmet Need for Mental Health Services, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Perceived unmet need for mental health services	6.9% [f] (5.7–8.2)	7.6% [e,f] (6.6–8.7)	7.3% [e,f] (6.1–8.4)	6.7% (3.8–9.5)	5.0% [b,c] (4.0–6.0)	4.3% [a,b,c] (3.4–5.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 6.33
Perceived Unmet Need for Mental Health Services, by Gender

	Men	Women
Perceived unmet need for mental health services	6.1%[a] (5.4–6.9)	10.2% (8.9–11.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

- There were some differences across service branches in perceived unmet need, with the Army, Marine Corps, and Navy having higher proportions with perceived unmet need than the Air Force and Coast Guard (Table 6.32).
- Officers were less likely to report perceived unmet need than enlisted pay grades (Table 6.32).
- Men were significantly less likely to report perceived unmet need than women (Table 6.33).
- There were no significant differences in perceived unmet need across racial/ethnic groups or age groups (see Appendix Tables D.61 and D.62).

Reasons for Not Seeking Care

To understand potential policy strategies that can increase treatment utilization, the HRBS asked about the reasons why people did not receive mental health treatment. This question was asked of two groups of respondents who had indications of need for treatment. One group asked this question was the group that indicated that they perceived a need for treatment that they did not receive. This group of individuals decided that they might need treatment, and yet they did not receive it. The other group was composed of people who scored 8 or above on the K6 (moderate distress), our measure of clinically significant psychological distress, and did not receive treatment. This group had a level of distress suggesting a need, regardless of whether they themselves though that they should seek treatment. Table 6.34 shows the proportion of this group that endorsed each of the potential reasons for not seeking care.

Table 6.34
Reasons for Not Receiving Needed Treatment for Mental Health Problems in the Past Year

	% 95-percent CI
I did not think I needed it	53.7% (50.2–57.3)
It would have harmed my career	40.1% (37.2–43.0)
I did not think treatment would help	38.8% (35.8–41.8)
Members of my unit might have less confidence in me	35.1% (32.2–38.0)
It was too difficult to get time off work for treatment	33.9% (31.0–36.8)
My supervisor/unit leadership might have a negative opinion of me or treat me differently	32.4% (29.5–35.2)
I was concerned that the information I gave the counselor might not be kept confidential	29.8% (27.1–32.6)
It was too difficult to schedule an appointment	29.1% (26.3–31.9)
I could have been denied security clearance in the future	28.3% (25.7–30.9)
It would have negatively affected my family life	15.2% (13.0–17.4)
I did not know where to get help	11.1% (9.1–13.2)
My commanders or supervisors discourage the use of mental health services	6.8% (5.1–8.4)
I could not afford the cost	5.0% (3.6–6.4)
It was too difficult to get childcare	3.5% (2.5–4.5)

- The most-common reason for not seeking care is not thinking that it was needed. This is consistent with findings from the civilian literature suggesting that low perceived need for treatment is the most common reason that people with mental health problems do not seek care (Mojtabai, Olfson, and Mechanic, 2002). The third-most-common reason, not thinking treatment would help, is closely related.
- Many of the most-commonly endorsed reasons for not receiving mental health care are related to potential adverse professional and interpersonal consequences of seeking care. These include "It would have harmed my career," "Members of my unit might have less confidence in me," and "My supervisor/unit leadership might have a negative opinion of me or treat me differently."
- The most-commonly endorsed practical problems with seeking care were "It was too difficult to get time off work for treatment" and "It was too difficult to schedule an appointment." These responses suggest that the process of seeking care is a challenge, both with respect to finding time away from one's duties to seek care and with respect to the ease of use of the MHS.

Concern that Mental Health Treatment Would Damage a Military Career

Prior studies have found that service members were concerned about the impact that seeking mental health care would have on their career in the military (Hoge, Castro, et al., 2004). In both the 2015 and 2018 HRBSs, respondents were asked: "In general, do you think it would damage a person's military career if the person were to seek counseling or mental health therapy/treatment through the military, regardless of the reason for seeking counseling?" The importance of this question is that it identifies a specific barrier to mental health treatment use that might be addressed through military policy. Tables 6.35 through 6.37 report results of this item from 2018.

- The proportion of respondents who endorsed the idea that seeking mental health treatment would damage a person's military career was 34.2 percent (CI: 33.1, 35.4; Table 6.35).
- The proportion reporting this belief was significantly higher in the Navy (37.3 percent, CI: 34.7, 39.8) than in the Air Force (32.2 percent, CI: 30.8, 33.6) and the Coast Guard (31.3 percent, CI: 28.6, 33.9; Table 6.35).

Table 6.35
Perception That Seeking Mental Health Treatment Would Damage Military Career, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Seeking mental health treatment would damage military career	32.2%[d] (30.8–33.6)	33.0% (30.6–35.4)	36.1% (33.3–38.9)	37.3%[a,e] (34.7–39.8)	31.3%[d] (28.6–33.9)	34.3% (33.1–35.5)	34.2% (33.1–35.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 6.36
Perception That Seeking Mental Health Treatment Would Damage Military Career, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Seeking mental health treatment would damage military career	34.1% (31.8–36.3)	34.4% (32.5–36.3)	30.4%[d,e] (28.3–32.6)	40.5%[c] (33.8–47.2)	37.7%[c] (35.3–40.2)	33.4% (31.3–35.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

Table 6.37
Perception That Seeking Mental Health Treatment Would Damage Military Career, by Gender

	Men	Women
Seeking mental health treatment would damage military career[z]	34.1% (32.7–35.4)	35.1% (33.2–37.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- The proportion reporting this belief was highest among warrant officers (40.5 percent, CI: 33.8, 47.2; Table 6.36). The proportion was significantly higher among warrant officers and junior officers than among senior enlisted personnel, who had the lowest proportion agreeing with the statement.
- There were no differences between men and women in the belief that seeking mental health treatment would damage a person's military career (Table 6.37).
- The proportion reporting that seeking mental health treatment would damage a person's military career was lower among black service members than among non-Hispanic white service members (Appendix Table D.63) and lower among those 45 years of age and older than among those under 45 years of age (Appendix Table D.64).

In terms of differences between the 2015 and 2018 HRBSs:

- There was no overall difference in the percentage of service members who perceived career-related stigma associated with use of mental health services. Similarly, there were no statistically significant trends in this item within service branches or pay grade groups.
- Between 2015 and 2018, there was a significant increase of about 9 percent in the proportion of women reporting that seeking mental health treatment would damage a person's military career (ARR = 1.09, 95-percent CI: 1.03, 1.15). However, there was no significant trend among men (ARR = 0.98, 95-percent CI: 0.94, 1.02).

Summary

Mental health problems, their social and emotional correlates, and their treatment remain complex challenges for the military. The past-month prevalence of psychological distress that is serious enough that treatment is warranted was nearly 10 percent, which is higher than rates observed in the general population (2.9 percent to 5.2 percent; Center for Behavioral Health Statistics and Quality, 2018). A similar pattern was observed for probable PTSD: 11.5 percent of service members met criteria for probable PTSD, compared with rates of approximately 4 percent in the general population (Kessler, Berglund, et al., 2004). While the comparison with general population studies should be made with caution, due to differences in the samples and the methods used, it is important to recognize that many service members are affected by these problems. There are some differences across branches that are consistent across different measures of mental health, with higher rates in the Army, Marine Corps, and Navy compared with the Air Force and the Coast Guard. However, even in the service branches with relatively low prevalence of mental health problems, the prevalence is quite high in absolute terms.

The use of mental health services is fairly common, with about a quarter of service members reporting treatment in the past year. However, as in the civilian population, attention should be given to the match between individuals' needs for treatment and their use of treatment. Despite the apparently high level of use, there are still significant barriers to treatment reported by people with perceived unmet needs and people with high levels of distress who did not receive treatment. Issues facing the military in increasing the use of mental health treatment by service members who need it are similar to those faced in the civilian world. In both the general population and the military, individuals with mental health problems frequently do not consider themselves in need of treatment or do not believe that treatment will be a benefit to them (Mojtabai et al., 2011; Hoge, Castro, et al., 2004; Acosta et al., 2014). In addition, the military faces additional challenges with the widespread perception that seeking care for mental health problems will disrupt one's relationships with one's peers and commanders and damage one's potential for career advancement within the military.

With respect to angry or aggressive behaviors, rates were highest in the Marine Corps and lowest in the Air Force and Coast Guard. Responses indicating lifetime experiences of unwanted sexual contact were most common in the Navy and least common in the Coast Guard. Experiences of physical abuse since joining the military were relatively uncommon but were more commonly indicated among the Army, Navy, and Marine Corps. Overall, the data indicate that although relatively few military personnel had experienced physical abuse in the past year, a larger number of service members had experienced unwanted sexual contact.

The 2018 HRBS asked specifically about unwanted sexual contact that occurred since joining the military and found that 9.6 percent of service members responded that they had experienced any unwanted sexual contact since joining the military, and 2.5 percent indicated such experiences within the past 12 months. Experiences of unwanted sexual contact were much more common among women than men: Nearly a third of women indicated such experiences since joining the military, and nearly one in ten women (9.1 percent) indicated experiencing unwanted sexual contact in the past 12 months. Yet, even among men, a nontrivial number experienced such events, with over 5 percent of male service members indicating that they had experienced unwanted sexual contact since joining the military and around 1 percent indicating such experiences in the past year. It is important to note that the question asks about events that occurred at any time and at any place since joining the military, so they might not

have occurred on a military site or during official military activities, and the perpetrator might not have been a military service member. It is also important to remember that the measure of unwanted sexual contact used in the 2018 HRBS is not directly comparable with any other civilian or military survey, including the WGRA.

Suicidal ideation and suicide behaviors were more prevalent among service members than among the general population. Approximately one in 12 service members (8.3 percent) endorsed having thoughts of suicide, and 1.4 percent endorsed a suicide attempt in the past 12 months; by comparison, among adults aged 18 or older in the general population, 4.3 percent endorsed thoughts of suicide, and 0.6 percent reported a suicide attempt in the past year (Substance Abuse and Mental Health Services Administration, 2019b). Additionally, rates of past-year suicidal ideation among service members increased by 31 percent compared with the 2015 HRBS (6.3 percent). Although rates of suicide attempts did not significantly change between the 2015 HRBS (1.4 percent) and 2018 HRBS (1.2 percent), the increase in rates of suicidal ideation is concerning because ideation may be a precursor to suicide attempts and is tightly linked to mental health conditions, such major depressive disorder (Bryan, Bryan, et al., 2014; Franklin et al., 2017; Jobes and Joiner, 2019). This could indicate a need for additional targeted suicide prevention efforts among active component service members.

The percentage of service members using mental health services—around one quarter of service members in the past year—was similar to estimates from the 2015 HRBS. Mental health specialists were the most commonly accessed type of providers for mental health services, although general medical doctors, pastoral counselors (including clergy members and chaplains), and other providers also appear to contribute substantially to mental health services for service members. Perceived unmet need for mental health treatment was low (7 percent of all service members). However, among those with likely treatment need (i.e., those who self-identified as needing services but not getting them and those who endorsed serious psychological distress but did not utilize mental health treatment), the most common reason for not seeking care was not thinking that it was needed, which is consistent with findings from the civilian literature (Mojtabai, Olfson, and Mechanic, 2002). Additionally, many of the most commonly endorsed reasons for not receiving mental health care are related to potential adverse professional and interpersonal consequences of seeking care. This is consistent with the finding that over a third of the full sample (34.2 percent) endorsed the idea that seeking mental health treatment would damage a person's military career.

CHAPTER SEVEN

Physical Health and Functional Limitations

This chapter presents analyses of chronic physical health conditions and physical symptoms, self-rated health, and health-related functional limitations. Military service, including training, deployment, and duty-related exposures, as well as health-related military policies and practices, are among the many factors that could affect the prevalence of chronic conditions among military service members. These factors may sometimes reduce the prevalence of chronic conditions (e.g., those entering military service are selected in part based on the adequacy of their health status; administrative or medical reasons can lead to early attrition; norms and requirements regarding physical activity could reduce rates of obesity and some chronic illness) and sometimes increase health risks (e.g., high-impact activities and carrying heavy loads can cause lower-extremity or other joint problems; Cohen et al., 2012). In turn, health conditions may result in reduced productivity and missed days of work, affecting individual, unit, and population readiness and rendering some individuals or units nondeployable or marginally functional in potentially demanding situations, missions, or environments. Within the physical health and functional limitations domain, we examined the relationship of health-related absenteeism (duty days missed due to health) and presenteeism (duty days impaired due to health) with chronic physical conditions (reported by a service member to have been diagnosed by a medical provider), physical symptoms (somatic symptoms and pain), and self-rated health.

Each section reviews the relevance of the topic to the military and provides estimates by service branch. We also present results by pay grade and gender. Results by race/ethnicity and age group are presented in Appendix D. Key measures used are described in the applicable section, and additional details about the measures may be found in Appendix C. All analyses demonstrated statistically significant omnibus tests (a Rao-Scott chi-square test for categorical variables and F-tests for continuous variables), unless otherwise noted in the tables. Statistically significant group differences (pairwise comparisons) are presented within each table. However, only statistically significant differences that the research team's subject-matter experts determined to be substantively meaningful (i.e., those that could be used to change or develop policy or contribute to inequalities in health outcomes across subgroups) are discussed in the text.

Where appropriate, the text compares service members with civilian benchmarks (i.e., HP2020 goals) and/or current prevalence rates among U.S. adults; however, we caution readers that making direct comparisons between the military and civilian populations ignores the fact that the two groups are very different on some sociodemographic characteristics (e.g., gender, age) related to the health outcomes and health behaviors of interest. Readers should also use caution when interpreting comparisons between the 2018 HRBS results and other populations or prior versions of the HRBS because these comparisons are not necessarily statistically sig-

nificant and could simply reflect sampling variability across the two samples being compared; however, when applicable, the report does compare results between the 2015 and 2018 HRBSs using a regression framework to control for some of the methodological differences related to survey implementation and analysis (see Chapter Two). When interpreting changes across surveys, it is important to keep in mind what the base for that increase is. That is, a 20-percent increase for an outcome with a 2015 prevalence of 2 percent represents a much smaller increase in absolute value than the same percentage increase for an outcome with a 2015 prevalence of 25 percent (0.4 versus 5.0 percent). Thus, extremely large percentage increases (or decreases) across surveys are often substantively small even though the percentage changes appear quite large.

Chronic Conditions

The burden of chronic disease in the United States is substantial. Chronic diseases are the leading cause of death in the United States (National Center for Chronic Disease Prevention and Health Promotion, 2020). The presence of chronic conditions is associated with functional, physical, social, and cognitive limitations (Buttorff, Ruder, and Bauman, 2017) and reduced quality of life (Megari, 2013). Chronic diseases account for the majority of health care costs in the United States (Gerteis et al., 2014), and the seven most common chronic disease are estimated to result in $1.3 trillion in costs, which represents 78 percent of health spending (Bodenheimer, Chen, and Bennett, 2009). One 2018 HRBS item asked whether respondents had been told by a doctor or health professional during the past 12 months that they were diagnosed with high blood pressure; high blood sugar or diabetes; high cholesterol; asthma; angina or coronary heart disease; heart attack, also called myocardial infarction; back pain; or bone, joint, or muscle injury or condition. In addition, we developed a measure to indicate the number of medical diagnoses that service members had received in the past year, categorized as no conditions, one or two conditions, or three or more conditions. Results for past-12-month diagnosis of chronic conditions by subgroup (i.e., service branch, pay grade, and gender) are shown in Tables 7.1 through 7.3. Key findings include the following:

- Overall, 40.3 percent of service members reported being told by a health care provider that they had at least one of the eight chronic conditions (Table 7.1). The prevalence ranged from 34.5 percent in the Coast Guard to 47.0 percent in the Army (Table 7.1). This prevalence suggests the presence of a potentially large group of medically vulnerable service members.
- As expected, the prevalence of conditions increased with age (Appendix Table D.66). The rate of diagnosis for many chronic conditions increased with pay grade as well (Table 7.2), though this is likely due to the influence of age. Men had higher rates of high blood pressure and high cholesterol, and women had higher rates of asthma (Table 7.3).
- The most commonly reported provider-diagnosed conditions were bone, joint, or muscle injury (including arthritis) (26.4 percent) and back pain (24.6 percent; Table 7.1). HP2020 has several objectives related to arthritis and chronic back conditions, including the reduction of functional limitations, as well as reducing arthritis-related joint pain and chronic pain. Based on NHIS data, approximately 22.8 percent of U.S. adults have been diagnosed with arthritis, with somewhat higher rates in women than men (CDC, 2018d).

Table 7.1
Past Year Physician-Diagnosed Chronic Conditions, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
High blood pressure	7.4%[b] (6.7–8.2)	10.8%[a,e] (9.3–12.3)	8.7% (7.2–10.1)	8.9% (7.5–10.2)	7.7%[b] (6.3–9.0)	9.2% (8.5–9.8)	9.1% (8.4–9.8)
Diabetes	0.8% (0.5–1.0)	0.8% (0.5–1.2)	0.4%[d,e] (0.2–0.7)	1.4%[c] (0.7–2.0)	1.3%[c] (0.8–1.9)	0.9% (0.7–1.1)	0.9% (0.7–1.1)
High cholesterol	2.9%[b,c,d,e] (2.5–3.4)	5.1%[a,c,e] (4.2–5.9)	1.9%[a,b,d,e] (1.4–2.3)	4.9%[a,c,e] (4.1–5.7)	8.5%[a,b,c,d] (6.9–10.1)	4.0% (3.7–4.4)	4.2% (3.8–4.5)
Asthma	1.5%[e] (1.2–1.9)	2.4%[c,e] (1.7–3.1)	1.0%[b] (0.5–1.4)	1.5% (1.0–2.1)	0.6%[a,b] (0.3–1.0)	1.7% (1.4–2.0)	1.7% (1.4–2.0)
Angina or coronary heart disease[z]	0.2% (0.1–0.3)	0.3% (0.1–0.5)	0.2% (0.1–0.4)	0.2% (0.0–0.4)	0.4% (0.1–0.7)	0.2% (0.1–0.3)	0.3% (0.2–0.3)
Heart attack[z]	0.1% (0.0–0.2)	0.1% (0.0–0.2)	0.1% (0.0–0.2)	0.1% (0.0–0.3)	0.2% (0.0–0.5)	0.1% (0.0–0.2)	0.1% (0.1–0.2)
Back pain	20.8%[b,c] (19.6–22.0)	29.7%[a,d,e] (27.5–32.0)	26.1%[a,d,e] (23.7–28.5)	21.0%[b,c] (19.0–23.0)	19.1%[b,c] (17.0–21.2)	24.8% (23.7–25.8)	24.6% (23.6–25.6)
Bone, joint, or muscle injury (including arthritis)	21.6%[b,c] (20.4–22.8)	33.3%[a,c,d,e] (30.9–35.6)	27.7%[a,b,d,e] (25.3–30.0)	21.5%[b,c] (19.6–23.4)	19.0%[b,c] (16.9–21.0)	26.6% (25.5–27.7)	26.4% (25.3–27.4)
Number of medical diagnoses in past year							
No conditions	64.4%[b] (62.9–65.8)	53.0%[a,c,d,e] (50.4–55.6)	60.2%[b,e] (57.5–62.9)	63.5%[b] (61.1–65.9)	65.6%[b,c] (62.9–68.2)	59.5% (58.3–60.7)	59.7% (58.5–60.9)
1–2 conditions	32.2%[b] (30.8–33.6)	40.1%[a,d,e] (37.6–42.6)	35.3%[e] (32.6–37.9)	32.4%[b] (30.1–34.8)	29.9%[b,c] (27.3–32.4)	35.5% (34.3–36.7)	35.3% (34.2–36.5)
3+ conditions	3.4%[b] (2.9–3.9)	6.9%[a,c,d,e] (5.9–7.9)	4.6%[b] (3.6–5.6)	4.1%[b] (3.3–4.8)	4.6%[b] (3.6–5.6)	5.0% (4.5–5.4)	5.0% (4.5–5.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

These estimates are not directly comparable with the 2018 HRBS, in part because military populations are younger and originally selected for health, though it can be noted that no significant gender differences were found in prevalence of arthritis among service members (Table 7.3).

- Bone, joint, or muscle injury and back pain were significantly more common among senior enlisted and warrant officers (Table 7.2). These conditions were also more common among senior officers than junior officers and increased in prevalence with age (Table 7.2, Appendix Table D.66). Higher rates of both conditions were also observed among members of the Army and Marine Corps (Table 7.1).

Table 7.2
Past Year Physician-Diagnosed Chronic Conditions, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
High blood pressure	5.9%[b,c,d,f] (4.8–7.1)	10.8%[a,c,e] (9.5–12.1)	18.1%[a,b,e,f] (16.3–19.9)	13.8%[a,e] (9.4–18.2)	5.8%[b,c,d,f] (4.6–6.9)	12.8%[a,c,e] (11.3–14.2)
Diabetes	0.6%[c] (0.2–1.1)	0.7%[c,f] (0.4–0.9)	2.3%[a,b,e] (1.7–3.0)	1.8% (0.5–3.2)	0.8%[c] (0.5–1.2)	1.5%[b] (1.0–2.1)
High cholesterol	1.2%[b,c,d,e,f] (0.7–1.6)	4.2%[a,c,d,f] (3.5–4.9)	11.8%[a,b,e] (10.4–13.3)	11.6%[a,b,e] (7.7–15.6)	3.6%[a,c,d,f] (2.4–4.8)	11.7%[a,b,e] (10.3–13.1)
Asthma	1.1%[c,d] (0.6–1.6)	2.2%[d,e] (1.7–2.8)	3.1%[a,e] (2.3–3.9)	5.5%[a,b,e,f] (2.7–8.3)	0.8%[b,c,d] (0.4–1.2)	1.8%[d] (1.2–2.3)
Angina or coronary heart disease	0.3% (0.1–0.5)	0.1%[f] (0.1–0.2)	0.5% (0.2–0.7)	0.2% (0.0–0.4)	0.1% (0.0–0.3)	0.6%[b] (0.3–1.0)
Heart attack[z]	0.1% (0.0–0.3)	0.1% (0.0–0.2)	0.2% (0.0–0.3)	0.0% (0.0–1.4)	0.1% (0.0–0.2)	0.1% (0.0–0.2)
Back pain	18.7%[b,c,d,e,f] (16.8–20.6)	28.2%[a,c,d,e] (26.4–30.0)	43.1%[a,b,e,f] (40.7–45.5)	40.2%[a,b,e,f] (33.7–46.6)	14.8%[a,b,c,d,f] (13.1–16.4)	30.7%[a,c,d,e] (28.7–32.7)
Bone, joint, or muscle injury (including arthritis)	19.8%[b,c,d,f] (17.8–21.7)	29.3%[a,c,d,e,f] (27.6–31.1)	47.1%[a,b,e,f] (44.7–49.5)	45.4%[a,b,e] (38.9–52.0)	16.2%[b,c,d,f] (14.4–18.0)	36.2%[a,b,c,e] (34.1–38.3)
Number of medical diagnoses in past year						
No conditions	69.0%[b,c,d,f] (66.8–71.2)	54.8%[a,c,d,e,f] (52.9–56.8)	35.5%[a,b,e,f] (33.1–38.0)	38.5%[a,b,e] (32.0–45.1)	71.0%[b,c,d,f] (68.7–73.3)	44.7%[a,b,c,e] (42.6–46.9)
1–2 conditions	28.6%[b,c,d,f] (26.5–30.8)	39.6%[a,c,e,f] (37.6–41.5)	50.8%[a,b,e] (48.4–53.3)	49.3%[a,e] (42.7–55.9)	27.2%[b,c,d,f] (25.0–29.4)	46.1%[a,b,e] (43.9–48.3)
3+ conditions	2.4%[b,c,d,f] (1.7–3.1)	5.6%[a,c,d,e,f] (4.7–6.5)	13.6%[a,b,e,f] (12.1–15.2)	12.2%[a,b,e] (8.0–16.5)	1.8%[b,c,d,f] (1.2–2.4)	9.2%[a,b,c,e] (7.9–10.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- HP2020 aims to increase overall cardiovascular health and reduce coronary heart disease–related deaths. Relatedly, HP2020 has established objectives related to high blood pressure and high cholesterol. For high blood pressure, HP2020 has established a target of 26.9 percent of the U.S. adult population (Healthy People, 2020c). Among service members in the 2018 HRBS, 9.1 percent were diagnosed with high blood pressure (Table 7.1), suggesting that they fare well with respect to the HP2020 goal. In addition, NHANES data from 2015–2016 indicated that an estimated 32.1 percent of U.S. adults had hypertension (Wall et al., 2018), though demographic differences between the military and general population limit direct comparisons with these benchmarks.

Table 7.3
Past Year Physician-Diagnosed Chronic Conditions, by Gender

	Men	Women
High blood pressure	9.9%[a] (9.1–10.7)	5.3% (4.4–6.1)
Diabetes[z]	0.9% (0.7–1.1)	0.9% (0.5–1.4)
High cholesterol	4.6%[a] (4.2–5.0)	2.1% (1.6–2.7)
Asthma	1.6%[a] (1.2–1.9)	2.5% (1.9–3.0)
Angina or coronary heart disease[z]	0.2% (0.1–0.3)	0.4% (0.0–0.8)
Heart attack[z]	0.1% (0.0–0.2)	0.2% (0.0–0.5)
Back pain[z]	24.7% (23.6–25.9)	23.9% (22.3–25.6)
Bone, joint, or muscle injury (including arthritis)[z]	26.1% (24.9–27.3)	27.7% (25.9–29.5)
Number of medical diagnoses in past year		
No conditions[z]	59.6% (58.3–61.0)	59.9% (58.0–61.9)
1–2 conditions[z]	35.1% (33.7–36.4)	36.8% (34.8–38.7)
3+ conditions	5.3%[a] (4.8–5.8)	3.3% (2.7–4.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- Relatedly, regarding cholesterol, HP2020 established a target of 13.5 percent of U.S. adults with high total blood cholesterol levels (Healthy People, 2020d). According to NHANES, 27.1 percent of the population of U.S. adults age 20 and over had high cholesterol (National Center for Health Statistics, 2017a). Among service members, 4.2 percent were diagnosed with high cholesterol in the last year. Though still lower than the HP2020 target, it is notable that the Coast Guard had substantially higher rates of high cholesterol than other services (8.5 percent).
- HP2020 has also established objectives related to diabetes, including reducing the annual number of new cases of diagnosed diabetes and diabetes-related deaths. According to data from NHIS, an estimated 9.8 percent of U.S. adults age 20 and over were diagnosed with diabetes (Mendola et al., 2018). Though not directly comparable with our data, results from the 2018 HRBS suggest that rates were much lower in service members (0.9 percent).

- An estimated 1.7 percent of service members were diagnosed with asthma in the past year. HP2020 has several objectives related to asthma, including reducing asthma hospitalizations, deaths, functional limitations, and missed school or work. In 2011–2014, 8.8 percent of U.S. adults age 20 and over were diagnosed with asthma (Akinbami and Fryar, 2016). Though this is not directly comparable to our data, in part due to the age range in this sample, it suggests lower rates of asthma among service members.

In terms of comparisons between the 2015 and 2018 HRBSs:

- Several individual symptoms showed a significant decrease among all service members between the 2015 and 2018 HRBSs: stomach and bowel problems (ARR = 0.78, 95-percent CI: 0.72, 0.84), back pain (ARR = 0.89, 95-percent CI: 0.85, 0.93), pain in the arms/legs/joints (ARR = 0.88, 95-percent CI: 0.84, 0.92), headaches (ARR = 0.86, 95-percent CI: 0.80, 0.91), chest pain or shortness of breath (ARR = 0.62, 95-percent CI: 0.55, 0.70), dizziness (ARR = 0.58, 95-percent CI: 0.51, 0.67), feeling tired or having low energy (ARR = 0.83, 95-percent CI: 0.80. 0.87), and trouble sleeping (ARR = 0.85, 95-percent CI: 0.81, 0.88).

Physical Symptoms

An estimated 34 percent of participants in the civilian population reported at least one frequent general physical symptom (Escobar et al., 2010), and one-third of somatic symptoms did not have a disease-based explanation and were considered to be medically unexplained (Escobar et al., 2010; Kroenke, 2003). The presence of multiple physical symptoms is associated with greater rates of depression, anxiety, substance use disorders, and medical service use (Escobar et al., 2010; Kroenke, 2003; Löwe et al., 2008).

HRBS respondents completed a symptom checklist comprising eight common physical symptoms (stomach or bowel problems; back pain; pain in the arms, legs, or joints; headaches; chest pain or shortness of breath; dizziness; feeling tired or having low energy; and trouble sleeping) using the Somatic Symptom Scale–8 (Gierk et al., 2014; Kroenke et al, 2002). Respondents were asked to indicate how much they were bothered by each of these symptoms in the past 30 days. Response options included "not bothered at all," "bothered a little bit," and "bothered a lot." We report the percentage of service members who reported being bothered a lot by each symptom. In addition to reporting individual symptoms, we developed two measures related to pain. The first measure includes any service members who reported being bothered a lot by either back pain or pain in the arms, legs, or joints. The second measure also includes service members who reported being bothered a lot by headaches. Finally, we developed a summary score by assigning each symptom a score of 0 (not bothered at all), 1 (bothered a little bit), or 2 (bothered a lot), summing the values across all eight measures, and creating a measure of *high physical symptom severity* (defined as a score of 8 or higher). Note, however, that there is no existing literature that validates this scoring against the probability of a clinical diagnosis; "high" in this context reflects that the scoring pattern is relatively infrequent in the population.

Results can be found in Tables 7.4 to 7.6. Key findings include the following:

- Among the most commonly reported symptoms were trouble sleeping (20.2 percent) and feeling tired or having low energy (18.4 percent; Table 7.4). A recent study high-

Table 7.4
Bothered a Lot by Physical Symptoms in the Past 30 Days, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Stomach or bowel problems	4.7%[d] (4.1–5.3)	6.1% (5.0–7.2)	5.9% (4.8–7.0)	6.5%[a,e] (5.4–7.7)	4.3%[d] (3.3–5.3)	5.8% (5.3–6.4)	5.8% (5.3–6.3)
Back pain	14.1%[b,c,d] (13.1–15.1)	21.0%[a,e] (19.0–23.0)	22.2%[a,d,e] (19.9–24.5)	17.8%[a,c,e] (15.8–19.8)	12.8%[b,c,d] (11.1–14.6)	18.7% (17.7–19.6)	18.5% (17.5–19.4)
Pain in the arms, legs, or joints	11.7%[b,c] (10.8–12.6)	20.2%[a,d,e] (18.2–22.2)	21.1%[a,d,e] (18.9–23.4)	14.3%[b,c,e] (12.5–16.1)	10.1%[b,c,d] (8.5–11.7)	16.7% (15.8–17.7)	16.5% (15.6–17.4)
Headaches	6.4%[b,c,d] (5.7–7.1)	10.2%[a,e] (8.8–11.6)	10.3%[a,e] (8.6–12.0)	9.7%[a,e] (8.2–11.1)	6.2%[b,c,d] (4.9–7.5)	9.1% (8.4–9.8)	9.0% (8.4–9.7)
Chest pain or shortness of breath	2.1%[c] (1.7–2.6)	2.8% (2.0–3.5)	3.6%[a,e] (2.7–4.6)	2.5% (1.6–3.4)	1.3%[c] (0.6–2.0)	2.7% (2.3–3.1)	2.6% (2.2–3.0)
Dizziness[z]	1.6% (1.2–1.9)	1.9% (1.4–2.5)	2.4% (1.6–3.2)	2.5% (1.8–3.2)	1.6% (0.8–2.3)	2.1% (1.8–2.4)	2.0% (1.7–2.3)
Feeling tired or having low energy	13.2%[b,c,d] (12.2–14.2)	19.2%[a,e] (17.2–21.2)	21.9%[a,e] (19.5–24.2)	21.0%[a,e] (19.0–23.1)	15.0%[b,c,d] (13.1–17.0)	18.5% (17.6–19.5)	18.4% (17.5–19.4)
Trouble sleeping	13.0%[b,c,d] (12.0–14.0)	22.6%[a,e] (20.4–24.8)	24.7%[a,e] (22.1–27.2)	22.0%[a,e] (19.8–24.3)	15.9%[b,c,d] (13.7–18.0)	20.4% (19.3–21.4)	20.2% (19.2–21.3)
Any bodily pain (back, arms, legs, or joints)	20.2%[b,c,d] (19.0–21.4)	30.0%[a,d,e] (27.8–32.3)	31.6%[a,d,e] (29.0–34.2)	23.8%[a,b,c,e] (21.6–26.0)	17.7%[b,c,d] (15.6–19.7)	26.2% (25.2–27.3)	26.0% (24.9–27.0)
Any bodily pain including headache	22.9%[b,c,d] (21.7–24.1)	33.6%[a,d,e] (31.3–36.0)	35.6%[a,d,e] (32.9–38.3)	27.4%[a,b,c,e] (25.1–29.7)	20.6%[b,c,d] (18.4–22.8)	29.7% (28.6–30.8)	29.4% (28.3–30.5)
High physical symptom severity	10.0%[b,c,d] (9.1–10.8)	20.4%[a,e] (18.4–22.4)	20.0%[a,e] (17.7–22.2)	17.1%[a,e] (15.1–19.1)	10.7%[b,c,d] (9.1–12.4)	16.9% (15.9–17.9)	16.7% (15.8–17.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

lighted the prevalence of sleep problems and fatigue in military service members, with 48.6 percent reporting poor sleep quality and 33.0 percent reporting daytime fatigue at least three to four times per week (Troxel et al., 2015). Both trouble sleeping and feeling tired or having low energy were reported more often among enlisted service members than officers (Table 7.5) and were more common among women than men (Table 7.6). Members of the Air Force and Coast Guard had the lowest rates of sleep problems and fatigue (Table 7.4).

- Back pain (18.5 percent) and pain in the arms, legs, or joints (16.5 percent) were the next-most-common symptoms (Table 7.4). In addition, 26.0 percent reported bodily pain not including headache, and 29.4 percent reported bodily pain including headache. A study

Table 7.5
Bothered a Lot by Physical Symptoms in the Past 30 Days, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Stomach or bowel problems	4.8%[c] (3.8–5.7)	6.8%[c,e] (5.9–7.7)	9.3%[a,b,e,f] (8.1–10.6)	8.5%[e] (4.8–12.3)	3.6%[b,c,d] (2.8–4.5)	5.0%[c] (4.1–5.9)
Back pain	16.1%[b,c,d,e] (14.4–17.8)	20.6%[a,c,e,f] (19.0–22.3)	30.7%[a,b,e,f] (28.5–32.8)	25.1%[a,e,f] (19.5–30.7)	10.5%[a,b,c,d,f] (9.0–12.0)	16.5%[b,c,d,e] (14.9–18.1)
Pain in the arms, legs, or joints	14.5%[c,d,e] (12.8–16.2)	17.9%[c,e] (16.3–19.4)	29.3%[a,b,e,f] (27.2–31.4)	22.3%[a,e] (17.2–27.4)	7.9%[a,b,c,d,f] (6.7–9.2)	16.3%[c,e] (14.8–17.9)
Headaches	9.4%[c,e,f] (8.1–10.7)	9.5%[c,e,f] (8.4–10.6)	13.0%[a,b,e,f] (11.6–14.5)	10.6%[e,f] (7.0–14.2)	4.0%[a,b,c,d,f] (3.2–4.8)	6.0%[a,b,c,d,e] (5.0–7.0)
Chest pain or shortness of breath[x]	3.0% (2.2–3.8)	2.4% (1.9–3.0)	2.9% (2.2–3.7)	1.7% (0.1–3.3)	1.5% (0.9–2.2)	2.2% (1.6–2.9)
Dizziness	2.1% (1.6–2.7)	2.0% (1.5–2.4)	3.0%[e,f] (2.2–3.7)	3.1% (0.8–5.3)	1.2%[c] (0.7–1.7)	1.6%[c] (1.1–2.1)
Feeling tired or having low energy	19.5%[e,f] (17.7–21.4)	19.9%[e,f] (18.3–21.5)	21.7%[e,f] (19.8–23.5)	16.7% (12.1–21.4)	10.8%[a,b,c] (9.4–12.2)	11.6%[a,b,c] (10.3–12.9)
Trouble sleeping	21.6%[c,e,f] (19.6–23.6)	21.2%[c,e,f] (19.6–22.9)	27.5%[a,b,e,f] (25.1–29.9)	21.1%[e,f] (15.9–26.2)	8.8%[a,b,c,d,f] (7.5–10.1)	13.1%[a,b,c,d,e] (11.7–14.6)
Any bodily pain (back, arms, legs, or joints)	22.7%[b,c,d,e] (20.7–24.6)	28.8%[a,c,e] (27.0–30.6)	42.1%[a,b,e,f] (39.7–44.5)	35.2%[a,e,f] (28.9–41.4)	14.8%[a,b,c,d,f] (13.1–16.5)	25.4%[c,d,e] (23.6–27.3)
Any bodily pain including headache	26.4%[b,c,d,e] (24.3–28.4)	32.4%[a,c,e,f] (30.6–34.3)	46.1%[a,b,e,f] (43.7–48.5)	37.4%[a,e,f] (31.1–43.7)	16.9%[a,b,c,d,f] (15.1–18.7)	27.5%[b,c,d,e] (25.5–29.4)
High physical symptom severity	16.4%[c,e,f] (14.6–18.2)	18.3%[c,e,f] (16.8–19.9)	26.9%[a,b,d,e,f] (24.9–28.9)	18.3%[c,e,f] (13.6–23.1)	6.5%[a,b,c,d,f] (5.4–7.6)	11.0%[a,b,c,d,e] (9.7–12.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

of active-duty service members using TRICARE claims data found that in 2010, 52 percent of men and 57 percent of women had a pain-related diagnosis. They noted that rates of diagnoses had increased since 2006 (Quraishi, Jeffery, and Kloc, 2012). Rates of pain-related diagnoses in that study might have been higher given the focus on service members receiving treatment. However, results from the 2018 HRBS highlight that pain remains a common concern within the general population of service members.

- In the 2018 HRBS, higher rates of pain (with and without headache) were reported by members of the Army and Marine Corps than by members of the other three services (Table 7.4). Senior enlisted and warrant officers also had the highest rates of pain (both with and without headache; Table 7.5). The difference in rates of pain between enlisted and officers became more pronounced across pay grade. For example, focusing on the

Table 7.6
Bothered a Lot by Physical Symptoms in the Past 30 Days, by Gender

	Men	Women
Stomach or bowel problems	5.0%[a] (4.4–5.6)	9.8% (8.7–11.0)
Back pain	18.0%[a] (16.9–19.1)	20.8% (19.1–22.4)
Pain in the arms, legs, or joints	16.2%[a] (15.1–17.2)	18.4% (16.8–20.0)
Headaches	7.3%[a] (6.6–8.0)	17.7% (16.1–19.4)
Chest pain or shortness of breath	2.4%[a] (2.0–2.8)	3.8% (2.9–4.7)
Dizziness	1.7%[a] (1.4–2.0)	3.8% (3.0–4.7)
Feeling tired or having low energy	16.8%[a] (15.8–17.9)	26.3% (24.5–28.1)
Trouble sleeping	19.6%[a] (18.4–20.8)	23.4% (21.7–25.1)
Any bodily pain (back, arms, legs, or joints)	25.2%[a] (24.0–26.4)	29.7% (27.9–31.5)
Any bodily pain including headache	27.9%[a] (26.6–29.1)	36.9% (35.0–38.9)
High physical symptom severity	15.2%[a] (14.2–16.3)	24.1% (22.4–25.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

presence of any bodily pain including headache, junior enlisted personnel had higher rates (26.4 percent) than junior officers (16.9 percent), a difference of nearly 10 percentage points. Comparing the difference in rates of pain for senior enlisted personnel (46.1 percent) and senior officers (27.5 percent) shows an increase in this disparity.

- Rates of pain were significantly higher among women than among men (Table 7.6). Rates also tended to increase with age, with lower rates among service members age 17–34 than among those age 35–44 (Appendix Table D.68).
- Significantly more women were bothered a lot by each of the physical symptoms (Table 7.6). This difference was especially pronounced for headache and feeling tired or having low energy. Women also had higher rates of high physical symptom severity scores.
- Among service members, 16.7 percent had a high physical symptom severity score (Table 7.4). Rates of high physical symptom severity were significantly lower among members of the Air Force and Coast Guard (Table 7.4). Rates were also significantly higher among senior enlisted service members (Table 7.5). Both junior and senior officers

had significantly lower rates of high physical symptom severity scores than enlisted service members or warrant officers (Table 7.5).

In terms of comparisons between the 2015 and 2018 HRBSs:

- The percentage of service members who reported any bodily pain (not including headaches) significantly decreased between the 2015 and 2018 surveys, by roughly 11 percent (ARR = 0.89, 95-percent CI: 0.86, 0.93). There were significant within–service branch differences across HRBSs, with the rate significantly decreasing in the Air Force (ARR = 0.88, 95-percent CI: 0.81, 0.94), Army (ARR = 0.89, 95-percent CI: 0.84, 0.95), Navy (ARR = 0.89, 95-percent CI: 0.82, 0.97), and Coast Guard (ARR = 0.85, 95-percent CI: 0.76, 0.94). There was no significant change in the Marine Corps (ARR = 0.95, 95-percent CI: 0.88, 1.03). There were also significant decreases compared with the 2015 HRBS among junior enlisted personnel (E1–E4; ARR = 0.84, 95-percent CI: 0.77, 0.91), mid-level enlisted personnel (E5–E6; ARR = 0.86, 95-percent CI: 0.80, 0.92), and junior officers (O1–O3; ARR = 0.77, 95-percent CI: 0.69, 0.86). Finally, there were significant decreases for women (ARR = 0.92, 95-percent CI: 0.87, 0.98) and men (ARR = 0.88, 95-percent CI: 0.84, 0.92).
- The same trends were observed for service members reporting any bodily pain, including headaches. The percentage significantly decreased between the 2015 and 2018 surveys, by roughly 10 percent (ARR = 0.90, 95-percent CI: 0.87, 0.93). Regarding differences within service branch, the rate significantly decreased in the Air Force (ARR = 0.88, 95-percent CI: 0.82, 0.94), Army (ARR = 0.89, 95-percent CI: 0.84, 0.94), Navy (ARR = 0.92, 95-percent CI: 0.85, 0.99), and Coast Guard (ARR = 0.86, 95-percent CI: 0.78, 0.95). There was no significant change in the Marine Corps (ARR = 0.94, 95-percent CI: 0.88, 1.01). Regarding pay grade, there were significant decreases among junior enlisted (E1–E4; ARR = 0.84, 95-percent CI: 0.78, 0.91), mid-level enlisted (E5–E6; ARR = 0.85, 95-percent CI: 0.80, 0.91), and junior officers (O1–O3; ARR = 0.79, 95-percent CI: 0.72, 0.88). Finally, there were significant decreases for women (ARR = 0.92, 95-percent CI: 0.88, 0.97) and men (ARR = 0.88, 95-percent CI: 0.84, 0.92).
- There was a significant decrease in the percentage of service members reporting high physical symptom severity between the 2015 and 2018 surveys, by approximately 13 percent (ARR = 0.87, 95-percent CI: 0.83, 0.91). There were significant within–service branch changes, with decreases observed in the Air Force (ARR = 0.79, 95-percent CI: 0.71, 0.88), Army (ARR = 0.86, 95-percent CI: 0.79, 0.93), and Navy (ARR = 0.87, 95-percent CI: 0.78, 0.96). Regarding pay grade, there were significant decreases between surveys for E1–E4 (ARR = 0.83, 95-percent CI: 0.74, 0.93), E5–E6 (ARR = 0.82, 95-percent CI: 0.75, 0.90), W1–W5 (ARR = 0.81, 95-percent CI: 0.66, 0.99), and O1–O3 (ARR = 0.67, 95-percent CI: 0.57, 0.79). There were also significant decreases observed among men (ARR = 0.85, 95-percent CI: 0.79, 0.90) and women (ARR = 0.90, 95-percent CI: 0.84, 0.96).

Traumatic Brain Injury and Postconcussive Symptoms

Military service members are at risk for experiencing a range of physical injuries. Some causes of injury are related to the military experience or are more common among service members, such as physical training exercises, parachuting, and falls or jumps (Canham-Chervak et al., 2010; Jones et al., 2000; Kaufman, Brodine, and Shaffer, 2000). Other causes of injury include vehicle crashes (both privately owned and military vehicles) and sports (Canham-Chervak et al., 2010; Jones et al., 2000). Deployment also increases the risk of certain types of injuries, such as injuries from combat-related causes (e.g., explosives, gunshot wounds) and noncombat causes (e.g., machinery; Belmont, Owens, and Schoenfeld, 2016; Le et al., 2018). Each of these events can place service members at increased risk for a TBI. From 2000 to 2018, a total of 383,947 service members experienced TBIs (Defense and Veterans Brain Injury Center, 2018). Approximately 82.3 percent of TBIs were mild, 9.7 percent were moderate, 5.6 percent were severe, and 1.4 percent were penetrating. Moreover, TBI is one of the most common injuries among veterans of Operation Enduring Freedom and Operation Iraqi Freedom, affecting an estimated 12.2 percent of veterans (Tanielian and Jaycox, 2008). Mental health concerns are common among service members with a history of mild traumatic brain injury (mTBI), including depression and PTSD (Kennedy et al., 2019; McDonald et al., 2017), as is chronic pain (Nampiaparampil, 2008). Moderate and severe TBI can lead to lasting cognitive dysfunction (Rabinowitz and Levin, 2014). Understanding the current prevalence of mTBI, TBI, and postconcussive symptoms will allow the military to strengthen postdeployment screening processes and identify those at greater risk for experiencing persistent symptoms or long-term effects of the injury.

TBI was assessed using three sets of items based on the Brief Traumatic Brain Injury Screen, which was developed by an interdisciplinary VA task force and used by the Defense and Veterans Brain Injury Center for previously deployed military veterans (Schwab et al., 2006). The assessment has been used extensively in military and VA settings. HRBS respondents were first asked to indicate whether they had experienced injuries in the past 12 months from each of the following sources: being struck by a flying object or fragment, bullet, vehicular accident, hard fall, blast or explosion, or some other way. This item was designed to measure past-year exposure to injuries potentially related to TBI. Next, to assess whether TBI may have occurred and to estimate its severity, respondents were asked whether they had received a jolt or blow to their head as a result of those injuries that immediately resulted in any of the following symptoms: loss of consciousness, confusion, memory loss, concussion symptoms (e.g., headache, dizziness), or head injury. Last, respondents were asked to report whether they had experienced any common postconcussive symptoms in the past 30 days that they thought could be related to the injury, including headaches, dizziness, memory problems, balance problems, ringing in the ears, irritability, sleep problems, or sensitivity to light. Note that in the 2015 HRBS, questions about injury and TBI were only asked of previously deployed personnel; in the 2018 HRBS, these questions were asked of all personnel.

A positive screen for mTBI occurred when a respondent (1) reported one or more injuries during any deployment and (2) recalled having lost consciousness for up to 20 minutes; feeling dazed, confused, or "seeing stars"; experiencing postconcussive symptoms; or having a lack of memory of the event. A positive screen for moderate to severe TBI occurred when a respondent reported loss of consciousness lasting longer than 20 minutes. Finally, a positive screen for postconcussive symptoms occurred if a service member screened positive for TBI and endorsed

four or more postconcussive symptoms or indicated that they had experienced a concussion or symptoms of a concussion.

Tables 7.7 to 7.9 present overall rates of injury, possible TBI, and postconcussive symptoms in the past 12 months. Key findings include the following:

- In the 2018 HRBS, 26.9 percent of service members experienced an injury (Table 7.7). Rates of injury were significantly higher among members of the Army and Marine Corps compared with the other service branches (Table 7.7). Officers had lower rates of injury than junior and senior enlisted personnel (Table 7.8).
- A total of 6.1 percent of service members screened positive for mTBI (Table 7.7). Rates of screening positive for mTBI were significantly higher among the Army, Marine Corps, and Navy than the Air Force and Coast Guard (Table 7.7). In addition, enlisted service members had significantly higher rates of screening positive for mTBI than officers (Table 7.8).
- Rates of moderate to severe TBI were low, with 0.2 percent of service members screening positive (Table 7.7). There were no significant differences in rates of screening positive for moderate or severe TBI across service branches (Table 7.7) or pay grades (Table 7.8).
- An estimated 4.2 percent of service members reported postconcussive symptoms. Rates of postconcussive symptoms were significantly higher among members of the Army, Marine Corps, and Navy (Table 7.7), which is consistent with the higher rates of mTBI in these groups. Similarly, there were higher rates of postconcussive symptoms among enlisted service members than among officers (Table 7.8).
- There were no significant gender differences for any of the injury or TBI-related outcomes (Table 7.9). There were also few age- or race/ethnicity–related differences (Appendix Tables D.69 and D.70), though non-Hispanic Asian service members had higher rates of moderate to severe TBI than non-Hispanic black and Hispanic service members.

Table 7.7
Past-Year Injury, TBI, and Postconcussive Symptoms, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any injury	22.4%[b,c] (21.1–23.6)	30.0%[a,d,e] (27.6–32.4)	31.5%[a,d,e] (28.8–34.2)	24.7%[b,c] (22.4–27.0)	24.5%[b,c] (22.0–27.0)	27.0% (25.9–28.1)	26.9% (25.8–28.0)
Positive screen for mild TBI	3.7%[b,c,d] (3.1–4.3)	7.3%[a,e] (5.9–8.6)	6.8%[a,e] (5.3–8.4)	6.6%[a,e] (5.1–8.0)	3.6%[b,c,d] (2.6–4.5)	6.1% (5.5–6.8)	6.1% (5.4–6.7)
Positive screen for moderate to severe TBI[z]	0.1% (0.0–0.2)	0.2% (0.0–0.5)	0.4% (0.0–1.0)	0.3% (0.1–0.5)	0.2% (0.0–0.5)	0.2% (0.1–0.4)	0.2% (0.1–0.4)
Postconcussive symptoms	1.9%[b,c,d] (1.5–2.4)	5.6%[a,e] (4.3–6.8)	4.6%[a,e] (3.3–6.0)	4.5%[a,e] (3.4–5.6)	2.0%[b,c,d] (1.2–2.8)	4.3% (3.7–4.8)	4.2% (3.6–4.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 7.8
Past-Year Injury, TBI, and Postconcussive Symptoms, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any injury	28.5%[e,f] (26.3–30.7)	27.0%[e] (25.3–28.8)	28.4%[e,f] (26.3–30.5)	26.3% (20.6–32.0)	20.4%[a,b,c] (18.3–22.5)	24.0%[a,c] (22.1–25.9)
Positive screen for mild TBI	7.1%[e,f] (5.8–8.5)	5.7%[e,f] (4.9–6.6)	7.8%[e,f] (6.6–9.0)	4.9% (2.3–7.6)	2.7%[a,b,c] (1.8–3.5)	3.3%[a,b,c] (2.6–4.1)
Positive screen for moderate to severe TBI[z]	0.2% (0.0–0.5)	0.3% (0.1–0.6)	0.2% (0.0–0.3)	0.0% (0.0–1.4)	0.1% (0.0–0.3)	0.1% (0.0–0.2)
Postconcussive symptoms	4.9%[e,f] (3.8–6.0)	4.2%[e,f] (3.4–5.0)	6.0%[e,f] (4.9–7.0)	2.1% (0.3–3.9)	1.4%[a,b,c] (0.9–1.9)	1.4%[a,b,c] (0.9–1.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 7.9
Past-Year Injury, TBI, and Postconcussive Symptoms, by Gender

	Men	Women
Any injury[z]	27.2% (25.9–28.5)	25.5% (23.8–27.2)
Positive screen for mild TBI[z]	6.2% (5.4–6.9)	5.5% (4.6–6.4)
Positive screen for moderate to severe TBI[z]	0.2% (0.1–0.4)	0.2% (0.0–0.4)
Postconcussive symptoms[z]	4.2% (3.5–4.8)	4.3% (3.5–5.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Self-Rated Health

In addition to reporting on physical symptoms, service members were asked to self-report their overall physical health. Self-rated health was assessed with a widely used single-item assessment, asking "Would you say your overall health is (excellent, very good, good, fair, poor)?" Single-item self-rated health items like this question have good concurrent validity with measures of physical and emotional health (DeSalvo, Fisher, et al., 2006) and have been shown

to be predictive of all-cause mortality (DeSalvo, Bloser, et al., 2006). Results can be found in Tables 7.10 through 7.12. Key findings include the following:

- Most service members reported that their health was very good or excellent (combined 52.3 percent). In addition, 36.2 percent reported that their health was good (Table 7.10). Rates of excellent health were significantly higher among members of the Air Force

Table 7.10
Self-Rated Overall Physical Health, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Excellent	16.9%[c,d,e] (15.8–18.1)	15.5%[c,e] (13.5–17.5)	11.8%[a,b] (10.0–13.5)	13.1%[a] (11.3–15.0)	11.5%[a,b] (9.8–13.3)	14.7% (13.8–15.7)	14.6% (13.7–15.5)
Very good	41.6%[b,d] (40.1–43.1)	36.3%[a,e] (33.8–38.7)	38.7% (35.9–41.6)	34.7%[a,e] (32.3–37.2)	42.5%[b,d] (39.7–45.3)	37.6% (36.4–38.8)	37.7% (36.6–38.9)
Good	34.6%[d,e] (33.2–36.0)	35.0% (32.5–37.4)	35.5% (32.7–38.2)	39.6%[a] (37.0–42.1)	39.0%[a] (36.2–41.7)	36.1% (34.9–37.3)	36.2% (35.0–37.4)
Fair	6.2%[b,c,d] (5.5–6.9)	11.1%[a,e] (9.4–12.7)	11.9%[a,e] (10.1–13.8)	10.5%[a,e] (8.9–12.1)	6.2%[b,c,d] (4.9–7.6)	9.8% (9.1–10.6)	9.7% (9.0–10.5)
Poor	0.7%[b,c,d] (0.4–0.9)	2.2%[a,e] (1.4–2.9)	2.1%[a] (1.1–3.1)	2.1%[a] (1.2–2.9)	0.8%[b] (0.4–1.3)	1.8% (1.4–2.1)	1.7% (1.4–2.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.
[a] Statistically significantly different from Air Force estimate.
[b] Statistically significantly different from Army estimate.
[c] Statistically significantly different from Marine Corps estimate.
[d] Statistically significantly different from Navy estimate.
[e] Statistically significantly different from Coast Guard estimate.

Table 7.11
Self-Rated Overall Physical Health, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Excellent	15.6%[b,c,e,f] (13.7–17.4)	10.7%[a,c,e,f] (9.5–11.9)	7.1%[a,b,e,f] (5.9–8.2)	7.9%[e,f] (4.2–11.6)	25.8%[a,b,c,d] (23.5–28.1)	22.4%[a,b,c,d] (20.5–24.3)
Very good	35.7%[e,f] (33.4–37.9)	36.9%[e,f] (35.0–38.8)	33.8%[e,f] (31.6–36.1)	42.0% (35.5–48.6)	46.9%[a,b,c] (44.4–49.5)	45.5%[a,b,c] (43.3–47.7)
Good	36.3%[c,e,f] (34.0–38.5)	39.6%[c,e,f] (37.7–41.5)	44.7%[a,b,e,f] (42.3–47.2)	39.3%[e,f] (32.8–45.7)	22.9%[a,b,c,d] (20.7–25.1)	27.0%[a,b,c,d] (25.1–29.0)
Fair	10.4%[e,f] (8.9–11.9)	11.0%[e,f] (9.7–12.3)	12.6%[e,f] (11.1–14.1)	8.3%[e] (5.1–11.4)	3.9%[a,b,c,d] (3.0–4.8)	4.6%[a,b,c] (3.7–5.5)
Poor	2.1%[e,f] (1.4–2.9)	1.8%[e,f] (1.2–2.4)	1.8%[e,f] (1.2–2.4)	2.6% (0.0–5.5)	0.5%[a,b,c] (0.1–0.9)	0.5%[a,b,c] (0.2–0.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.
[a] Statistically significantly different from E1–E4 estimate.
[b] Statistically significantly different from E5–E6 estimate.
[c] Statistically significantly different from E7–E9 estimate.
[d] Statistically significantly different from W1–W5 estimate.
[e] Statistically significantly different from O1–O3 estimate.
[f] Statistically significantly different from O4–O6 estimate.

Table 7.12
Self-Rated Overall Physical Health, by Gender

	Men	Women
Excellent	15.3%[a] (14.2–16.4)	11.3% (10.1–12.5)
Very good	38.2%[a] (36.9–39.6)	35.3% (33.4–37.2)
Good	35.5%[a] (34.2–36.9)	39.6% (37.6–41.6)
Fair	9.2%[a] (8.4–10.1)	12.2% (10.8–13.5)
Poor[z]	1.7% (1.3–2.2)	1.7% (1.0–2.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

(16.9 percent) than members of the Marine Corps (11.8 percent), Navy (13.1 percent), and Coast Guard (11.5 percent). Members of the Air Force (6.2 percent) and Coast Guard (6.2 percent) had significantly lower rates of fair health than members of the Army, Marine Corps, and Navy, and members of the Air Force had significantly lower rates of poor health than members of the Army, Marine Corps, or Navy (Table 7.10).

- Junior and senior officers had significantly higher rates of very good and excellent health than enlisted service members (Table 7.11).
- Men had higher rates of very good and excellent health than women, and women had higher rates of fair or good health. There were no significant gender differences in rates of poor health, which was reported by only 1.7 percent of men and women (Table 7.12).
- Self-rated physical health did not decrease across age groups; service members ages 35–44 had the lowest rates of excellent health, but there were no differences across other age groups (Appendix Table D.72). Similarly, there were few significant racial/ethnic differences in self-rated health (Appendix Table D.71).

Health-Related Functional Limitations

In addition to their impact on health care utilization and quality of life, chronic conditions and physical limitations can affect individuals' ability to carry out normal daily responsibilities. This can result in reduced productivity and missed days of school or work (Burton et al., 2005; Merrill et al., 2013; Schultz and Edington, 2007; Goetzel et al., 2004; Schultz, Chen, and Edington, 2009; Strömberg et al., 2017), which, in turn, are associated with increased costs.

We assessed absenteeism (i.e., lost work or school days because of health symptoms) and presenteeism (i.e., days present at work or school but with performance compromised because of health symptoms). Respondents were asked how many days in the past 30 days their mental

or physical symptoms caused them to miss school or work or to feel so impaired that even though they went to work or school, their productivity was reduced. We calculated the average number of days of absenteeism and presenteeism. Key findings are presented in Tables 7.13 through 7.15 and include the following:

- On average, service members reported missing 0.62 days of work (absenteeism) and experiencing reduced productivity (presenteeism) on 2.19 days in the past 30 days (Table 7.13).
- One difference in days missed appeared across service branches: Service members in the Army reported significantly more absenteeism than their peers in the Air Force (Table 7.13). Members of the Air Force and Coast Guard reported significantly less presenteeism than members of the Army, Marine Corps, and Navy.
- Officers reported significantly fewer missed days of work and fewer days of reduced productivity than junior, mid-level, or senior enlisted personnel (Table 7.14).
- Men reported fewer missed days and days of reduced productivity than women (Table 7.15).
- There were no age-related differences with respect to absenteeism or presenteeism (Appendix Table D.74). Non-Hispanic black service members reported significantly more missed days of work than non-Hispanic white, Hispanic, and other race/ethnicity service members (Appendix Table D.73). Hispanic service members had fewer days of reduced productivity than non-Hispanic white service members.

Table 7.13
Health-Related Functional Limitations: Absenteeism and Presenteeism, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Absenteeism (average number of days lost due to mental or physical symptoms, past 30 days)	0.37[b] (0.30–0.44)	0.85[a] (0.66–1.04)	0.59 (0.44–0.75)	0.56 (0.43–0.69)	0.56 (0.25–0.88)	0.62 (0.54–0.70)	0.62 (0.54–0.70)
Presenteeism (average number of days productivity was impaired by mental or physical symptoms, past 30 days)	1.42[b,c,d] (1.28–1.57)	2.39[a,e] (2.06–2.73)	2.45[a,e] (2.09–2.81)	2.60[a,e] (2.22–2.98)	1.56[b,c,d] (1.19–1.93)	2.21 (2.05–2.38)	2.19 (2.03–2.35)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 7.14
Health-Related Functional Limitations: Absenteeism and Presenteeism, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Absenteeism (average number of days lost due to mental or physical symptoms, past 30 days)	0.71[e,f] (0.55–0.86)	0.60[e,f] (0.47–0.73)	0.83[e,f] (0.68–0.99)	0.65 (0.31–0.98)	0.28[a,b,c] (0.19–0.38)	0.30[a,b,c] (0.22–0.38)
Presenteeism (average number of days productivity was impaired by mental or physical symptoms, past 30 days)	2.47[e,f] (2.15–2.79)	2.29[e,f] (2.03–2.55)	2.23[e,f] (1.98–2.48)	1.95 (1.24–2.65)	1.33[a,b,c] (1.12–1.55)	1.20[a,b,c] (1.04–1.37)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 7.15
Health-Related Functional Limitations: Absenteeism and Presenteeism, by Gender

	Men	Women
Absenteeism (average number of days lost due to mental or physical symptoms, past 30 days)	0.55[a] (0.46–0.64)	0.98 (0.80–1.15)
Presenteeism (average number of days productivity was impaired by mental or physical symptoms, past 30 days)	2.04[a] (1.86–2.23)	2.92 (2.64–3.21)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

Summary

This chapter presented analyses related to chronic conditions, physical symptoms, TBI, self-rated health, and health-related functional limitations. Overall, 35 percent of service members reported being told by a health care provider that they had at least one of the eight chronic conditions we examined. In turn, the presence of these conditions has implications for readiness and resilience, as well as health care utilization and associated costs. We found that rates of certain chronic conditions were lower than the benchmarks established by HP2020, including high blood pressure, high cholesterol, and diabetes. However, it is important to take into

consideration that this could reflect selection factors and aspects of military service that might serve to maintain good cardiometabolic health (e.g., fitness requirements).

When examining chronic conditions and physical symptoms, we found that many of these outcomes were more prevalent among members of the Army and Marine Corps, with significantly lower prevalence among members of the Air Force and Coast Guard. For some outcomes, prevalence in the Navy was somewhere between these two extremes (e.g., bodily pain), though in other cases it was comparable to the prevalence among members of the Army and Marine Corps (e.g., fatigue). In addition, we found differences by pay grade. The prevalence of pain was higher among enlisted service members than officers and increased with pay grade. We observed similar trends by branch of service and pay grade for injury and TBI. These differences by service branch and pay grade likely reflect the accumulation of factors that increase the likelihood of pain and injury across a career (e.g., participation in more training exercises, more deployments, more carrying of heavy loads), as well as differences in roles, responsibilities, and missions across pay grades and services. This finding also suggests the importance of efforts to prevent pain by addressing these factors.

Regarding self-rated health, there were some differences by service; for example, members of the Air Force were more likely to report excellent health than members of the Marine Corps, Navy, or Coast Guard. There were also differences by pay grade, with officers reporting higher rates of very good and excellent health than enlisted service members. However, in general, self-rated health was good, very good, or excellent across groups.

On average, service members lost less than one day of work or school because of mental or physical health symptoms (absenteeism) and performed with lower productivity just over two days a month (presenteeism). Women and enlisted service members were more impacted by absenteeism and presenteeism than men and officers. This suggests some productivity loss due to health concerns.

CHAPTER EIGHT

Sexual Behavior and Health

Sexual health is a key aspect of mental and physical well-being. This domain includes behaviors and outcomes related to prevention of human immunodeficiency virus (HIV), STIs, unintended pregnancy, and cancer, among others (Douglas and Fenton, 2013). Each of these can be a factor in force readiness, especially if the behavior or outcome leads to a medical status that prevents a service member from being deployed (e.g., pregnancy). Furthermore, DoD and the Coast Guard assume some cost of the treatment of STIs among service members.

This chapter reports on past-year sexual risk behaviors reported by service members, including having more than one sex partner, having sex with a new partner without using a condom, and not using a condom during their most-recent episode of vaginal sex. We also report the percentage of service members with a past-year STI and the percentage who were at high risk for HIV infection, according to CDC guidelines (CDC, 2019c). Finally, we report the past-year percentage with an unintended pregnancy (either a pregnancy the service member caused, for male respondents, or personally experienced, for female respondents).

A second section of this chapter reports on contraceptive access, use, and methods. We report on past-year contraceptive methods used by service members during their most-recent episode of vaginal sex, the percentage of service members at risk for pregnancy who were using the most-effective methods of contraception, and, for those who experienced an unintended pregnancy in the past year, the contraceptive method used at the time the unintended pregnancy occurred. We also report on deployment-related contraceptive counseling and access. Contraception related to deployments is a key issue currently of interest to Congress, as indicated in the 2016 and 2017 NDAAs *(National Defense Authorization Act for Fiscal Year 2016*, 2015; *National Defense Authorization Act for Fiscal Year 2017*, 2016).

In the final section of this chapter, we report on HIV testing among service members overall and among those at higher risk for infection.

Comparable U.S. population data for most indicators are not available for a recent period and are reported only where available. We also compare service member outcomes to relevant HP2020 targets. Readers should use caution when interpreting comparisons between the 2018 HRBS results and U.S. population data or HP2020 targets because these comparisons are not necessarily statistically significant and because the military population differs from the general population in demographics (e.g., gender, age) and other factors that are related to health. We provide CIs for U.S. estimates where available.

Readers should also use caution when interpreting comparisons between the 2018 HRBS results and prior versions of the HRBS because these comparisons are not necessarily statistically significant and could simply reflect sampling variability across the two samples being compared; however, when applicable, we compared results between the 2015 and 2018 HRBSs

using a regression framework to control for some of the methodological differences related to survey implementation and analysis (see Chapter Two). When interpreting changes across surveys, it is important to keep in mind what the base for that increase is. That is, a 20-percent increase for an outcome with a 2015 prevalence of 2 percent represents a much smaller increase in absolute value than the same percentage increase for an outcome with a 2015 prevalence of 25 percent (0.4 versus 5.0 percent). Thus, extremely large percentage increases (or decreases) across surveys are often substantively small even though the percentage changes appear quite large.

Each section below highlights the importance or relevance of the topic to the general population and to the military and then provides an analysis of each topic by service branch. When relevant, we also describe results of analyses by pay grade, age group, gender, and race/ethnicity. Tables describing the results of analyses by age group and race/ethnicity can be found in Appendix D. Key measures used are described in the applicable section, and additional details about these measures may be found in Appendix C. All analyses demonstrated statistically significant omnibus tests (Rao-Scott chi-square test for categorical variables and F-tests for continuous variables), unless otherwise noted in the tables. Only statistically significant differences that the research team subject-matter experts determined to be substantively meaningful (i.e., those that could be used to change or develop policy or contribute to inequalities in health outcomes across subgroups) are discussed in the text.

Sexual Risk Behaviors and Outcomes

Findings related to past-year sexual risk behaviors and outcomes across all service branches are presented in Table 8.1. Key overall findings include the following:

- About one in five (19.3 percent) service members had more than one sex partner in the past year.
- About one in three (34.9 percent) service members had sex with a new partner without using a condom in the past year.
- Across all service branches, 23.8 percent of personnel used a condom the most-recent time they had vaginal sex in the past year.
- STI was reported by 3.4 percent of service members in the past year.
- About one in five (21.8 percent) service members were at high risk for HIV infection at the time of the survey.
- Unintended pregnancy was caused or experienced by 2.9 percent of personnel in past year.

Tables 8.1 through 8.3 display the percentages of personnel engaging in past-year sexual risk behaviors, as well as related outcomes, by service branch, pay grade, and gender, respectively. Key findings include the following:

- The Marine Corps and the Navy had the highest percentage of members in two of the six sexual risk categories: more than one sex partner in the past year and currently at high risk for HIV infection (Table 8.1). The Marine Corps exceeded all services in the percentage who had sex with a new partner without a condom in the past year. Percent-

Table 8.1
Sexual Risk Behaviors and Outcomes, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
2+ sex partners in past year	17.0%[c,d] (15.8–18.1)	17.8%[c] (15.6–19.9)	25.6%[a,b,e] (22.9–28.2)	20.9%[a,e] (18.6–23.2)	15.4%[c,d] (13.2–17.5)	19.5% (18.4–20.6)	19.3% (18.3–20.4)
Sex with a new partner without a condom in past year	31.4%[c,d] (30.0–32.8)	33.9%[c] (31.4–36.4)	42.3%[a,b,d,e] (39.4–45.1)	35.7%[a,c] (33.3–38.2)	32.9%[c] (30.1–35.6)	34.9% (33.7–36.2)	34.9% (33.7–36.0)
Condom use during most-recent vaginal sex	24.6% (23.2–25.9)	22.7% (20.4–25.0)	27.4%[d] (24.8–30.1)	22.4%[c] (20.0–24.7)	23.8% (21.3–26.3)	23.8% (22.6–24.9)	23.8% (22.7–24.9)
STI in past year[z]	3.1% (2.5–3.6)	3.0% (2.2–3.9)	4.0% (2.8–5.3)	4.0% (2.9–5.1)	2.6% (1.7–3.4)	3.4% (2.9–3.9)	3.4% (2.9–3.8)
High risk for HIV[1]	19.2%[c,d] (18.0–20.4)	20.4%[c] (18.1–22.6)	27.8%[a,b,e] (25.0–30.5)	23.7%[a,e] (21.3–26.1)	17.0%[c,d] (14.8–19.2)	22.0% (20.9–23.1)	21.8% (20.7–22.9)
Unintended pregnancy in past year	2.4% (1.9–2.9)	2.7% (1.9–3.5)	3.5%[e] (2.4–4.5)	3.6%[e] (2.5–4.6)	1.3%[c,d] (0.7–2.0)	3.0% (2.5–3.4)	2.9% (2.5–3.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

ages of service members reporting an unintended pregnancy in the past were also higher in these two services, though differences were statistically significant only relative to the Coast Guard.

- There were no statistically significant differences across services in the percentages of service members with an STI in the past year (Table 8.1).
- Junior enlisted service members (pay grades E1–E4) had the highest rates of most sexual risk behaviors and outcomes but among the highest rates of condom use during the most-recent time they had vaginal sex (a protective behavior). The latter rates were also higher among junior officers (O1–O3; Table 8.2).
- Consistent with the overall pattern of findings for pay grade, younger age was also related to greater sexual risk behaviors and negative outcomes and greater likelihood of condom use during the most-recent occurrence of vaginal sex (Appendix Table D.76).
- Differences in the percentages of military men versus women who had multiple sex partners or who had sex with a new partner without a condom in the past year were not statistically significant (Table 8.3). However, a significantly higher percentage of military men (24.5 percent) than women (20.0 percent) used a condom during the most-recent time they had vaginal sex. Comparison data for the U.S. population (age 15–44) are available from the 2011–2015 National Survey of Family Growth, which found that 33.7 percent

Table 8.2
Sexual Risk Behaviors and Outcomes, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
2+ sex partners in past year	27.9%[b,c,d,e,f] (25.8–30.0)	16.1%[a,c,f] (14.6–17.6)	8.2%[a,b,e] (6.9–9.4)	9.5%[a] (4.6–14.3)	14.1%[a,c,f] (12.1–16.0)	5.8%[a,b,e] (4.7–6.8)
Sex with a new partner without a condom in past year	37.8%[e,f] (35.6–40.1)	36.8%[e,f] (35.0–38.7)	33.0%[e,f] (30.5–35.4)	34.5%[f] (28.1–40.9)	26.2%[a,b,c] (23.9–28.5)	22.8%[a,b,c,d] (21.0–24.7)
Condom use during most-recent vaginal sex	29.9%[b,c,d,f] (27.7–32.0)	20.4%[a,c,e,f] (18.8–22.1)	10.6%[a,b,e,f] (9.2–12.0)	14.5%[a,e] (9.0–20.0)	28.1%[b,c,d,f] (25.7–30.5)	14.2%[a,b,c,e] (12.6–15.7)
STI in past year	4.3%[c,e,f] (3.5–5.2)	3.8%[c,e,f] (2.9–4.6)	1.6%[a,b] (1.1–2.1)	1.0% (0.0–2.3)	1.8%[a,b] (1.2–2.3)	1.1%[a,b] (0.7–1.5)
High risk for HIV[1]	30.4%[b,c,d,e,f] (28.2–32.6)	19.2%[a,c,f] (17.6–20.8)	10.4%[a,b,e,f] (9.0–11.8)	10.5%[a] (5.5–15.4)	15.8%[a,c,f] (13.8–17.9)	7.1%[a,b,c,e] (5.9–8.2)
Unintended pregnancy in past year	3.9%[c,e,f] (3.0–4.7)	3.0%[e,f] (2.3–3.6)	1.6%[a] (0.9–2.2)	2.1% (0.0–4.8)	1.5%[a,b] (1.0–2.1)	0.8%[a,b] (0.4–1.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

(CI: 31.9, 35.5) of men and 23.8 percent (CI: 22.4, 25.2) of women reported using a condom during the most-recent time they had sex (Copen, 2017).

- A higher percentage of military women than men had an STI in the past year or were at high risk for HIV infection at the time of the survey (Table 8.3).
- Military women were much more likely to report experiencing an unintended pregnancy in the past year (5.5 percent) compared with the percentage of military men who reported causing an unintended pregnancy (2.4 percent; Table 8.3). This difference is probably a result of men having incomplete information about the occurrence of unintended pregnancies. The percentage of military women who reported experiencing an unintended pregnancy was slightly higher than among women of reproductive age in the U.S. population (4.5 percent [CI: 4.1, 4.9]; Finer and Zolna, 2016).
- Non-Hispanic black and Hispanic service members and service members in the Other race/ethnicity category were significantly more likely than non-Hispanic white and non-Hispanic Asian service members to be at high risk for HIV at the time of the survey. Non-Hispanic black service members were significantly more likely to report an unintended pregnancy in the past year than non-Hispanic white, Hispanic, and non-Hispanic Asian service members (Appendix Table D.75).

Table 8.3
Sexual Risk Behaviors and Outcomes, by Gender

	Men	Women
2+ sex partners in past year[z]	19.1% (17.9–20.3)	20.8% (19.0–22.6)
Sex with a new partner without a condom in past year[z]	34.6% (33.3–36.0)	36.2% (34.2–38.1)
Condom use during most-recent vaginal sex	24.5%[a] (23.2–25.8)	20.0% (18.3–21.6)
STI in past year	2.7%[a] (2.2–3.2)	7.0% (5.8–8.1)
High risk for HIV[1]	21.3%[a] (20.1–22.6)	24.4% (22.5–26.2)
Unintended pregnancy in past year	2.4%[a] (1.9–2.9)	5.5% (4.4–6.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

Unintended pregnancy among servicewomen presents unique challenges for DoD. Pregnancy among active component servicewomen can result in duty restrictions (e.g., hours, certain physical tasks, exposure to environmental hazards), limitations regarding travel and deployments, and evacuation from theater (e.g., U.S. Department of the Navy, 2007; U.S. Army Public Health Command, 2010; U.S. Department of the Air Force, 2014). In many cases, a planned pregnancy can be timed to avoid conflicts with deployment and training cycles, whereas unintended pregnancies may not allow for such considerations. Thus, we looked in more detail at the female portion of our sample. We found that:

- Women in the Marine Corps (8.7 percent) were significantly more likely to report experiencing an unintended pregnancy in the past year than military women in the Air Force (3.7 percent) or Coast Guard (1.6 percent). Women in the Army (6.1 percent) and Navy (5.8 percent) were also significantly more likely to experience an unintended pregnancy than women in the Coast Guard.

Where appropriate, we also compared some of the sexual risk behaviors observed in the 2018 HRBS with the same measures in the 2015 HRBS. In terms of comparisons between the 2015 and 2018 HRBSs:

- There was a significant decrease (ARR = 0.85, 95-percent CI: 0.81, 0.89) in the percentage of service members who reported having more than one sex partner in the past year.

- There was a significant decrease in the percentage of service members who reported having sex with a new partner without using a condom in the past year (ARR = 0.95, 95-percent CI: 0.92, 0.99).
- No significant change was detected in the percentage of service members who reported using a condom during the most-recent time they had vaginal sex in the past year.
- The percentage of service members who reported having an STI in the past year increased significantly (ARR = 2.67, 95-percent CI: 2.20, 3.24).
- The percentage of service members who were at high risk for HIV at the time of the survey decreased significantly (ARR = 0.93, 95-percent CI: 0.89, 0.98).
- No significant change was detected in the percentage of service members who reported an unintended pregnancy in the past year.
- Compared with the 2015 HRBS, there were some significant differences within service branches in sexual risk behaviors and outcomes. The percentage of service members who reported having more than one sex partner decreased in the Air Force (ARR = 0.82, 95-percent CI: 0.75, 0.90), Army (ARR = 0.86, 95-percent CI: 0.76, 0.97), Marine Corps (ARR = 0.87, 95-percent CI: 0.77, 0.98), and Navy (ARR = 0.83, 95-percent CI: 0.74, 0.93). The percentage of service members who had sex with a new partner without using a condom decreased only in the Army (ARR = 0.85, 95-percent CI: 0.79, 0.91). There was an increase in STIs in all service branches: Air Force (ARR = 3.01, 95-percent CI: 2.07, 4.40), Army (ARR = 2.48, 95-percent CI: 1.61, 3.81), Marine Corps (ARR = 2.33, 95-percent CI: 1.46, 3.73), Navy (ARR = 2.20, 95-percent CI: 1.46, 3.31), and Coast Guard (ARR = 3.45, 95-percent CI: 2.15, 5.55).
- Compared with the 2015 HRBS, there were some significant differences within pay grades in sexual risk behaviors and outcomes. A significant decrease in the percentage of service members who reported more than one sex partner was observed in all pay grades except for senior officers (O4–O6): E1–E4 (ARR = 0.88, 95-percent CI: 0.81, 0.95), E5–E6 (ARR = 0.85, 95-percent CI: 0.76, 0.94), E7–E9 (ARR = 0.84, 95-percent CI: 0.71, 0.99), W1–W5 (ARR = 0.69, 95-percent CI: 0.47, 1.00), and O1–O3 (ARR = 0.80, 95-percent CI: 0.70, 0.91). A significant decrease in the percentage of service members who had sex with a new partner without using a condom was observed within the E5–E6 (ARR = 0.93, 95-percent CI: 0.88, 1.00) and O1–O3 (ARR = 0.90, 95-percent CI: 0.82, 0.98) pay grades. A significant increase in STIs was observed within all pay grades except for warrant officers (W1–W5): E1–E4 (ARR = 1.86, 95-percent CI: 1.39, 2.47), E5–E6 (ARR = 3.44, 95-percent CI: 2.26, 5.24), E7–E9 (ARR = 3.73, 95-percent CI: 2.10, 6.63), O1–O3 (ARR = 2.70, 95-percent CI: 1.68, 4.33), and O4–O6 (ARR = 5.50, 95-percent CI: 2.65, 11.43). Finally, a significant decrease in the percentage of service members at high risk for HIV was observed only among junior enlisted personnel (E1–E4; ARR = 0.91, 95-percent CI: 0.84, 0.98).
- Compared with the 2015 HRBS, there were some significant differences in sexual risk behaviors and outcomes by gender. There was a significant decrease in the percentage of service members who reported having more than one sex partner among both men (ARR = 0.86, 95-percent CI: 0.81, 0.92) and women (ARR = 0.83, 95-percent CI: 0.76, 0.90). A significant decrease in the percentage of service members who reported having sex with a new partner without a condom was observed only for women (ARR = 0.93, 95-percent CI: 0.88, 0.99). There was an increase in STIs among both men (ARR = 2.10, 95-percent CI:1.57, 2.79) and women (ARR = 3.23, 95-percent CI: 2.48, 4.20). The per-

centage of service members at high risk for HIV decreased only among men (ARR = 0.91, 95-percent CI: 0.86, 0.97).

Contraceptive Use and Methods

At the end of 2016, DoD issued a memorandum (DHA-IPM 16-003; DoD, 2016) establishing comprehensive standards of care with respect to methods of contraception and counseling on methods of contraception for members of the Armed Forces (Defense Health Agency, 2016). These standards adopt the CDC's practice recommendations for contraceptive use as the clinical practice guidelines for the military. Analyses in this section examined service members' past-year contraceptive use and methods at the most-recent time they had vaginal sex and at the time they experienced (for women) or caused (for men) an unintended pregnancy. The percentage of service members who reported that they or their partner used each type of birth control during the most-recent time they had vaginal sex is shown in Table 8.4.

The most commonly used methods were condoms (23.8 percent) and birth control pills (20.3 percent; Table 8.4). Long-acting contraception, such as an intrauterine device (IUD), has been associated with substantially lower unintended pregnancy rates, even among women who, at least initially, showed a preference for short-acting contraceptives (Hubacher et al., 2017), as well as in a convenience sample of low-income women (Winner et al., 2012). Long-acting methods are more effective in part because they do not require users to remember to use them or to use them correctly, as do some other methods. The most commonly used long-acting method was an IUD, used by about one in ten service members as their contraceptive method the most-recent time they had vaginal sex (Table 8.4).

We categorized service members' past-year contraceptive use the most-recent time they had vaginal sex into four categories (1) used highly effective (i.e., long-acting) contraception methods (contraceptive implant, IUD, or sterilization), (2) used other contraception (birth control pills, shots, patch, or ring; diaphragm; condom; or some other method), (3) did not use contraception, or (4) contraceptive method was not applicable (did not have vaginal sex, was expecting a child, or was trying to conceive). We also explored whether these contraceptive choices were associated with unintended pregnancies in the military.

Tables 8.5 through 8.7 display the percentages of service members falling into each of the four categories of contraceptive methods use during the most-recent time they had vaginal sex and at the time an unintended pregnancy occurred. We computed this as a percentage of the group for whom contraceptive use was applicable for the unintended pregnancy analysis, since an unintended pregnancy was not possible for the not-applicable group. Key findings are described below.

Birth Control Use During Most-Recent Vaginal Sex

- As noted above, about one in six service members (16.8 percent) did not use any birth control the most-recent time they had vaginal sex (Table 8.5).
- One quarter (25.4 percent) of personnel across all service branches reported use of highly effective birth control the most-recent time they had vaginal sex (Table 8.5).
- Methods of birth control that are less than highly effective were the most commonly used methods overall (34.1 percent; Table 8.5).

Table 8.4
Method of Contraception Used During Most-Recent Vaginal Sex in Past Year

	Percentage Reporting Use
Highly effective methods	
Male sterilization (vasectomy)	7.5% (7.0–7.9)
IUD	9.9% (9.2–10.6)
Female sterilization (e.g., tubal ligation, hysterectomy)	3.9% (3.5–4.3)
Contraceptive implant (e.g., Implanon)	6.0% (5.4–6.6)
Other methods	
Condom	23.8% (22.7–24.9)
Birth control pill	20.3% (19.3–21.3)
Birth control shots, birth control patch, contraceptive ring, or diaphragm	6.2% (5.5–6.9)
Some other method	4.8% (4.3–5.3)
No contraception or not applicable	
Did not use any form of birth control	16.8 % (15.9–17.7)
No vaginal sex in the past 12 months	14.3% (13.3–15.3)
I/my partner was trying to get pregnant	6.9% (6.3–7.4)
I/my partner was already pregnant	4.1% (3.6–4.6)

- The Army and the Marine Corps had a significantly higher percentage of members who did not use any birth control compared with the Air Force (Table 8.5).
- The Air Force and the Marine Corps had a significantly higher percentage of members using methods that are less than highly effective compared with the Navy (Table 8.5).
- The Coast Guard, the Navy, and the Air Force had significantly higher percentages of members using highly effective birth control methods compared with the Army and the Marine Corps (Table 8.5).
- The percentage of personnel who used the most highly effective birth control methods was the lowest among junior enlisted personnel (pay grades E1–E4; Table 8.6).
- The youngest service members (ages 17–24) were the least likely to report that they did not use any birth control the most-recent time they had vaginal sex. They were also the

Table 8.5
Method of Contraception, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Birth control method at time of most-recent vaginal sex							
No contraception	13.7%[b,c] (12.7–14.7)	19.3%[a] (17.3–21.2)	16.9%[a] (14.8–19.0)	16.3% (14.5–18.1)	16.4% (14.4–18.4)	16.8% (15.9–17.7)	16.8% (15.9–17.7)
Highly effective contraception	27.2%[b,c] (25.9–28.5)	23.2%[a,d,e] (21.2–25.1)	22.0%[a,d,e] (19.8–24.1)	28.1%[b,c] (25.9–30.4)	29.0%[b,c] (26.6–31.5)	25.3% (24.2–26.3)	25.4% (24.4–26.4)
Other contraception	36.7%[d] (35.2–38.1)	32.9% (30.4–35.4)	38.0%[d] (35.2–40.8)	30.7%[a,c] (28.2–33.1)	35.8% (33.0–38.6)	34.0% (32.8–35.2)	34.1% (32.9–35.2)
Not applicable[1,z]	22.4% (21.1–23.6)	24.7% (22.3–27.0)	23.2% (20.5–25.8)	24.9% (22.5–27.3)	18.8% (16.6–21.0)	23.9% (22.8–25.1)	23.8% (22.7–24.9)
Birth control method at time of unintended pregnancy[2]							
No contraception[z]	55.6% (45.2–66.0)	70.5% (55.7–85.3)	NR (41.4–73.4)	72.1% (60.4–83.8)	NR (22.0–71.8)	65.8% (58.8–72.9)	65.6% (58.6–72.5)
Highly effective contraception[z]	2.4% (0.0–5.0)	7.5% (0.0–20.6)	5.9% (0.0–14.8)	8.2% (1.5–14.9)	NR (4.1–57.9)	6.4% (1.4–11.5)	6.8% (1.8–11.8)
Other contraception	42.0%[d] (31.7–52.3)	22.0% (10.8–33.1)	NR (20.9–52.4)	19.7%[a] (9.8–29.6)	NR (3.4–40.8)	27.7% (21.6–33.8)	27.6% (21.6–33.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] Not applicable includes service members who reported that they had not had vaginal sex during the past 12 months, were expecting a child, or were trying to conceive.

[2] Only those service members who reported experiencing or causing an unintended pregnancy in the past year are included in this portion of the table.

least likely to report using highly effective birth control methods and the most likely to report using other birth control methods (Appendix Table D.78).

- There were no statistically significant differences between military men and women in use of no birth control or less-effective birth control methods (Table 8.7).
- Non-Hispanic black and Hispanic service members were more likely to report that they did not use any birth control compared with non-Hispanic white service members and those in the other race/ethnicity category. Non-Hispanic Asian service members were the least likely to report using highly effective birth control, whereas Non-Hispanic white service members and those in the "other" category had the highest percentages of use of highly effective birth control (Appendix Table D.77).

Table 8.6
Method of Contraception, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Birth control method at time of most-recent vaginal sex						
No contraception	14.7%[b,c,e,f] (13.0–16.4)	18.4%[a,c,e] (16.9–20.0)	26.1%[a,b,e,f] (24.1–28.1)	19.2%[e] (14.6–23.7)	10.0%[a,b,c,d,f] (8.5–11.5)	19.1%[a,c,e] (17.3–20.8)
Highly effective contraception	16.6%[b,c,d,e,f] (14.9–18.3)	27.2%[a,c,d,f] (25.5–28.9)	42.3%[a,b,e] (39.9–44.8)	40.8%[a,b,e] (34.5–47.2)	26.7%[a,c,d,f] (24.4–28.9)	43.7%[a,b,e] (41.6–45.9)
Other contraception	40.1%[b,c,d,f] (37.8–42.4)	32.2%[a,c,e,f] (30.3–34.0)	18.1%[a,b,e] (16.4–19.9)	22.7%[a,e] (16.3–29.0)	39.5%[b,c,d,f] (36.9–42.0)	21.5%[a,b,e] (19.7–23.3)
Not applicable[1]	28.7%[b,c,d,e,f] (26.5–30.9)	22.2%[a,c,f] (20.6–23.9)	13.4%[a,b,e] (11.8–15.0)	17.3%[a] (12.1–22.6)	23.9%[a,c,f] (21.8–26.0)	15.7%[a,b,e] (14.2–17.3)
Birth control method at time of unintended pregnancy[2]						
No contraception[z]	64.7% (53.9–75.4)	67.7% (57.6–77.8)	NR (43.8–82.7)	NR (NR)	NR (43.6–78.9)	NR (50.2–93.4)
Highly effective contraception[z]	8.0% (0.0–16.2)	5.9% (0.2–11.5)	5.0% (0.0–12.0)	NR (NR)	4.9% (0.0–11.3)	0.0% (0.0–0.0)
Other contraception[z]	27.3% (18.2–36.4)	26.4% (17.4–35.4)	NR (12.7–50.7)	NR (NR)	NR (16.6–51.1)	NR (6.6–49.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] Not applicable includes service members who reported that they had not had vaginal sex during the past 12 months, were expecting a child, or were trying to conceive.

[2] Only those service members who reported experiencing or causing an unintended pregnancy in the past year are included in this portion of the table.

Birth Control Use at the Time of Unintended Pregnancy

- At the time at which an unintended pregnancy occurred, most service members were not using any birth control (65.6 percent), 6.8 percent reported using highly effective birth control methods, and 27.6 percent reported using other (less effective) birth control methods (Table 8.5).
- Differences by service branch (Table 8.5), pay grade (Table 8.6), gender (Table 8.7), race/ethnicity (Appendix Table D.77), and age group (Appendix Table D.78) were not statistically significant, with one exception: Service members in the Air Force were more likely to be using less effective contraceptives at the time of an unintended pregnancy than were service members in the Navy. Note, however, that we had limited ability to test for differences across subgroups given the small number of service members who reported an unintended pregnancy. This low prevalence also produced wide CIs for our estimates

Table 8.7
Method of Contraception, by Gender

	Men	Women
Birth control method at time of most-recent vaginal sex		
No contraception[z]	16.8% (15.8–17.8)	16.7% (15.2–18.3)
Highly effective contraception	25.0%[a] (23.8–26.1)	27.4% (25.7–29.1)
Other contraception[z]	34.2% (32.9–35.6)	33.2% (31.2–35.1)
Not applicable[1,z]	24.0% (22.7–25.3)	22.7% (21.0–24.4)
Birth control method at time of unintended pregnancy[2]		
No contraception[z]	66.6% (57.5–75.7)	63.3% (53.3–73.2)
Highly effective contraception[z]	8.1% (1.2–15.1)	3.9% (0.0–7.9)
Other contraception[z]	25.3% (17.8–32.7)	32.8% (23.2–42.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] Not applicable includes service members who reported that they had not had vaginal sex during the past 12 months, were expecting a child, or were trying to conceive.

[2] Only those service members who reported experiencing or causing an unintended pregnancy in the past year are included in this portion of the table.

within each service and prevented us from presenting estimates for some services (e.g., the Marine Corps and Coast Guard).

The HP2020 target for the proportion of women 15–44 years of age at risk of unintended pregnancy who used (or whose partners used) contraception at most-recent sexual intercourse is 91.6 percent (Healthy People, 2020a). The most-recent civilian estimate available, based on 2015–2017 data from the National Survey of Family Growth (available on the HP2020 website), is 79.6 percent (CI: 76.7, 82.2). The HP2020 measure and age grouping is not fully reproducible with HRBS data but can be approximated. To do so, we computed the percentage of servicewomen 17–44 years of age who reported using a contraceptive method the most-recent time they had vaginal sex, with a denominator of women aged 17–44 who had vaginal sex in the past 12 months and were not pregnant, nor seeking pregnancy, nor (themselves or their partners) surgically sterile.

- We found that 77.0 percent of servicewomen under age 45 who were at risk of unintended pregnancy used contraception the most-recent time they had vaginal sex.

- The Army had a lower percentage of female personnel at risk of unintended pregnancy who used contraception than the Air Force (Table 8.8). No other statistically significant differences across service branch were observed.

Data from the 2015–2017 National Survey of Family Growth show that 60.2 percent (CI: 57.4, 63.0) of U.S. women 20–44 years of age who were not already pregnant or trying to become pregnant used a most-effective or moderately effective method of contraception (sterilization or use of a contraceptive implant, IUD, birth control pills/shots/patch/ring, or a diaphragm; National Survey of Family Growth, data available on HP2020 website at Healthy People, 2020b). The HP2020 target is 69.3 percent or higher (Healthy People, 2020b).

- In the 2018 HRBS, 65.0 percent (CI: 62.8, 67.2 percent) of servicewomen ages 20–44 who were not already pregnant or trying to become pregnant used a most- or moderately effective method of contraception.
- Estimates were not statistically significantly different by service with one exception: The Air Force had a higher percentage of female personnel ages 20–44 who used a most-effective or moderately effective method of contraception than the Army (Table 8.8).

In terms of comparisons between the 2015 and 2018 HRBSs:

- There was a significant decrease in the percentage of service members who reported that they did not use any contraception the most-recent time they had vaginal sex in the past year (ARR = 0.92, 95-percent CI: 0.87, 0.96).

Table 8.8
HP2020 Family Planning Objectives, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Used contraception at most-recent vaginal sex[1]	80.6%[b] (78.4–82.8)	72.9%[a] (68.2–77.6)	79.1% (73.9–84.3)	77.7% (73.4–82.0)	75.6% (70.9–80.3)	77.1% (74.9–79.2)	77.0% (75.0–79.1)
Used moderately or most-effective birth control method at most-recent vaginal sex[2]	69.1%[b] (66.6–71.6)	59.8%[a] (55.0–64.6)	64.0% (57.8–70.2)	66.5% (61.7–71.3)	64.7% (59.8–69.7)	65.0% (62.7–67.3)	65.0% (62.8–67.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[1] Calculated among servicewomen age 44 and under who were at risk for unintended pregnancy, defined as those who had vaginal sex during the past 12 months and were not pregnant, seeking to become pregnant, or surgically sterilized.

[2] Calculated among servicewomen age 20–44 who had vaginal sex during the past 12 months and were not pregnant or seeking to becoming pregnant.

- There was a significant increase in the overall percentage of service members who used an IUD the most-recent time they had vaginal sex in the past year (ARR = 1.29, 95-percent CI: 1.20, 1.38).
- No significant change was detected in the percentage of service members who used a contraceptive implant or the percentage of women 20–44 years old who used a moderately effective or most-effective birth control method the most-recent time they had vaginal sex.
- Compared with the 2015 HRBS, there were some significant differences in contraceptive use within service branches. A significant decrease in the percentage of service members who reported that they did not use any contraception the most-recent time they had vaginal sex was observed in the Navy (ARR = 0.86, 95-percent CI: 0.78, 0.96) and Coast Guard (ARR = 0.88, 95-percent CI: 0.78, 0.99). A significant increase in IUD use at most-recent vaginal sex occurred in all service branches except the Marine Corps: the Air Force (ARR = 1.30, 95-percent CI: 1.14, 1.48), Army (ARR = 1.21, 95-percent CI: 1.03, 1.42), Navy (ARR = 1.29, 95-percent CI: 1.12, 1.49), and Coast Guard (ARR = 1.45, 95-percent CI: 1.21, 1.74).
- Compared with the 2015 HRBS, there were some significant differences in contraceptive use within pay grades. A significant decrease in the percentage of service members who reported that they did not use any contraception the most-recent time they had vaginal sex was observed in the E5–E6 (ARR = 0.89, 95-percent CI: 0.80, 0.98) and O4–O6 (ARR = 0.90, 95-percent CI: 0.80, 1.00) pay grades. A significant increase in IUD use at most-recent vaginal sex occurred in the E1–E4 (ARR = 1.50, 95-percent CI: 1.24, 1.81), E7–E9 (ARR = 1.44, 95-percent CI: 1.20, 1.74), and O1–O3 (ARR = 1.41, 95-percent CI: 1.23, 1.62) pay grades.
- Compared with the 2015 HRBS, there were some significant differences in contraceptive use by gender. A decrease in the percentage of service members who reported that they did not use any contraception the most-recent time they had vaginal sex was observed only among men (ARR = 0.90, 95-percent CI: 0.85, 0.95). There was an increase in IUD use at most-recent vaginal sex among both men (ARR = 1.35, 95-percent CI: 1.22, 1.50) and women (ARR = 1.22, 95-percent CI: 1.11, 1.35).

Deployment-Related Unintended Pregnancy, Contraceptive Access and Counseling

As noted earlier, an unintended pregnancy while deployed presents challenges for servicewomen and operational difficulties that can be a threat to force lethality and readiness. NDAA 2016 Section 718 required that servicewomen have access to comprehensive counseling on the full range of contraceptive methods at medical visits predeployment and during deployment, and NDAA 2017 Section 747 further directed that information be obtained on the experiences of service members in accessing family planning services and counseling. DoD memorandum DHA-IPM 16-003 also requires that contraceptive counseling be delivered at annual physical health assessments, as well as at predeployment and during-deployment health care visits. To address these issues and directives, we examined incidence of unintended pregnancy during a past-year deployment, receipt of contraceptive counseling prior to deployment, and ability to get and refill preferred birth control methods before and during deployment.

The implications of these outcomes are very different for female versus male service members. Though it is problematic for either gender to lack access to contraception, for servicewomen, lack of access while deployed could result in unintended pregnancy during deployment and duty reassignment and/or evacuation from theater, as noted previously. Therefore, we present the outcomes for men and women separately, where possible. All percentages in this section are for service members who had deployed in the past year, rather than service members overall (see Chapter Ten in this report). The small number of individuals in our sample who had deployed in the year prior to the survey limited our ability to test for differences across service branch and pay grade and resulted in fairly wide CIs around the estimates for these subgroups. The reader should consider these issues when interpreting results.

Key findings include the following:

- Just under 1 in 1,000 service members (0.08 percent; CI: 0.01, 0.15) experienced an unintended pregnancy during a past-year deployment. We were unable to generate reliable estimates of this outcome by subgroup, given the very low incidence.

Key findings for women include the following:

- Overall, 39.0 percent of female service members reported receiving contraceptive counseling prior to deployment, with no differences by service branch (Table 8.9) or race/ethnicity (Appendix Table D.79) reaching statistical significance.
- The most junior personnel (pay grades E1–E4) reported higher rates of contraceptive counseling than most other groups (Table 8.10). Consistent with this, the youngest personnel (ages 17–24) reported significantly higher rates of contraceptive counseling than all other age groups (Appendix Table D.80).

Table 8.9
Deployment-Related Contraceptive Counseling and Access (Women Only), by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Contraceptive counseling prior to deployment[z]	36.3% (30.6–42.0)	34.6% (25.1–44.2)	41.9% (29.8–54.1)	45.5% (37.5–53.5)	28.5% (15.9–41.1)	39.5% (35.0–44.0)	39.0% (34.7–43.4)
Able to get or refill preferred birth control method before being deployed[z]	89.2% (84.0–94.4)	87.7% (79.7–95.7)	NR (64.1–94.7)	84.9% (76.1–93.6)	89.9% (81.8–98.1)	86.3% (81.8–90.8)	86.4% (82.1–90.7)
Able to get or refill preferred birth control method while deployed[z]	66.2% (54.3–78.1)	80.7% (67.9–93.5)	86.6% (71.2–100.0)	79.5% (69.2–89.7)	NR (36.3–70.7)	78.5% (71.9–85.0)	77.7% (71.3–84.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 8.10
Deployment-Related Contraceptive Counseling and Access (Women Only), by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Contraceptive counseling prior to deployment	50.6%[b,e,f] (42.1–59.1)	34.6%[a] (28.2–41.0)	34.0% (24.3–43.7)	NR (0.0–48.2)	28.5%[a] (20.2–36.7)	22.9%[a] (14.7–31.2)
Able to get or refill preferred birth control method before being deployed[z]	84.8% (76.9–92.7)	86.1% (79.6–92.6)	94.2% (87.6–100.0)	NR (NR)	87.0% (78.0–96.1)	90.7% (82.4–99.0)
Able to get or refill preferred birth control method while deployed[x]	83.1% (73.7–92.5)	71.9% (59.9–83.9)	85.1% (72.1–98.1)	NR (NR)	NR (46.7–79.4)	82.9% (68.9–97.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- A large majority of women who sought access to birth control reported that they were able to get or refill their preferred method before being deployed (86.4 percent) and while deployed (77.7 percent; Table 8.9). There were no statistically significant differences in these outcomes by service branch (Table 8.9), pay grade (Table 8.10), age group (Appendix Table D.80), or race/ethnicity (Appendix Table D.79).

Key findings for men include the following:

- Overall, 14.5 percent of men reported contraceptive counseling prior to deployment, with the Marine Corps reporting higher rates than the Army (Table 8.11). Hispanic men were more likely to report receiving contraceptive counseling compared with Non-Hispanic black men (Appendix Table D.81).
- Among servicemen who sought birth control, 13.5 percent reported being able to access their preferred method before being deployed and 19.0 percent reported this access while deployed (Table 8.11). There were no statistically significant differences in birth control access prior to or during deployment by service branch (Table 8.11), pay grade (Table 8.12), or age (Appendix Table D.82). Non-Hispanic white men were more likely than Non-Hispanic black men to report that they were able to access their preferred birth control method while deployed (Appendix Table D.81).

Table 8.11
Deployment-Related Contraceptive Counseling and Access (Men Only), by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Contraceptive counseling prior to deployment	16.1% (13.3–18.9)	10.7%[c] (7.1–14.2)	18.9%[b] (14.8–22.9)	15.3% (11.7–18.8)	14.2% (9.9–18.4)	14.5% (12.7–16.3)	14.5% (12.7–16.3)
Able to get or refill preferred birth control method before being deployed[z]	14.7% (6.2–23.1)	12.7% (1.6–23.8)	19.2% (7.5–30.8)	9.5% (4.6–14.5)	NR (12.2–52.1)	13.1% (8.2–18.0)	13.5% (8.7–18.3)
Able to get or refill preferred birth control method while deployed[z]	23.5% (12.6–34.5)	NR (6.5–38.1)	21.7% (8.6–34.8)	11.7% (5.7–17.8)	NR (8.4–51.5)	18.8% (11.9–25.6)	19.0% (12.2–25.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 8.12
Deployment-Related Contraceptive Counseling and Access (Men Only), by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Contraceptive counseling prior to deployment[z]	14.4% (10.8–17.9)	16.3% (13.2–19.3)	13.9% (10.8–17.1)	11.2% (2.8–19.6)	12.5% (9.0–16.0)	8.3% (5.4–11.2)
Able to get or refill preferred birth control method before being deployed[z]	16.1% (6.6–25.6)	9.4% (3.5–15.3)	14.5% (7.0–22.0)	7.4% (0.0–16.9)	NR (4.8–38.2)	13.4% (0.8–26.1)
Able to get or refill preferred birth control method while deployed[z]	20.5% (8.8–32.1)	16.1% (6.0–26.2)	10.8% (3.6–18.1)	NR (5.4–85.5)	NR (12.5–56.9)	12.9% (0.0–26.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

HIV Testing

The CDC recommends annual testing for HIV among those at high risk and suggests that men who have sex with men (MSM) consider testing every three to six months (CDC, 2019c). DoD Instruction 6485.01 requires screening at least every two years (DoDI, 2013), and an HIV test result on file (within the past 24 months) is required to deploy (DoDI, 2006; DoD, 2014). As noted earlier, the 2018 HRBS used CDC guidelines to define those at high risk for HIV infection (CDC, 2019c).[1] Key findings include the following (Tables 8.13–8.15):

- Among active component service members, 75.8 percent reported having been tested for HIV in the past 12 months. More than half of these individuals, 38.3 percent of all personnel, had been tested in the past six months (Table 8.13).

Table 8.13
HIV Testing, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
HIV test in past 12 months	72.6%[b,d] (71.3–74.0)	78.0%[a] (75.7–80.3)	73.8% (71.0–76.6)	77.3%[a] (75.0–79.6)	73.6% (71.1–76.1)	75.9% (74.7–77.0)	75.8% (74.7–76.9)
High risk[1] for HIV tested in past 12 months[z]	79.9% (77.0–82.8)	84.4% (79.6–89.2)	76.8% (71.0–82.6)	82.0% (77.3–86.7)	74.6% (68.1–81.1)	81.4% (79.0–83.8)	81.2% (78.9–83.5)
Men who had sex with men in the past 12 months tested in past 12 months[t]	82.4% (74.5–90.3)	84.3% (70.3–98.3)	NR (22.7–65.9)	85.7% (73.7–97.6)	NR (52.8–93.4)	78.7% (70.9–86.4)	78.6% (71.0–86.2)
HIV test in past 6 months	35.2%[b] (33.8–36.7)	39.8%[a] (37.3–42.4)	39.0% (36.3–41.7)	39.0% (36.4–41.5)	35.6% (32.9–38.3)	38.3% (37.1–39.6)	38.3% (37.1–39.4)
Men who had sex with men in the past 12 months tested in past 6 months[z]	49.4% (39.4–59.3)	NR (39.5–75.0)	NR (11.0–45.4)	NR (38.2–70.5)	NR (33.7–81.4)	50.6% (41.8–59.4)	50.7% (42.1–59.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[d] Statistically significantly different from Navy estimate.

[t] At the aggregate, the chi-square test was statistically significant; however, individual pairwise comparisons are not shown due to suppression of point estimates.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

Table 8.14
HIV Testing, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
HIV test in past 12 months	69.7%[b,c,d,e,f] (67.5–71.9)	80.9%[a,e] (79.3–82.4)	82.2%[a,e] (79.9–84.5)	86.0%[a,e] (81.7–90.4)	75.7%[a,b,c,d,f] (73.6–77.9)	80.6%[a,e] (78.8–82.3)
High risk[1] for HIV tested in past 12 months	78.8%[c] (75.3–82.3)	84.0% (80.4–87.6)	89.4%[a] (85.6–93.2)	86.6% (73.3–100.0)	84.5% (79.3–89.7)	82.3% (76.0–88.6)
Men who had sex with men in the past 12 months tested in past 12 months[z]	73.2% (60.3–86.0)	87.3% (80.4–94.1)	87.2% (76.7–97.8)	NR (NR)	NR (60.7–95.7)	NR (60.2–94.5)
HIV test in past 6 months[z]	38.6% (36.3–40.9)	39.4% (37.5–41.3)	36.1% (33.8–38.4)	39.9% (33.4–46.4)	37.8% (35.2–40.3)	34.5% (32.4–36.6)
Men who had sex with men in the past 12 months tested in past 6 months[z]	46.5% (32.5–60.5)	57.8% (46.2–69.4)	NR (19.6–60.6)	NR (NR)	NR (38.7–76.0)	NR (46.5–86.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

- Personnel from the Army and Navy were most likely to have had a past-12-months test and were statistically significantly more likely to have had one than were members of the Air Force. Army personnel were more likely to have had a test within the past six months than were members of the Air Force (Table 8.13).
- There were no statistically significant differences between men and women in the percentages who reported HIV testing (past six or 12 months; Table 8.15).
- Among personnel at high risk for HIV, 81.2 percent reported a past-12-months HIV test. We did not observe any statistically significant differences by service branch (Table 8.13), gender (Table 8.15), or race/ethnicity (Appendix Table D.83).
- The most-junior service members (pay grades E1–E4), as well as the youngest personnel (ages 17–24), were the least likely to have received an HIV test in the past 12 months. However, differences in past-six-months HIV testing rates by pay grade and age were not significant (Table 8.14 and Appendix Table D.84).

The HP2020 goal for HIV testing among MSM is for 68.4 percent to have had an HIV test in the past year (Healthy People, 2020e). Data from the National HIV Behavioral Sur-

Table 8.15
HIV Testing, by Gender

	Men	Women
HIV test in past 12 months[z]	75.6% (74.3–76.9)	76.9% (75.2–78.6)
High risk[1] for HIV tested in past 12 months[z]	80.5% (77.8–83.3)	84.1% (80.9–87.4)
Men who had sex with men in the past 12 months tested in past 12 months	78.6% (71.0–86.2)	N/A
HIV test in past 6 months[z]	37.9% (36.5–39.2)	40.2% (38.2–42.2)
Men who had sex with men in the past 12 months tested in past 6 months	50.7% (42.1–59.4)	N/A

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

veillance report indicate that in 2017, 77 percent of men who had sex with men in the United States reported a past-year HIV test (Cha et al., 2019). HIV testing among male service members who reported having sex with men in the past 12 months is shown in Tables 8.13 through 8.15, as well as Appendix Tables D.83 and D.84.

- Overall, 78.6 percent of servicemen who had sex with men reported a past-12-months HIV test, and 50.7 percent reported a test within the past six months. There were no significant differences by pay grade, age group, or race/ethnicity. Service branch differences are suppressed because of the suppressed point estimates for the Marine Corps and Coast Guard.

In terms of comparisons between the 2015 and 2018 HRBSs:

- There was a significant increase in the percentage of service members who reported HIV testing in the past year (ARR = 1.04, 95-percent CI: 1.03, 1.05).
- There was no significant change detected in the percentage of service members at high risk for HIV who had a past-year HIV test.
- A significant increase in past-year HIV testing was detected across all service branches except the Coast Guard: Air Force (ARR = 1.03, 95-percent CI: 1.01, 1.06), Army (ARR = 1.07, 95-percent CI: 1.04, 1.10), Marine Corps (ARR = 1.05, 95-percent CI: 1.01, 1.08), and Navy (ARR = 1.03, 95-percent CI: 1.00, 1.06).
- With regard to pay grades, a significant increase in past-year HIV testing was observed among service members in E5–E6 (ARR = 1.05, 95-percent CI: 1.02, 1.08), O1–O3

(ARR = 1.04, 95-percent CI: 1.01, 1.07), and O4–O6 (ARR = 1.09, 95-percent CI: 1.06, 1.12).
- With regard to gender, a significant increase in past-year HIV testing was observed among both women (ARR = 1.05, 95-percent CI: 1.02, 1.07) and men (ARR = 1.04, 95-percent CI: 1.02, 1.05).

Summary

Sexual behavior that increases risk for HIV, other STIs, and unintended pregnancy (such as sex without condoms or other methods of birth control and sex with more than one partner in the past year) is not uncommon among service members. However, overall, we found evidence that rates of sexual risk behavior had declined or had not changed since 2015. The only exception was the rate of past-year STIs, which had increased significantly since 2015. This increase in STIs was consistent with data on STI incidence rates among service members between 2010 and 2018 obtained from the Armed Forces Health Surveillance Branch and the Navy and Marine Corps Public Health Center at the EpiData Center (Stahlman, Seliga, and Oetting, 2019) and also with U.S. population trends. The CDC reported that there were large increases in STI incidence among U.S. adults between 2013 and 2017 (National Center for HIV/AIDS, 2018).

There was also an uptick in use of IUDs, one of the most effective methods of contraception. This may be a result of DoD adoption of new guidelines, as noted above. The services are 4.3 percentage points short of the HP2020 target for use of most or moderately effective contraception among women at risk of pregnancy. However, the contraceptive methods most commonly used by service members overall are less than highly effective and fall short of the HP2020 goal for use of *any* contraceptive method at last intercourse among women at risk (77.7 percent versus 91.6 percent).

More than one in 20 servicewomen reported a past-year unintended pregnancy. This may be somewhat higher than the overall U.S rate, though direct comparison to the latter is not possible. Most unintended pregnancies involved sex without use of birth control, though more than one in four occurred when service members reported using methods that are less than highly effective. Encouraging use of more-effective methods (among service members who find them acceptable and for whom they are medically appropriate), educating service members in correct use of less-effective methods, and encouraging use of digital apps and other reminders to assist personnel in using short-acting methods consistently may help to reduce unintended pregnancy rates.

There were some differences across the services in a number of these behaviors and outcomes. The Marine Corps and Navy had the highest percentages of members who reported sexual risk behaviors and were at high risk for HIV infection at the time of the survey. The Marine Corps and Army had the lowest percentages of members who used the most highly effective contraception methods.

There were also clear differences across pay grades, age groups, and racial/ethnic groups. The most-junior personnel and the youngest personnel were the most likely to engage in sexual risk behaviors, had the highest rates of STIs and unintended pregnancies, and had the lowest rates of past-year HIV testing. Junior and younger personnel were also least likely to use the most highly effective contraception methods and the most likely to be using other meth-

ods. However, junior personnel were also the least likely to report not using any contraception. Non-Hispanic black and Hispanic service members, and service members in the other race/ethnicity group were more likely to be at higher risk for HIV than non-Hispanic white and non-Hispanic Asian service members. Black service members also had higher rates of unintended pregnancies than non-Hispanic white, Hispanic, and non-Hispanic Asian service members. These disparities by age and race/ethnicity in unintended pregnancies are consistent with U.S. population data (Finer and Zolna, 2016).

Some service members who wished to access birth control prior to or during deployment, particularly men, reported trouble doing so. About one in five women and four in five men could not get the method they preferred. The low rate of access among men could be a result of TRICARE policies that do not cover condoms. Although we did not ask men what their preferred method of contraception was, our results for method at most-recent sex indicated that a plurality of servicemen used condoms as their method of contraception. Furthermore, most service members did not receive counseling about contraception prior to deployment. Despite these shortcomings, unintended pregnancy during deployment was rarely reported, occurring in fewer than one in 1,000 service members.

There was a slight increase in the total percentage of service members who received an HIV test during the past year. Also, the services are exceeding the HP2020 target for the percentage of MSM who have had an HIV test in the past year. Still, a notable percentage of both MSM (about 21 percent) and those at high risk for contracting HIV (about one in five service members) were not tested during this recommended period. *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c). Given the potential impact of untreated HIV infection on readiness and the potential for spread of untreated infection, it could be useful to intervene with health care providers and/or service personnel to increase rates of testing of those at high risk.

CHAPTER NINE

Sexual Orientation and Health

The health issues and needs of lesbian, gay, or bisexual (LGB) individuals differ somewhat from those of their peers (Institute of Medicine, 2011). In the general U.S. population, LGB adults are more likely to smoke cigarettes, binge drink, drink heavily, use marijuana and other illicit drugs, misuse opioids, and suffer from a variety of chronic health conditions compared with heterosexual peers (Duncan et al., 2019; Fredriksen-Goldsen et al., 2017; Gonzales and Henning-Smith, 2017; Gonzales, Przedworski, and Henning-Smith, 2016; Schuler et al., 2018; Schuler, Stein, and Collins, 2019). Recent national data indicate that sexual minorities are also more likely to have had any mental illness, serious mental illness, serious psychological distress, and/or a major depressive episode in the past year (Medley et al., 2016; Ward et al., 2014). LGB individuals may also be less likely to access routine health care (Institute of Medicine, 2011), though they are more likely to access mental health services than the general population (Cochran, Mays, and Sullivan, 2003). Any similar disparities in health behavior and outcomes among LGB individuals serving in the military may affect readiness.

This chapter provides an estimate of the percentage of servicemen and servicewomen who are LGB and key information about the health-related behavior and health status of LGB service members. The chapter begins with an overview of the LGB military population. Sexual orientation can be measured as (1) relative attraction to the same sex, (2) sexual activity with others of the same sex, and (3) sexual identity (i.e., whether one sees oneself as gay, lesbian, or bisexual; Savin-Williams, 2009). We provide estimates of the percentage of service personnel who were LGB in 2018 based on same-sex activity and sexual identity. We also provide the percentages of LGB-identified personnel by service branch, pay grade, and gender, with estimates by race/ethnicity and age group available in Appendix D.

Thereafter, we focus on sexual identity as it relates to health. We explore disparities between LGB and non-LGB–identified service members with regard to health promotion (routine checkups, weight status, physical activity, and sleep), substance use, mental health and use of mental health services, physical health (physician-diagnosed chronic conditions, pain, and injuries), unwanted sexual contact and physical abuse, and sexual and reproductive health. Measures used are described in applicable chapters of this report, and additional details about these measures may be found in Appendix C. We focus on the health status and behavior of the combined LGB population. Although it is likely that there are differences in health-related behavior and outcomes by subgroup (e.g., bisexuals may differ from gay and lesbian service members, LGB men may differ from LGB women), these subgroups each make up a very small fraction of the service member population as a whole.

Sexual Orientation

Table 9.1 provides estimates based on the two measures of sexual orientation: activity and identity, by gender. Key findings include the following:

- Among men, 3.4 percent (CI: 2.8, 4.0) had one or more same-sex partners in the past 12 months. Among women, 9.9 percent (CI: 8.7, 11.0) did so.
- More servicewomen than servicemen identify as LGB, and more service members identify as bisexual than gay or lesbian. Among the 4.1 percent of LGB servicemen, 1.6 percent (CI: 1.2, 1.9) identified as gay, and 2.5 percent (CI: 2.1, 2.9) identified as bisexual. Among the 17.6 percent of LGB servicewomen, 6.0 percent (CI: 5.2, 6.8) identified as gay or lesbian and 11.6 percent (CI: 10.2, 13.0) identified as bisexual.

Tables 9.2 and 9.3 show the percentages of service members who identify as LGB overall and by service branch and pay grade. Key findings include the following:

- In 2018, 6.3 percent (CI: 5.8, 6.9) of service members identified as LGB (Table 9.2).
- The Navy (7.6 percent [CI: 6.3, 8.9] and the Air Force (6.7 percent [CI: 6.0, 7.4]) had the highest percentages of service members who identified as LGB, statistically significantly more than the Coast Guard (4.7 percent [CI: 3.7, 5.8]; Table 9.2).
- LGB personnel were more likely to be junior enlisted personnel or junior officers, with statistically significant differences observed between E1–E4 members (8.2 percent) compared with all other pay grades except E5–E6 and between O1–O3 members compared with O4–O6 members (Table 9.3).
- Significantly more service members under age 35 (8.5 percent among those aged 17–24 and 6.1 percent among those aged 25–34) self-identified as LGB compared with those aged 35 or older (3.3 percent among those aged 35–44 and 2.3 percent among those 45 or older; see Appendix Table D.86).

Table 9.1
Sexual Orientation, by Gender

	Men	Women
Sexual activity		
Had one or more same-sex partners in the past 12 months	3.4%[a] (2.8–4.0)	9.9% (8.7–11.0)
Sexual identity		
Gay or lesbian	1.6%[a] (1.2–1.9)	6.0% (5.2–6.8)
Bisexual	2.5%[a] (2.1–2.9)	11.6% (10.2–13.0)
Total LGB identity	4.1%[a] (3.5–4.6)	17.6% (16.0–19.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

Table 9.2
LGB Identity, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
LGB	6.7%[e] (6.0–7.4)	5.7% (4.7–6.7)	5.5% (4.1–6.8)	7.6%[e] (6.3–8.9)	4.7%[a,d] (3.7–5.8)	6.4% (5.8–6.9)	6.3% (5.8–6.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 9.3
LGB Identity, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
LGB	8.2%[c,d,e,f] (7.1–9.2)	6.3%[c,f] (5.4–7.1)	3.0%[a,b,e] (2.3–3.7)	3.3%[a] (1.3–5.2)	5.3%[a,c,f] (4.3–6.2)	2.2%[a,b,e] (1.7–2.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

LGB Health Promotion and Disease Prevention

Table 9.4 indicates the percentages of LGB service members and non-LGB personnel for six key health promotion measures. We found that:

- Among LGB personnel, 67.5 percent (CI: 63.2, 71.9) had a routine checkup in the past 12 months, which is similar to the percentage among other service members.
- Fewer LGB service members, 53.9 percent (CI: 49.6, 58.3), have BMI scores that classify them as overweight or obese relative to non-LGB service members (64.1 percent, CI: 62.8, 65.3).
- The percentages of LGB service members who engaged in recommended levels of MPA (72.3 percent; CI: 68.8, 75.9) and VPA (45.1 percent; CI: 40.7, 49.5) each week were similar to the percentages of non-LGB personnel who did so.
- Our estimate of the percentage of LGB personnel who got sufficient sleep (on average, 7 or more hours per night) was 29.8 percent (CI: 26.0, 33.6). This was not statistically different from the percentage among other personnel (33.6 percent; CI: 32.4, 37.7).
- However, fewer LGB service members described the quality of their sleep as fairly good or good (55.9 percent: CI 51.6, 60.3) than did non-LGB personnel (64.8 percent; CI: 63.5, 66.0).

Table 9.4
Health Promotion and Disease Prevention, by LGB Identity

	LGB	Non-LGB
Routine checkup, past 12 months[z]	67.5% (63.2–71.9)	70.4% (69.2–71.7)
Overweight or obese	53.9%[a] (49.6–58.3)	64.1% (62.8–65.3)
150+ mins/week of MPA, past 30 days[z]	72.3% (68.8–75.9)	71.8% (70.7–72.9)
75+ mins/week of VPA, past 30 days[z]	45.1% (40.7–49.5)	45.4% (44.1–46.6)
7+ hours of sleep per 24-hour period, past 30 days[z]	29.8% (26.0–33.6)	33.6% (32.4–37.7)
Good or fairly good sleep quality, past 30 days	55.9%[a] (51.6–60.3)	64.8% (63.5–66.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-LGB estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

LGB Substance Use

We examined binge and heavy drinking, tobacco use, and use of any illegal drug by LGB identity. We also examined use of prescription pain relievers in this section. Though legal, the prescribed use of these substances for prolonged periods is a risk factor for later misuse and abuse. Results are reported in Table 9.5. Key findings related to substance use include the following:

- Among LGB personnel, 39.1 percent (CI: 34.9, 43.3) reported binge drinking in the past 30 days, and 13.9 percent (CI: 10.9, 16.9) reported heavy drinking. The percentages among non-LGB personnel were lower for both measures (binge drinking, 33.7 percent [CI: 32.4, 34.9]; heavy drinking, 9.5 percent [CI: 8.7, 10.4]).
- We found no statistically significant differences in rates of current (past-30-day) smoking among LGB versus non-LGB personnel.
- Roughly one in four LGB service members (24.5 percent; CI 20.6, 28.3) reported use of e-cigarettes in the past 30 days, about 50 percent more than the percentage of non-LGB members who used e-cigarettes (15.7 percent; CI: 14.6, 16.8).
- LGB service members were substantially less likely to use smokeless tobacco than non-LGB personnel: 5.8 percent (CI: 3.8, 7.7) versus 13.9 percent: (CI: 12.8, 14.9).
- A small percentage of LGB service members (3.1 percent; CI: 1.5, 4.7) reported past-year drug use, but this was more than twice the percentage among other personnel (1.2 percent; 0.8, 1.6).
- No statistically significant difference was detected in the percentages of LGB and non-LGB service members using prescription pain relievers in the past year.

Table 9.5
Substance Use, by LGB Identity

	LGB	Non-LGB
Binge drinking, past 30 days	39.1%[a] (34.9–43.3)	33.7% (32.4–34.9)
Heavy drinking, past 30 days	13.9%[a] (10.9–16.9)	9.5% (8.7–10.4)
Cigarette smoking, past 30 days[z]	21.1% (17.7–24.6)	18.2% (17.1–19.3)
E-cigarette use, past 30 days	24.5%[a] (20.6–28.3)	15.7% (14.6–16.8)
Smokeless tobacco use, past 30 days	5.8%[a] (3.8–7.7)	13.9% (12.8–14.9)
Any drug use, past 12 months	3.1%[a] (1.5–4.7)	1.2% (0.8–1.6)
Used prescription pain relievers, past 12 months[z]	14.8% (11.6–18.0)	11.9% (11.1–12.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-LGB estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

LGB Mental Health and Mental Health Services Use

A variety of mental health indicators were included in the 2018 HRBS, as well as indicators of mental health service use. We focused on the most-central of them for this chapter. Results are reported in Table 9.6. All of the mental and emotional health problems examined were more common among LGB service members compared with non-LGB personnel, although it is important to note that, overall, a minority of LGB personnel experienced difficulties with their mental health. Key findings include the following:

- There were substantial differences in experiences of psychological distress between LGB and non-LGB service members. Nearly one in three LGB service members (30.5 percent; CI: 26.3, 34.7) reported psychological distress levels indicative of serious distress, about twice the percentage of non-LGB service members (15.5 percent; CI: 14.5, 16.5).
- Symptoms of probable PTSD were experienced by one in six LGB service members (16.6 percent; CI: 13.5, 19.6). This was statistically significantly more than the percentage of non-LGB personnel experiencing such symptoms (11.2 percent; CI: 10.4, 12.0).
- Past-year suicidal thoughts were reported by about twice as many LGB as non-LGB service members (15.8 percent [CI: 12.5, 19.1] versus 7.7 percent [CI: 7.0, 8.5]); past-year suicide attempts were nearly three times as common among LGB personnel (3.2 percent [CI: 1.6, 4.8] versus 1.1 percent [CI: 0.8, 1.5]).
- LGB service members were more likely to report angry or aggressive behavior in the past 30 days than were non-LGB personnel (54.4 percent [CI: 50.1, 58.7] versus 48.8 percent [CI: 47.5, 50.0]).

Table 9.6
Mental and Emotional Health and Mental Health Services Use, by LGB Identity

	LGB	Non-LGB
Serious psychological distress, past 12 months	30.5%[a] (26.3–34.7)	15.5% (14.5–16.5)
Probable PTSD	16.6%[a] (13.5–19.6)	11.2% (10.4–12.0)
Suicidal thoughts, past 12 months	15.8%[a] (12.5–19.1)	7.7% (7.0–8.5)
Suicide attempt, past 12 months	3.2%[a] (1.6–4.8)	1.1% (0.8–1.5)
Any angry or aggressive behavior, past 30 days	54.4[a] (50.1–58.7)	48.8% (47.5–50.0)
Any mental health service use, past 12 months	35.7[a] (31.7–39.7)	24.8% (23.7–25.9)
Saw mental health care specialist, past 12 months	30.5%[a] (26.6–34.4)	17.3% (16.4–18.3)
Saw general medical provider for a mental health problem, past 12 months	19.6%[a] (16.2–22.9)	13.0% (12.1–13.9)
Used medication for a mental health problem, past 12 months	13.0%[a] (10.7–15.4)	8.1% (7.5–8.8)
Perceived unmet need for mental health services, past 12 months	13.8%[a] (10.8–16.9)	6.3% (5.7–7.0)
Believe that mental health treatment would damage military career	45.6%[a] (41.3–50.0)	33.5% (32.3–34.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.
[a] Statistically significantly different from non-LGB estimate.

- Use of all forms of mental health services tested, including visiting a mental health care specialist (30.5 percent; CI: 26.6, 34.4), visiting a general medical doctor for mental health issues (19.6 percent; CI: 16.2, 22.9), and use of medication (13.0 percent; CI: 10.7, 15.4), was more common among LGB service members than among non-LGB members. In the non-LGB group, the specialist percentage was 17.3 (CI: 16.4, 18.3); the general medical percentage was 13.0 (CI: 12.1, 13.9); and medication use was 8.1 percent (CI: 7.5–8.8).
- Despite greater mental health service utilization, LGB personnel more often reported unmet need for mental health services in the past 12 months (13.8 percent [CI: 10.8, 16.9] versus 6.3 percent [CI: 5.7, 7.0]) and were more likely to believe that mental illness was a stigmatizing condition (45.6 percent [CI: 41.3, 50.0] versus 33.5 percent [CI: 32.3, 34.7]) than were non-LGB personnel.

LGB Physical Health

Table 9.7 indicates the percentages of LGB service members who reported each of a variety of physical health problems, as well as percentages among non-LGB personnel.

- There were no statistically significant differences in reports of any of the physical health problems examined (high blood pressure, diabetes, high cholesterol, asthma, back pain, musculoskeletal injury) by LGB identity.

LGB Unwanted Sexual Contact and Physical Abuse

In the general U.S. population, LGB individuals are more likely to experience sexual and physical abuse (Katz-Wise and Hyde, 2012; Walters, Chen, and Breiding, 2013). This is also the case in the U.S. military (see Davis et al., 2017, and Breslin et al., 2019). Key findings related to unwanted sexual contact and physical abuse are presented in Table 9.8 and include the following:

- Since joining the military, 29.5 percent (CI: 25.6, 33.4) of LGB service members had experienced unwanted sexual contact, and 10.9 percent (CI 8.0, 13.7) indicated having such an experience within the past 12 months. These percentages are more than three and five times higher, respectively, than the percentages observed among other personnel.
- Approximately one in 12 LGB service members had experienced physical assault since joining the military (8.2 percent; CI: 5.7, 10.8); 2.8 percent (CI: 0.9, 4.6) had experienced

Table 9.7
Physical Health, by LGB Identity

	LGB	Non-LGB
Physician-diagnosed chronic conditions		
High blood pressure[z]	7.2% (5.1–9.2)	9.2% (8.5–9.9)
Diabetes[z]	0.6% (0.2–1.0)	0.9% (0.7–1.2)
High cholesterol[z]	3.4% (1.4–5.3)	4.2% (3.9–4.6)
Asthma[z]	1.8% (0.9–2.7)	1.7% (1.4–2.0)
Pain and injury		
Back pain[z]	22.3% (18.8–25.8)	24.8% (23.7–25.8)
Bone, joint, or muscle injury (including arthritis)[z]	24.0% (20.4–27.6)	26.5% (25.4–27.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table 9.8
Unwanted Sexual Contact and Physical Abuse, by LGB Identity

	LGB	Non-LGB
Unwanted sexual contact since joining the military	29.5%[a] (25.6–33.4)	8.2% (7.7–8.8)
Unwanted sexual contact, past 12 months	10.9%[a] (8.0–13.7)	1.9% (1.6–2.3)
Physically assaulted since joining the military	8.2%[a] (5.7–10.8)	5.1% (4.6–5.6)
Physically assaulted, past 12 months	2.8%[a] (0.9–4.6)	1.0% (0.7–1.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses. For unwanted sexual contact, the exact question wording in the 2018 HRBS is "The next question is about unwanted sexual contact, meaning times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration. Since joining the military, have you ever experienced unwanted sexual contact?" and "Did this unwanted sexual contact occur in the past 12 months?"

[a] Statistically significantly different from non-LGB estimate.

a physical assault in the past 12 months. Among non-LGB personnel, percentages were significantly lower: 5.1 percent (CI: 4.6, 5.6) indicated experiencing any assault since joining the military, and 1.0 percent (CI: 0.7, 1.2) responded that they had experienced any assault in the past 12 months.

LGB Sexual and Reproductive Health

Sexual and reproductive health are influenced by key behaviors, such as numbers of sexual partners and use of condoms and other contraception. We looked at how these indicators varied by LGB status and examined important outcomes for individual health and readiness. The latter included diagnosis of STI, regular testing for HIV infection, and unintended pregnancy. Key findings related to sexual and reproductive health are presented in Table 9.9 and include the following:

- Across all services, 41.8 percent (CI: 37.4, 46.2) of LGB service members had more than one sexual partner in the past year, and 43.5 percent (CI: 39.2, 47.8) had unprotected vaginal or anal sex with a new sex partner in the past year. The percentages were lower among non-LGB personnel (17.8 percent, CI: 16.8, 18.9, and 34.3 percent, CI: 33.1, 35.5, respectively).
- Consistent with these risk behaviors, 10.2 percent (CI: 6.9, 13.5) of LGB personnel had an STI in the past year, which is significantly higher than the 2.9 percent (CI: 2.5, 3.4) among the rest of the service.
- LGB service members were more likely to have had an HIV test in the past six months than were other service members (43.1 percent [CI: 38.8, 47.4] versus 37.9 percent [CI:

Table 9.9
Sexual and Reproductive Health, by LGB Identity

	LGB	Non-LGB
New partner without condom use, past 12 months	43.5%[a] (39.2–47.8)	34.3% (33.1–35.5)
2+ sex partners, past 12 months	41.8%[a] (37.4–46.2)	17.8% (16.8–18.9)
STI, past 12 months	10.2%[a] (6.9–13.5)	2.9% (2.5–3.4)
HIV test, past 6 months	43.1%[a] (38.8–47.4)	37.9% (36.7–39.2)
HIV test, past 12 months[z]	77.7% (74.1–81.3)	75.7% (74.5–76.8)
No birth control use at most-recent vaginal sex, past 12 months[z]	19.2% (16.2–22.3)	16.6% (15.7–17.5)
Unintended pregnancy, past 12 months[z]	2.6% (1.1–4.1)	2.9% (2.5–3.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-LGB estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

36.7, 39.2]). Among LGB service members, 77.7 percent (CI: 74.1, 81.3) had an HIV test in the past year. This percentage was not statistically significantly different from non-LGB personnel (75.7 percent; CI: 74.5, 76.8).

- Among LGB service personnel who had vaginal sex in the past year, 19.2 percent (CI: 16.2, 22.3) did not use any form of birth control during the most-recent time they had vaginal sex, while the rate was 16.6 percent (CI: 15.7, 17.5) among other service members. This difference was not significant.
- Among LGB service members, 2.6 percent caused or experienced an unintended pregnancy in the past 12 months, which is not significantly different from the percentage among non-LGB service members (2.9 percent).

Summary

LGB personnel make up just over 6 percent of service members in the active component and have unique health-related issues. Although these individuals are a small portion of the force, the disparities in their experiences, behaviors, and outcomes warrant close attention and tracking by DoD so that their specific needs can be addressed.

LGB personnel are similar to non-LGB personnel in rarely experiencing chronic health problems and in terms of most key health-promoting behaviors, including levels of physical activity and average hours of sleep per night. They are less likely than other personnel to be overweight or obese. However, compared with non-LGB personnel, their perceived sleep quality was worse. This could be a function of some of the other health behaviors and outcomes they reported, which can be associated with poor-quality sleep. More LGB personnel reported

drug use, binge drinking, and e-cigarette use than non-LGB service members, and substantially more LGB members had mental health problems—rates of PTSD were almost 50 percent higher, and serious distress, suicidal thoughts, and suicide attempts were two to three times higher among LGB personnel.

LGB personnel were more likely to use all mental health services than their non-LGB peers. Yet unmet mental health needs were still more than twice as common among LGB service members, with nearly one in seven reporting that they needed help with mental health issues in 2018 and did not get it. Perhaps as a result of the dual stigma of mental health issues and LGB status, LGB service members were also more likely to believe that using mental health services would harm their career than were their non-LGB counterparts. Nearly half of LGB personnel endorsed this idea. Given the substantial mental health burden among LGB personnel, unmet need for mental health treatment and the potential role of stigma in this unmet need take on particular significance.

As previously noted, elevated mental health and substance use issues among LGB individuals are also found in the civilian population. These disparities are thought to be a result of minority stress (Hatzenbuehler and Link, 2014), the difficulty of being a member of a marginalized social group (Meyer, 2003). While a variety of factors contribute to minority stress, they include bullying and violence. Almost 30 percent of LGB service members responded that they had been the victim of unwanted sexual contact since joining the military, and nearly 8 percent responded that they had been the victim of physical assault since joining the military; these statistics indicate a stressful environment for these LGB personnel.

Regarding sexual health, more LGB service members engaged in sexual behavior that poses a risk to health and might result in unintended pregnancy. In line with this, one in ten LGB personnel experienced an STI in the year prior to the survey. However, LGB service members used birth control (when they had vaginal sex) at rates similar to non-LGB personnel and, possibly as a result, were no more likely to experience an unintended pregnancy than their non-LGB counterparts.

In considering these results, it is important to keep in mind that LGB service members are a heterogeneous group. About half of LGB personnel are women, and more than half identify as bisexual. About 60 percent of LGB servicemen and 65 percent of LGB servicewomen are bisexual. This is in line with estimates for the general population (Copen, Chandra, and Febo-Vazquez, 2016). Bisexual invisibility (Taylor, 2018) is thought to pose an additional source of stress, and so acknowledging bisexuality in policy and dialogue around LGB issues in the military may be important in reducing LGB disparities overall. Finally, more than one in six servicewomen identify as LGB. Addressing the needs of LGB individuals is therefore integral to addressing the health of female service members.

CHAPTER TEN

Deployment Experiences and Health

This chapter presents the results of active component service members' experiences with combat and non-combat deployment and health and health-related behaviors. Specifically, this chapter presents descriptive statistics about the frequency and duration of deployments, as well as select analyses of substance use, mental and emotional health, and physical health by deployment history.

Each section highlights the importance of deployment-related analyses for the military community. Key measures used are described in the applicable section, and additional details about these measures may be found in Appendix C. Recent and lifetime deployment demographics are presented by service branch, pay grade, and gender, while analyses by age group and race/ethnicity are available in Appendix D. Additional analyses stratify the sample by recent deployment. All analyses demonstrated statistically significant omnibus tests (Rao-Scott chi-square test for categorical variables and F-tests for continuous variables), unless otherwise noted in the tables. Statistically significant group differences (pairwise comparisons) are also presented. However, only statistically significant differences that the research team's subject-matter experts determined to be substantively meaningful (i.e., those that could be used to change or develop policy or contribute to inequalities in health outcomes across subgroups) are discussed in the text.

Frequency and Duration of Combat and Noncombat Deployments

The 2018 HRBS included several deployment-related items that ascertained both the number of deployments and the amount of time that service members spent in deployment. We were able to assess both lifetime and recent (i.e., past-12-month) deployments. In addition, a single item asked respondents to indicate how many combat deployments they had experienced in their military career. A combat deployment was defined as a deployment during which one received imminent danger pay (IDP), hazardous duty pay, and/or combat zone tax exclusion benefits.

Lifetime Number of Deployments

Tables 10.1 through 10.3 present the number of lifetime deployments among active component members across all services, by pay grade, and by gender. Key findings related to total cumulative deployments include the following:

- Across all services, 60.4 percent of service members had at least one previous deployment (deployed to either a combat or noncombat zone during their service in the military); 39.6 percent reported having never deployed (Table 10.1).

Table 10.1
Lifetime Number of Deployments, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
1 time	19.7%[e] (18.5–20.9)	19.4%[e] (17.3–21.4)	22.3%[e] (19.8–24.8)	18.7%[e] (16.5–21.0)	7.5%[a,b,c,d] (6.0–8.9)	19.7% (18.7–20.7)	19.3% (18.3–20.3)
2 times	11.6%[d,e] (10.7–12.6)	12.6%[e] (11.1–14.1)	11.8%[d,e] (10.1–13.4)	15.5%[a,c,e] (13.6–17.3)	5.0%[a,b,c,d] (3.8–6.3)	13.0% (12.2–13.7)	12.7% (11.9–13.5)
3 or more times	23.7%[d,e] (22.4–24.9)	26.0%[d,e] (24.1–27.8)	22.6%[d,e] (20.7–24.6)	37.5%[a,b,c,e] (35.2–39.8)	46.1%[a,b,c,d] (43.3–48.9)	27.8% (26.9–28.8)	28.4% (27.5–29.3)
I have never been deployed	45.0%[d] (43.5–46.5)	42.1%[d] (39.4–44.8)	43.3%[d] (40.3–46.2)	28.3%[a,b,c,e] (25.6–30.9)	41.4%[d] (38.6–44.3)	39.5% (38.2–40.8)	39.6% (38.3–40.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 10.2
Lifetime Number of Deployments, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
1 time	21.1%[c,d,f] (19.2–23.1)	22.1%[c,d,f] (20.5–23.8)	6.3%[a,b,e,f] (5.2–7.4)	6.1%[a,b,e] (3.0–9.2)	22.9%[c,d,f] (20.8–25.1)	11.4%[a,b,c,e] (10.0–12.9)
2 times	6.1%[b,c,d,e,f] (5.0–7.2)	21.7%[a,c,d,e,f] (19.9–23.4)	11.3%[a,b,f] (9.8–12.7)	12.4%[a,b] (8.0–16.9)	14.2%[a,b] (12.6–15.9)	14.5%[a,b,c] (12.9–16.1)
3 or more times	4.7%[b,c,d,e,f] (3.7–5.7)	37.7%[a,c,d,e,f] (35.9–39.6)	78.0%[a,b,e,f] (75.7–80.4)	76.4%[a,b,e] (70.7–82.0)	20.5%[a,b,c,d,f] (18.6–22.4)	67.4%[a,b,c,e] (65.3–69.5)
I have never been deployed	68.0%[b,c,d,e,f] (65.8–70.2)	18.4%[a,c,d,e,f] (16.9–20.0)	4.4%[a,b,e] (2.5–6.4)	5.1%[a,b,e] (2.2–8.0)	42.4%[a,b,c,d,f] (39.8–44.9)	6.7%[a,b,e] (5.6–7.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

- Members of the Coast Guard were more likely than members of the other services to report three or more previous deployments (Table 10.1).
- Repeated deployments were positively associated with pay grade; that is, higher percentages of senior officers, warrant officers, and senior NCOs reported deploying three or more times during their service in the military compared to lower pay grades (Table 10.2).
- Women were more likely than men to report having never been deployed and less likely than men to report having deployed two or more times (Table 10.3).

Table 10.3
Lifetime Number of Deployments, by Gender

	Men	Women
1 time[z]	19.1% (17.9–20.3)	20.5% (18.9–22.1)
2 times	13.1%[a] (12.2–14.0)	10.7% (9.7–11.7)
3 or more times	30.7%[a] (29.6–31.9)	16.7% (15.4–17.9)
I have never been deployed	37.0%[a] (35.6–38.5)	52.2% (50.2–54.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Lifetime Number of Combat Deployments

Tables 10.4 through 10.6 present the number of lifetime combat deployments among active component members who had ever deployed across all services, by pay grade, and by gender. Key findings related to lifetime number of combat deployments include the following:

- Just over one-quarter (27.3 percent) of all service members who had ever deployed had never been on a combat deployment (Table 10.4). Roughly 32 percent had experienced one combat deployment, 17.9 had experienced two combat deployments, and 23.0 percent had experienced three or more lifetime combat deployments.

Table 10.4
Lifetime Number of Combat Zone Deployments, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
I have not had any combat zone deployments	22.5%[b,c,d,e] (20.7–24.2)	15.1%[a,c,d,e] (12.4–17.7)	44.2%[a,b,d,e] (40.7–47.7)	32.4%[a,b,c,e] (29.7–35.2)	73.8%[a,b,c,d] (70.7–76.9)	25.8% (24.4–27.2)	27.3% (26.0–28.7)
1 deployment	34.9%[c,e] (33.0–36.8)	35.5%[c,e] (32.5–38.4)	23.8%[a,b,d,e] (21.0–26.6)	30.5%[c,e] (27.8–33.2)	17.7%[a,b,c,d] (15.0–20.4)	32.3% (30.9–33.7)	31.8% (30.5–33.2)
2 deployments	18.7%[e] (17.2–20.2)	19.6%[c,e] (17.6–21.6)	15.5%[b,e] (13.5–17.5)	17.6%[e] (15.6–19.5)	5.4%[a,b,c,d] (3.7–7.1)	18.3% (17.3–19.3)	17.9% (16.9–18.8)
3 or more deployments	23.9%[b,c,d,e] (22.3–25.5)	29.9%[a,c,d,e] (27.6–32.1)	16.5%[a,b,e] (14.7–18.3)	19.5%[a,b,e] (17.9–21.1)	3.0%[a,b,c,d] (2.0–4.1)	23.6% (22.6–24.6)	23.0% (22.0–23.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 10.5
Lifetime Number of Combat Zone Deployments, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
I have not had any combat zone deployments	55.3%[b,c,d,e,f] (51.2–59.5)	24.9%[a,c,d,f] (23.1–26.7)	7.5%[a,b,e] (6.4–8.6)	5.6%[a,b,e] (3.7–7.6)	28.1%[a,c,d,f] (25.2–30.9)	9.1%[a,b,e] (7.8–10.3)
1 deployment	37.4%[c,d,f] (33.4–41.5)	36.3%[c,d,f] (34.1–38.5)	16.4%[a,b,e,f] (14.7–18.1)	15.9%[a,b,e] (10.5–21.2)	39.9%[c,d,f] (36.7–43.1)	21.3%[a,b,c,e] (19.4–23.2)
2 deployments	5.7%[b,c,d,e,f] (3.9–7.6)	21.4%[a] (19.6–23.1)	22.4%[a,e] (20.5–24.3)	21.7%[a] (16.2–27.2)	17.6%[a,c,f] (15.3–19.9)	23.4%[a,e] (21.5–25.4)
3 or more deployments	1.5%[b,c,d,e,f] (0.4–2.6)	17.5%[a,c,d,f] (16.0–19.0)	53.8%[a,b,e,f] (51.5–56.1)	56.8%[a,b,e,f] (50.1–63.5)	14.4%[a,c,d,f] (12.4–16.4)	46.1%[a,b,c,d,e] (43.9–48.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 10.6
Lifetime Number of Combat Zone Deployments, by Gender

	Men	Women
I have not had any combat zone deployments	26.7%[a] (25.2–28.2)	31.3% (28.7–33.9)
1 deployment	31.0%[a] (29.4–32.5)	37.7% (35.3–40.2)
2 deployments[z]	17.9% (16.8–19.0)	17.8% (16.1–19.5)
3 or more deployments	24.5%[a] (23.4–25.6)	13.1% (11.8–14.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- Service members in the Coast Guard were the least likely to have experienced a combat deployment, while service members in the Army were the most likely to have experienced three or more combat deployments (Table 10.4).
- Junior enlisted service members were the most likely to have never experienced a combat deployment (Table 10.5). Senior enlisted personnel, warrant officers, and senior officers were all more likely to have experienced three or more lifetime combat deployments compared with junior enlisted and junior officers. Results by age mirrored these results, with the youngest service members being most likely to have never experienced a combat deployment (Appendix Table D.90).

- Women were more likely to have never experienced a combat deployment, whereas men were more likely to have experienced one or three or more lifetime combat deployments (Table 10.6).

Lifetime Duration of Deployments

Tables 10.7 through 10.9 present the duration of lifetime deployments among active component members across all services, by pay grade, and by gender. Key findings related to lifetime duration of deployments (both combat and noncombat) include the following:

- Among previously deployed service members, total lifetime duration of deployments varied widely: 18.1 percent deployed for a total of one to six months, and 11.2 percent deployed for 49 months or more, with slightly larger percentages deploying for seven to 12 months (26.2 percent), 13 to 24 months (24.0 percent), and 25 to 48 months (20.5 percent; Table 10.7).
- Service members in the Army, Navy, and Coast Guard were more likely than members of the Air Force and Marine Corps to report having deployed for 49 months or more in their lifetime (Table 10.7).
- Lifetime deployment duration was positively associated with pay grade—that is, higher percentages of senior officers, warrant officers, and senior NCOs reported deploying for 25 months or more during their service in the military compared with lower pay grades (Table 10.8).
- Men were less likely than women to have deployed for fewer than 12 months but more likely than women to have deployed for 25 or more months in their lifetime (Table 10.9).

Table 10.7
Lifetime Duration of Deployments, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
1 to 6 months	28.1%[b,d,e] (26.2–29.9)	10.9%[a,c,e] (8.6–13.2)	28.7%[b,d,e] (25.2–32.3)	14.0%[a,c,e] (11.5–16.4)	19.5%[a,b,c,d] (16.7–22.3)	18.1% (16.8–19.3)	18.1% (16.9–19.3)
7 to 12 months	26.5%[e] (24.7–28.3)	27.9%[e] (25.0–30.7)	22.3% (19.4–25.1)	26.6%[e] (23.8–29.3)	19.0%[a,b,d] (16.2–21.8)	26.4% (25.0–27.8)	26.2% (24.8–27.5)
13 to 24 months[x]	25.4% (23.7–27.1)	22.0% (19.6–24.4)	23.2% (20.6–25.9)	25.5% (23.1–27.8)	24.1% (21.0–27.1)	24.0% (22.8–25.1)	24.0% (22.8–25.1)
25 to 48 months	14.8%[b,d,e] (13.4–16.1)	25.7%[a,c,d,e] (23.6–27.8)	17.4%[b] (15.3–19.5)	20.4%[a,b] (18.5–22.2)	20.5%[a,b] (17.7–23.3)	20.5% (19.5–21.5)	20.5% (19.6–21.4)
49 months or more	5.3%[b,c,d,e] (4.5–6.1)	13.6%[a,c] (12.1–15.1)	8.4%[a,b,d,e] (7.1–9.7)	13.6%[a,c] (12.3–14.9)	16.9%[a,c] (14.5–19.4)	11.0% (10.4–11.7)	11.2% (10.6–11.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

Table 10.8
Lifetime Duration of Deployments, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
1 to 6 months	42.1%[b,c,d,e,f] (38.0–46.2)	13.7%[a,c,d,e,f] (12.3–15.1)	3.5%[a,b,d,e,f] (2.7–4.3)	1.0%[a,b,c,e,f] (0.4–1.6)	20.0%[a,b,c,d,f] (17.3–22.7)	6.9%[a,b,c,d,e] (5.7–8.1)
7 to 12 months	40.1%[b,c,d,f] (35.9–44.2)	27.8%[a,c,d,e,f] (25.8–29.9)	8.6%[a,b,e,f] (7.4–9.8)	7.6%[a,b,e] (3.2–11.9)	33.2%[b,c,d,f] (30.2–36.2)	13.1%[a,b,c,e] (11.5–14.7)
13 to 24 months	14.9%[b,e,f] (12.1–17.8)	29.9%[a,c,f] (27.9–31.9)	18.2%[b,e,f] (16.4–19.9)	20.5% (14.8–26.3)	28.7%[a,c] (25.8–31.6)	25.6%[a,b,c] (23.6–27.6)
25 to 48 months	2.6%[b,c,d,e,f] (1.5–3.7)	20.8%[a,c,d,e,f] (19.2–22.5)	37.7%[a,b,e] (35.4–40.0)	34.0%[a,b,e] (27.6–40.4)	13.2%[a,b,c,d,f] (11.3–15.1)	36.8%[a,b,e] (34.6–39.0)
49 months or more	0.4%[b,c,d,e,f] (0.0–0.8)	7.7%[a,c,d,e,f] (6.7–8.7)	32.0%[a,b,e,f] (29.8–34.2)	36.9%[a,b,e,f] (30.5–43.2)	4.9%[a,b,c,d,f] (3.7–6.0)	17.6%[a,b,c,d,e] (15.9–19.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 10.9
Lifetime Duration of Deployments, by Gender

	Men	Women
1 to 6 months	17.4%[a] (16.0–18.7)	23.1% (20.8–25.5)
7 to 12 months	25.3%[a] (23.8–26.8)	32.0% (29.6–34.5)
13 to 24 months[z]	23.8% (22.5–25.1)	25.0% (23.0–27.1)
25 to 48 months	21.4%[a] (20.3–22.4)	14.9% (13.3–16.5)
49 months or more	12.2%[a] (11.4–12.9)	4.9% (4.1–5.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Duration of Recent Deployments

Tables 10.10 through 10.12 present the total duration of recent deployments among active component members who had ever deployed across all services, by pay grade, and by gender. Key findings related to duration of a recent deployment (i.e., in the 12 months prior to the survey) include the following:

- Slightly more than half (54.3 percent) of previously deployed active component personnel reported that they had not deployed in the past 12 months. Among personnel who had deployed in the past 12 months, the highest percentage (16.6 percent) reported deploying for four to six months, while the lowest percentage (2.9 percent) reported deploying for less than one month (Table 10.10).
- Service members in lower pay grades were more likely than those in higher pay grades to have deployed in the past 12 months (Table 10.11).
- While men were more likely than women to have deployed at all in the past 12 months, there were no differences by gender in total duration of past-year deployments (Table 10.12).
- Non-Hispanic white service members were more likely than non-Hispanic black and Hispanic service members to have deployed three or more times over their lifetime (Appendix Table D.87) but less likely than Hispanic service members to have deployed at all in the past 12 months (Appendix Table D.93).

Table 10.10
Total Duration of Deployments in the Past 12 Months, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
I did not deploy in the past 12 months	61.6%[b,c,d,e] (59.7–63.6)	55.3%[a,c,e] (52.3–58.2)	44.7%[a,b,d] (41.4–48.0)	52.8%[a,c] (50.0–55.6)	46.9%[a,b] (43.4–50.4)	54.5% (53.1–56.0)	54.3% (52.9–55.7)
Less than 1 month	2.5%[e] (1.9–3.2)	2.3%[e] (1.4–3.1)	4.5%[e] (2.8–6.2)	2.4%[e] (1.6–3.2)	9.5%[a,b,c,d] (7.7–11.4)	2.7% (2.2–3.1)	2.9% (2.4–3.3)
1 to 3 months	7.4%[c,e] (6.3–8.5)	7.1%[c,e] (5.4–8.8)	13.4%[a,b,d] (11.0–15.8)	9.6%[c,e] (8.0–11.1)	17.8%[a,b,d] (15.1–20.5)	8.8% (7.9–9.6)	9.0% (8.2–9.9)
4 to 6 months	18.1%[b] (16.5–19.7)	12.3%[a,c,d] (10.1–14.5)	21.9%[b,e] (18.6–25.2)	18.1%[b] (15.6–20.5)	15.4%[c] (12.8–18.1)	16.6% (15.4–17.8)	16.6% (15.4–17.8)
7 to 9 months	7.0%[b,d] (6.0–8.1)	15.1%[a,c,e] (12.6–17.5)	9.4%[b] (7.5–11.2)	12.6%[a,e] (10.4–14.8)	5.9%[b,d] (3.9–8.0)	11.7% (10.6–12.9)	11.6% (10.5–12.7)
10 to 12 months	3.3%[b,c] (2.6–4.0)	8.0%[a,d,e] (6.4–9.5)	6.2%[a] (4.6–7.8)	4.6%[b] (3.6–5.7)	4.3%[b] (2.7–5.9)	5.7% (5.0–6.4)	5.6% (5.0–6.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 10.11
Total Duration of Deployments in the Past 12 Months, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
I did not deploy in the past 12 months	27.6%[b,c,d,e,f] (24.0–31.3)	57.6%[a,c,f] (55.4–59.8)	70.3%[a,b,d,e,f] (68.2–72.4)	54.2%[a,c,f] (47.4–61.1)	54.8%[a,c,f] (51.6–58.0)	76.2%[a,b,c,d,e] (74.2–78.1)
Less than 1 month	4.0%[c] (2.5–5.5)	2.2% (1.5–2.8)	2.0%[a,e] (1.4–2.6)	3.9% (1.6–6.2)	3.9%[c] (2.7–5.1)	3.2% (2.4–4.0)
1 to 3 months	14.7%[b,c,f] (11.9–17.5)	7.0%[a,e] (5.9–8.0)	6.4%[a,e] (5.3–7.4)	10.8% (6.8–14.9)	11.2%[b,c,f] (9.2–13.2)	6.2%[a,e] (5.1–7.2)
4 to 6 months	29.2%[b,c,d,e,f] (25.3–33.0)	14.6%[a,c,f] (13.0–16.2)	9.8%[a,b,e] (8.4–11.2)	11.2%[a] (5.9–16.5)	16.7%[a,c,f] (14.3–19.1)	7.8%[a,b,e] (6.5–9.1)
7 to 9 months	20.5%[b,c,e,f] (16.9–24.2)	11.2%[a,c,f] (9.7–12.8)	5.4%[a,b,d,e] (4.3–6.5)	13.7%[c,f] (8.5–19.0)	9.2%[a,c,f] (7.2–11.2)	3.9%[a,b,d,e] (3.0–4.8)
10 to 12 months	3.9%[b] (2.5–5.4)	7.4%[a,e,f] (6.1–8.7)	6.2%[f] (5.0–7.3)	6.1% (2.9–9.2)	4.2%[b] (3.0–5.4)	2.7%[b,c] (1.9–3.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Table 10.12
Total Duration of Deployments in the Past 12 Months, by Gender

	Men	Women
I did not deploy in the past 12 months	53.5%[a] (51.9–55.1)	59.6% (57.0–62.1)
Less than 1 month[z]	2.9% (2.4–3.4)	2.5% (1.7–3.2)
1 to 3 months[z]	9.2% (8.3–10.1)	8.0% (6.5–9.5)
4 to 6 months	17.1%[a] (15.8–18.4)	13.1% (11.3–14.9)
7 to 9 months[z]	11.5% (10.3–12.8)	11.7% (9.9–13.5)
10 to 12 months[z]	5.7% (5.0–6.5)	5.1% (4.0–6.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Lifetime Combat Trauma Exposure

Tables 10.13 through 10.15 present the percentages of ever-deployed service members who reported that they had been exposed to a variety of combat trauma experiences. The list of experiences is based on the 2015 HRBS; however, it only uses those items that independently predicted a set of deployment-related health conditions (e.g., probable PTSD and probable major depression) in a regression model using data from the 2015 HRBS. The final set of six items asks about working with landmines or unexploded ordnance, witnessing members of one's own unit being seriously wounded or killed, knowing someone who was killed in combat, witnessing acts of violence or excessive force that violated rules of engagement, being wounded in combat, and witnessing civilians being seriously wounded or killed.

Table 10.13
Lifetime Combat Trauma Experiences During Deployment, by Service Branch

	Air Force	Army	Marine Corps	Navy	Coast Guard	DoD Total	Total
Any traumatic combat experience	25.0%[b,c,e] (23.3–26.7)	57.5%[a,c,d,e] (54.5–60.4)	37.7%[a,b,d,e] (34.6–40.8)	21.8%[b,c] (19.7–23.8)	17.3%[a,b,c] (14.5–20.0)	36.8% (35.5–38.2)	36.2% (34.9–37.5)
I worked with landmines or other unexploded ordnance	4.3%[b,c,e] (3.5–5.1)	18.3%[a,c,d,e] (16.3–20.4)	13.5%[a,b,d,e] (11.3–15.7)	5.8%[b,c,e] (4.4–7.1)	1.4%[a,b,c,d] (0.5–2.3)	10.8% (9.9–11.7)	10.5% (9.6–11.3)
I witnessed members of my unit or an ally unit being seriously wounded or killed	11.6%[b,c,e] (10.4–12.9)	37.9%[a,c,d,e] (35.3–40.5)	21.8%[a,b,d,e] (19.5–24.2)	10.1%[b,c,e] (8.8–11.4)	5.3%[a,b,c,d] (3.8–6.8)	21.5% (20.4–22.6)	21.0% (20.0–22.0)
Someone I knew well was killed in combat	11.5%[b,c,e] (10.3–12.7)	41.5%[a,c,d,e] (38.8–44.2)	24.3%[a,b,d,e] (21.9–26.7)	9.4%[b,c,e] (8.2–10.7)	4.8%[a,b,c,d] (3.3–6.4)	22.8% (21.7–23.9)	22.3% (21.2–23.3)
I witnessed or engaged in acts of cruelty, excessive force, or acts violating rules of engagement	2.5%[b] (1.9–3.1)	7.9%[a,c,d,e] (6.6–9.3)	3.4%[b] (2.2–4.7)	2.5%[b] (1.6–3.5)	1.9%[b] (0.5–3.3)	4.5% (3.9–5.1)	4.4% (3.9–5.0)
I was wounded in combat	0.9%[b,c] (0.5–1.2)	6.6%[a,c,d,e] (5.4–7.8)	3.2%[a,b,d,e] (2.3–4.2)	0.9%[b,c] (0.5–1.2)	0.2%[b,c] (0.0–0.5)	3.1% (2.7–3.6)	3.0% (2.6–3.5)
I witnessed civilians being seriously wounded or killed	12.7%[b,c,d] (11.4–13.9)	33.3%[a,c,d,e] (30.8–35.9)	16.7%[a,b,d,e] (14.7–18.6)	9.2%[a,b,c] (7.7–10.6)	9.5%[b,c] (7.5–11.5)	19.2% (18.2–20.2)	18.9% (17.9–19.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

Table 10.14
Lifetime Combat Trauma Experiences During Deployment, by Pay Grade

	E1–E4	E5–E6	E7–E9	W1–W5	O1–O3	O4–O6
Any traumatic combat experience	16.3%[b,c,d,e,f] (13.2–19.5)	34.9%[a,c,d,f] (32.8–37.1)	57.4%[a,b,e,f] (55.1–59.6)	61.4%[a,b,e] (54.8–67.9)	32.5%[a,c,d,f] (29.5–35.6)	51.1%[a,b,c,e] (48.8–53.4)
I worked with landmines or other unexploded ordnance	5.4%[b,c,d] (3.3–7.5)	10.5%[a,c] (9.1–11.9)	19.1%[a,b,e,f] (17.1–21.0)	13.4%a (8.8–17.9)	8.8%c (6.6–11.0)	9.5%c (8.1–10.9)
I witnessed members of my unit or an ally unit being seriously wounded or killed	5.5%[b,c,d,e,f] (3.8–7.2)	19.5%[a,c,d,f] (17.7–21.3)	39.2%[a,b,e,f] (36.9–41.5)	45.3%[a,b,e,f] (38.5–52.2)	19.4%[a,c,d,f] (16.7–22.1)	29.5%[a,b,c,d,e] (27.4–31.7)
Someone I knew well was killed in combat	5.2%[b,c,d,e,f] (3.3–7.1)	19.5%[a,c,d,f] (17.7–21.3)	44.1%[a,b,e,f] (41.7–46.4)	48.8%[a,b,e,f] (42.0–55.5)	17.0%[a,c,d,f] (14.7–19.3)	36.9%[a,b,c,d,e] (34.7–39.2)
I witnessed or engaged in acts of cruelty, excessive force, or acts violating rules of engagement	1.9%[c,d,f] (0.7–3.2)	4.4%[c,d] (3.4–5.3)	7.1%[a,b,e] (5.8–8.4)	9.2%[a,b,e] (5.1–13.2)	3.9%[c,d] (2.7–5.0)	5.3%[a] (4.2–6.4)
I was wounded in combat	0.9%[c,d] (0.2–1.6)	2.6%[c,d] (1.8–3.3)	7.5%[a,b,e,f] (6.1–8.8)	7.1%[a,b,e,f] (3.4–10.7)	1.9%[c,d] (1.1–2.8)	2.9%[c,d] (2.1–3.7)
I witnessed civilians being seriously wounded or killed	6.5%[b,c,d,e,f] (4.3–8.7)	17.6%[a,c,d,f] (15.9–19.3)	34.1%[a,b,e,f] (31.8–36.4)	38.0%[a,b,e,f] (31.3–44.8)	16.5%[a,c,d,f] (14.2–18.7)	26.4%[a,b,c,d,e] (24.4–28.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from E1–E4 estimate.

[b] Statistically significantly different from E5–E6 estimate.

[c] Statistically significantly different from E7–E9 estimate.

[d] Statistically significantly different from W1–W5 estimate.

[e] Statistically significantly different from O1–O3 estimate.

[f] Statistically significantly different from O4–O6 estimate.

Key findings related to lifetime combat trauma exposure include the following:

- Overall, just over one-third (36.2 percent) of all service members had experienced at least one of the six combat traumas we measured (Table 10.13). The most frequently endorsed trauma was knowing someone who was killed in combat (22.3 percent), and the least-endorsed item was being wounded (3.0 percent).
- Service members in the Army (57.5 percent), followed by those in the Marine Corps (37.7 percent), were most likely to have experienced at least one combat trauma (Table 10.13). Members of the Coast Guard (17.3 percent) were least likely to have experienced at least one combat trauma. This service branch–specific pattern was also observed for each individual trauma item.
- Pay grade and traumatic experiences were positively correlated such that among both enlisted and officers, more senior service members were exposed to combat trauma than junior enlisted and junior officers (Table 10.14). A similar pattern was found by age: Younger service members were less likely to have experienced combat trauma (Appendix

Table 10.15
Lifetime Combat Trauma Experiences During Deployment, by Gender

	Men	Women
Any traumatic combat experience	37.8%[a] (36.3–39.3)	25.8% (23.8–27.9)
I worked with landmines or other unexploded ordnance	11.6%[a] (10.6–12.6)	3.1% (2.2–4.0)
I witnessed members of my unit or an ally unit being seriously wounded or killed	22.3%[a] (21.1–23.5)	12.5% (11.0–14.1)
Someone I knew well was killed in combat	23.3%[a] (22.1–24.5)	15.4% (13.7–17.0)
I witnessed or engaged in acts of cruelty, excessive force, or acts violating rules of engagement	4.7%[a] (4.1–5.4)	2.3% (1.6–3.0)
I was wounded in combat	3.3%[a] (2.8–3.8)	1.3% (0.8–1.8)
I witnessed civilians being seriously wounded or killed	20.2%[a] (19.0–21.3)	10.7% (9.3–12.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from women's estimate.

Table D.96). Given that service members of younger age and lower pay grade are less likely to have deployed for extended lengths of time, this is not surprising.

- Roughly one-third of men and one-quarter of women had experienced one combat-related trauma, and this gender difference is statistically significant (Table 10.15). Similarly, men were also more likely to have experienced each of the six individual combat trauma items.

Deployment Experiences and Health

A vast body of research has examined the complex relationship between deployment, especially combat deployment, on service member health and well-being after various conflicts (for example, see Bøg, Filges, and Jørgensen, 2018; Institute of Medicine, 2010). The HRBS has long been one of many systematic empirical studies used to assess these associations and one of the only studies to look at repeated cross-sectional snapshots over time. In this section, we explore whether service members who had experienced a recent deployment (i.e., in the past 12 months) significantly differed from their peers who had not deployed in the past year across a range of outcomes.[1] These outcomes cluster in the areas of substance use, mental and emotional health, and physical health and are defined in the same way as in earlier chapters. Finally, we caution readers not to interpret these results as causal. We cannot completely dis-

[1] Note that this group includes those who have never deployed.

entangle the timing of the outcomes with respect to the timing of the past-year deployment, though in most cases the outcomes are measured in the past 30 days.

Deployment and Substance Use

This section describes differences between service members who have and have not deployed in the past 12 months on a range of substance use outcomes, including binge and heavy drinking, current cigarette smoking and use of e-cigarettes, illicit drug use including marijuana, and prescription drug misuse. The results are presented in Table 10.16.

As described in Chapter Five, *binge drinking* is defined as consuming five or more drinks on the same occasion for men and consuming four or more drinks on the same occasion for women at least once in the past 30 days. *Heavy drinking* is defined as binge drinking on at least one or two days per week (i.e., approximately four or five occasions in the past 30 days). Key findings related to alcohol and tobacco use include the following:

Table 10.16
Substance Use, by Recent Deployment

	Deployed in Past 12 Months	Not Deployed in Past 12 Months
Binge drinking, past 30 days	39.8%[a] (37.5–42.2)	31.8% (30.5–33.2)
Heavy drinking, past 30 days	12.6%[a] (10.9–14.4)	8.7% (7.9–9.6)
Cigarette smoking, past 30 days	22.4%[a] (20.2–24.5)	16.8% (15.7–18.0)
E-cigarette use, past 30 days[z]	17.2% (15.1–19.4)	15.8% (14.6–17.1)
Any substance use excluding marijuana, past 30 days[z]	0.8% (0.2–1.4)	0.3% (0.1–0.5)
Any marijuana or synthetic cannabis use, past 30 days	0.7%[a] (0.03–1.4)	0.2% (0.1–0.3)
Any prescription drug misuse, past 12 months[z]	1.5% (0.8–2.2)	1.3% (0.9–1.7)
Prescription stimulant misuse[z]	0.5% (0.00–1.1)	0.5% (0.1–0.8)
Prescription sedative misuse[z]	0.5% (0.03–0.9)	0.4% (0.2–0.6)
Prescription pain reliever misuse[z]	1.1% (0.5–1.6)	0.9% (0.6–1.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from the not deployed estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

- Four in ten (39.8 percent) service members who deployed in the past 12 months reported binge drinking at least once in the past 30 days, a significantly higher percentage than among service members who did not experience a recent deployment (31.8 percent).
- A significantly larger portion of recently deployed service members engaged in heavy drinking in the past 30 days (12.6 percent) compared with service members who had not recently deployed (8.7 percent).

Key findings related to tobacco use include the following:

- Service members who recently deployed were significantly more likely to report smoking cigarettes (22.4 percent) than those who did not deploy (16.8 percent).
- Use of e-cigarettes in the past 30 days did not significantly differ between recent deployers (17.2 percent) and service members who had not recently deployed (15.8 percent).
- Table 10.16 also shows past-30-day use of several types of drugs, including marijuana and synthetic cannabis, inhalants, synthetic stimulants, nonprescription cough or cold medicine, nonprescription anabolic steroids, and drugs other than marijuana and synthetic cannabis (cocaine [including crack], LSD, PCP, MDMA [commonly called ecstasy], methamphetamine, heroin, and GHB).[2] Key findings related to marijuana use and drug use include the following: Though few respondents reported any drug use in the past 30 days, service members who had recently deployed were more likely to have used marijuana or synthetic cannabis in the past 30 days (0.7 percent) than service members who had not (0.2 percent).

Finally, Table 10.16 also shows *misuse* of prescription drugs, defined as use of a prescription drug in any way not directed by a doctor, which could include use without a prescription of one's own or using it in greater amounts, more often, or for longer than it was prescribed. Key findings related to prescription misuse include the following:

- Prescription drug misuse by service members who had deployed in the past 12 months did not differ significantly from service members who had not recently deployed. The same was true for misuse of prescription stimulants, sedatives, and pain relievers.

Deployment and Mental and Emotional Health

This section describes differences between service members who had and had not deployed in the past 12 months on a range of mental and emotional health outcomes, including psychological distress, PTSD, and sleep quality. Results are presented in Table 10.17.

As described in Chapter Six, overall mental health status was assessed using the K6 (Kessler, Barker, et al., 2003), a commonly used measure of nonspecific serious psychological distress. The K6 is designed to distinguish between distress that indicates the presence of a psychiatric disorder that a clinician would recognize and treat and distress that is commonly experienced but not suggestive of a clinical condition. In the 2018 HRBS, mental health status was assessed for the past 30 days and for the worst 30 days of the past year. Respondents with sum scores greater than or equal to 13 were categorized as having serious psychological distress. Respondents were also asked about PTSD symptoms using the PC-PTSD-5 (Prins et al.,

[2] Unlike Chapter Five, this version of the substance use variable includes cough or cold medicine and anabolic steroids.

Table 10.17
Mental and Emotional Health Indicators, by Recent Deployment

	Deployed in Past 12 Months	Not Deployed in Past 12 Months
Psychological distress (K6), past 12 months		
No to low distress	68.3%[a] (66.0–70.6)	71.2% (69.9–72.6)
Moderate distress	14.6%[a] (12.8–16.4)	12.6% (11.6–13.5)
Serious distress[z]	17.1% (15.1–19.1)	16.2% (15.1–17.4)
Psychological distress (K6), past 30 days		
No to low distress[z]	76.6% (74.5–78.8)	78.3% (77.0–79.5)
Moderate distress[z]	13.7% (11.9–15.5)	12.2% (11.2–13.2)
Serious distress[z]	9.6% (8.0–11.2)	9.5% (8.6–10.5)
Probable PTSD (PC-PTSD-5 score ≥3)[z]	12.2% (10.6–13.7)	11.3% (10.4–12.2)
Sleep quality in past 30 days		
Very good[z]	8.4% (7.2–9.7)	9.5% (8.7–10.4)
Fairly good[z]	54.1% (51.8–56.4)	55.3% (53.9–56.8)
Fairly bad[z]	31.5% (29.3–33.7)	29.0% (27.7–30.3)
Very bad[z]	6.0% (4.8–7.2)	6.1% (5.4–6.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from the not deployed estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

2016), a brief screening measure for PTSD. We chose a cutpoint of three or higher to indicate probable PTSD, which is the cutpoint shown to be optimally sensitive to probable PTSD in prior studies (Prins et al., 2016). This section also presents results of respondents' self-rated sleep quality in the past 30 days.

Key findings related to psychological distress, PTSD, and sleep quality include the following:

- Significantly fewer recently deployed service members met the criteria for no to low psychological distress in the past 12 months (68.3 percent) compared with those who did not recently deploy (71.2 percent). Significantly more recent deployers met the criteria for

moderate psychological distress (14.6 percent) compared with those who did not recently deploy (12.6 percent; Table 10.12). Differences in serious distress were observed but did not reach statistical significance.
- Differences in psychological distress in the past 30 days between deployers and others were not statistically significant.
- Twelve percent of recently deployed service members reported probable PTSD; this figure was not statistically significantly different from those who had not recently deployed.
- Differences in self-reported sleep quality by recent deployment were not statistically significant.

Deployment and Physical Health

This section describes differences between service members who have and have not deployed in the past 12 months on a range of physical health outcomes, including pain, TBI and postconcussive syndrome, and self-rated health. Results are presented in Table 10.18.

As described in Chapter Seven, the 2018 HRBS measured physical symptoms using the Somatic Symptom Scale–8 (Gierk et al., 2014); service members reported being not bothered at all, bothered a little, or bothered a lot by stomach or bowel problems; back pain; pain in the arms, legs, or joints; headaches; chest pain or shortness of breath; dizziness; feeling tired or having low energy; and trouble sleeping. A measure of *high physical symptom severity* was defined as a score of 8 or higher. In this section, we report estimates of service members with high physical symptom severity and those bothered a lot by at least one symptom (including and excluding headaches) in the past 30 days, by recent deployment.

This section also reports estimates of mTBI, moderate to severe TBI, and postconcussive symptoms, by recent deployment. TBI and mTBI were assessed using the Brief Traumatic Brain Injury Screen (Schwab et al., 2006). Service members screened positive for postconcussive symptoms if they screened positive for TBI or mTBI and endorsed four or more postconcussive symptoms. Service members were also asked to self-report their overall physical health.

Key findings related to physical health and recent deployment include the following:

- Though nearly one-third (30.2 percent) of recently deployed service members reported any bodily pain including headache in the past 30 days, differences in pain symptoms and severity between recent deployers and others did not reach statistical significance.
- Fewer than one in ten recently deployed service members screened positive for TBI or mild TBI, and differences in TBI and postconcussive symptoms between recent deployers and others did not reach statistical significance.
- Most recently deployed service members rated their health as very good or excellent (combined, 50.2 percent). These ratings were not significantly different from service members who had not recently deployed (combined, 53.2 percent).

Table 10.18
Physical Health, by Any Deployment in Past 12 Months

	Deployed in Past 12 Months	Not Deployed in Past 12 Months
Pain symptoms		
Any bodily pain (back, arms, legs, or joints), past 30 days[z]	26.9% (24.9–29.0)	25.6% (24.4–26.8)
Any bodily pain including headache, past 30 days[z]	30.2% (28.1–32.3)	29.1% (27.8–30.4)
High physical symptom severity, past 30 days[z]	16.6% (14.8–18.3)	16.8% (15.7–17.8)
TBI and postconcussive symptoms		
Positive screen for mild TBI, past 12 months[z]	7.0% (5.8–8.2)	5.7% (5.0–6.5)
Positive screen for moderate to severe TBI, past 12 months[z]	0.2% (0.02–0.3)	0.3% (0.1–0.4)
Postconcussive symptoms, past 30 days[z]	4.8% (3.8–5.8)	4.0% (3.3–4.6)
Self-rated health		
Excellent[z]	13.7% (12.1–15.2)	15.0% (13.9–16.1)
Very good[z]	36.5% (34.4–38.7)	38.2% (36.8–39.5)
Good[z]	37.9% (35.6–40.2)	35.5% (34.2–36.9)
Fair[z]	10.5% (9.0–12.0)	9.4% (8.6–10.3)
Poor[z]	1.4% (0.7–2.1)	1.8% (1.4–2.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from the not deployed estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Summary

The analyses in this chapter provide insight into how recent deployment is associated with active component service members' physical and mental health outcomes and propensity for risk behaviors. Understanding this association is important given that service members often deploy more than once in their career and because the negative consequences for health and

health behaviors that result from one deployment can potentially impact readiness for future deployments.

A majority of the 2018 HRBS sample had experienced at least one deployment since joining the military, though roughly one-quarter of ever-deployers had not yet experienced a combat deployment. Exposure to combat trauma was common, with just over one-third of service members reporting that they had experienced at least one of the six experiences asked about in the survey.

Problematic use of alcohol, measured as binge and heavy drinking; cigarette smoking; and use of marijuana were more common among service members who had recently deployed. Use of other drugs and prescription drug misuse was far less common among recent deployers and nondeployers, and there were no differences between the two groups.

We also observed that a significant number of previously deployed service members reported current mental and emotional health problems. Of those deploying recently (that is, in the past 12 months), over one-quarter met the criteria for moderate or serious psychological distress in the past 12 months, and just over one-tenth met the criteria for probable PTSD. However, only for moderate psychological distress did we see a significant difference between the groups, with the recently deployed reporting more distress than their nondeployed counterparts.

Of recently deployed service members, 7.0 percent screened positive for probable mTBI, and 4.8 percent had experienced or reported postconcussive symptoms in the past 30 days. TBI has become a signature physical injury among the armed forces; however, results from this analysis indicate that service members who were recently deployed were no more likely than those who were not deployed to suffer from probable mTBI, moderate to severe TBI, or postconcussive symptoms.

CHAPTER ELEVEN

Summary and Policy Implications

The HRBS is DoD's flagship survey for understanding the health, health-related behaviors, and well-being of service members. At the request of the Defense Health Agency, RAND revised, administered, and analyzed the 2018 version of the survey. This report has detailed the methodology, sample demographics, and results across the following domains: health promotion and disease prevention, substance use, mental and emotional health, physical health and functional limitations, sexual behavior and health, sexual orientation and health, and deployment experiences and health. We examined differences across several subgroups, including service branch, pay grade, gender, race/ethnicity, and age group.

The 2018 HRBS represents the first time the survey was offered confidentially on the internet. The overall, weighted response rate was 9.6 percent, resulting in 17,166 usable surveys. Although low response rates are not necessarily indicative of biased data, they are a reason to be cautious when interpreting results. The 2018 HRBS is also the first time that imputation was used for missing data.

This chapter provides a high-level overview of findings from each of the domains in the survey, as well as an overview of comparisons to HP2020 goals and between the 2015 HRBS and the 2018 HRBS. The chapter concludes with policy implications for improving the health and well-being of the active component and future iterations of the HRBS.

Health Promotion and Disease Prevention

Within this domain, we examined weight status, physical activity, screen time, annual physical assessments, and sleep. Key findings include the following:

- Overall, 33.3 percent of service members 20 years of age or older reported heights and weights consistent with CDC guidelines for normal weight (the general population HP2020 goal is at least 33.9 percent);[1] 15.1 percent were classified as obese (the HP2020 goal is less than 30.5 percent).
- Just under two-thirds of service members (71.8 percent) met the HP2020 goal for MPA of 150 minutes per week or VPA for at least 75 minutes per week. Roughly one-half (45.3 percent) met the HP2020 goal for MPA of 300 minutes per week or VPA for at least 150 minutes per week. Roughly half (49.6 percent) of service members reported engaging

[1] Note that the HP2020 goal is specific to adults age 20 or older.

in muscle-strengthening activities three or more times per week (HP2020 goal for two or more days per week: at least 24.1 percent).
- Overall, 27.2 percent of service members reported five or more hours per day of non–work-related screen time per day. This included time gaming or at a computer, television, smartphone, tablet, or other handheld device.
- The majority of service members (70.3 percent) reported receiving a routine medical checkup in the previous year, falling short of military standards.
- About one-third of service members met the HP2020 standard for sufficient sleep. The HP2020 target is 72.8 percent. All enlisted pay grade groups were significantly less likely than officers to report getting an average of seven or more hours of sleep per night over the past 30 days. Furthermore, 29.7 percent of service members rated their sleep as fairly bad, and 6.1 percent rated their sleep as very bad; 27.5 percent of service members reported being severely or moderately bothered by a lack of energy because of poor sleep over the past week. Finally, 13.1 percent of service members reported using OTC or prescription medications to sleep at least once per week over the past 30 days.
- About one-fifth (16.5 percent) of service members reported consuming energy drinks three or more times a week over the previous 30 days, including 22.7 percent of Marines (significantly higher than any other service). Less than 4 percent reported any consistent (i.e., one or more times per week) use of OTC medications to stay awake, and fewer still reported consistent use of prescription medications.

Substance Use

Within this domain, we examined alcohol, tobacco and nicotine, marijuana and synthetic cannabis, other drug use, and prescription drugs. Key findings include the following:

- According to survey estimates, more than one in three service members (34.0 percent) were current binge drinkers. The rate for binge drinking was significantly higher than the most recent available estimate for the U.S. population of adults aged 18 and above from the 2018 NSDUH (26.5 percent).
- Approximately one in ten service members (9.8 percent) were current heavy drinkers. Though rates for heavy drinking were not directly comparable because of differences in definitions across surveys, when we recalculated raw 2017 NSDUH data, we found that the rate for heavy drinking was higher in the HRBS than in the population of U.S adults over the age of 18 (8.9 percent).
- 6.2 percent of service members experienced one or more serious consequences from drinking in the past year, 4.9 percent reported any risky drinking and driving behavior, and 5.7 percent reported work-related productivity loss from alcohol use.
- More than one-quarter (28.2 percent) of all service members agreed with at least one of the following statements about military culture being supportive of drinking: finding it hard to fit in with one's command if they do not drink, belief that drinking is part of being in one's unit, belief that everyone is encouraged to drink at social events, and belief that leaders are tolerant of drunkenness when personnel are off duty.
- An estimated 37.8 percent of service members used tobacco in some form. This rate is much higher than estimated rates of current tobacco use in the general population

(approximately 19.3 percent). Rates of e-cigarette use were also higher among active component service members (16.2 percent) than in the general population (4.6 percent; CDC, 2017).
- Few service members reported use of any drugs in the past year (1.3 percent). Less than 1 percent reported use of any nonprescription cough or cold medicine in the past year (0.4 percent), nonprescription anabolic steroids (0.2 percent), marijuana or synthetic cannabis (0.9 percent), and drugs other than marijuana and synthetic cannabis (0.8 percent), including cocaine or crack, LSD, PCP, MDMA, methamphetamine, heroin, and GHB.
- Less than 1 percent (0.5 percent) of all service members reported use of drugs in the past 30 days. Less than one-half of 1 percent reported use of marijuana or synthetic cannabis (0.4 percent) or use of drugs other than marijuana and synthetic cannabis in the past 30 days (0.3 percent).
- Regarding prescription drugs, results suggest lower rates of past-year use of stimulants, sedatives, and pain relievers among service members compared with civilians, as well as lower rates of misuse.

Mental and Emotional Health

Within this domain, we examined mental health indicators (i.e., serious psychological distress and PTSD), social and emotional factors associated with mental health (i.e., angry and aggressive behaviors, unwanted sexual contact, physical abuse, problematic gambling), self-harm (including suicidal ideation, suicide plans, and suicide attempts), mental health service utilization, perceived unmet mental health treatment need, barriers to utilizing mental health services, and concerns that mental health treatment would damage one's military career. Key findings include the following:

- Approximately one in ten service members (9.6 percent) reported serious psychological distress in the past 30 days, and 11.5 percent of service members evidenced probable PTSD. Rates of both serious psychological distress and probable PTSD are higher than those observed among the general population (2.9 percent to 5.2 percent for serious psychological distress [Center for Behavioral Health Statistics and Quality, 2018]; 4 percent for PTSD [Kessler, Berglund, et al., 2004]).
- Approximately half (49.1 percent) of active component service members reported any angry or aggressive behavior in the past 30 days.
- Almost one-tenth (9.6 percent) of active component service members indicated experiencing any unwanted sexual contact since joining the military, with 2.5 percent of individuals indicating unwanted sexual contact in the past year. Women were six times more likely to have experienced unwanted sexual contact since joining the military than men (31.6 percent of women versus 5.2 percent of men) and eight times more likely to have experienced unwanted sexual contact within the past year than men (9.1 percent of women versus 1.2 percent of men). It is important to remember that the measure of unwanted sexual contact used in the 2018 HRBS is not comparable with any other civilian or military survey, including the WGRA.
- Relatively few military personnel indicated experiencing a physical assault while in the military (5.3 percent) or in the past year (1.1 percent). By comparison, in the general pop-

ulation, approximately 1.7 percent of individuals ages 12 and older indicated experiencing a physical assault in the past year (Morgan and Kena, 2018).

- In the 2018 HRBS, 8.3 percent of all service members endorsed having thoughts of suicide in the past 12 months, 2.7 percent reported suicide plans, and 1.2 percent reported a suicide attempt. These rates are higher than those observed among the general population: Among adults aged 18 or older in the general population, 4.3 percent endorsed thoughts of suicide, 1.3 percent endorsed suicide plans, and 0.6 percent reported a suicide attempt in the past year (Substance Abuse and Mental Health Services Administration, 2019a).
- The prevalence of problem gambling in the total active component population was approximately 1.6 percent, which is slightly lower than the prevalence of pathological gambling in the U.S civilian population (2.3 percent; Kessler, Hwang, et al., 2008]).
- Overall, approximately one in four service members (25.5 percent) reported using any mental health services. This proportion is higher than that found in the general population in the NSDUH (Substance Abuse and Mental Health Services Administration, 2019a).
- Receipt of mental health services was more common from specialty mental health providers (18.2 percent) than from general medical providers (13.4 percent). This pattern differs from that observed in the general population, where most individuals who receive mental health care receive that care from general medical providers (Olfson et al., 2019). Among service members in the 2018 HRBS, the average frequency of service use was about one mental health visit per month (11.9 visits in the past year).
- Approximately 8.5 percent of all active component service members reported using a medication for a mental health condition in the past year. By comparison, in the civilian population, about 12 percent of adults age 18 and over reported using a prescription medication for a mental health problem in the past year (Substance Abuse and Mental Health Services Administration, 2019a). Medication is the most commonly received form of mental health treatment in the general population, which is different from the pattern of mental health treatment utilization observed among active component service members.
- Among all service members, approximately 7 percent endorsed unmet need for mental health treatment at some point in the past year (i.e., he or she needed mental health care in the past 12 months and did not receive it). Among those with stated unmet need for treatment or a positive screen for moderate or severe psychological distress, the most commonly endorsed reason for not receiving care was thinking that treatment was not needed at the time. This is consistent with findings from the civilian literature suggesting that low perceived need for treatment was the most common reason that people with mental health problems did not seek care (Mojtabai, Olfson, and Mechanic, 2002). Practical challenges associated with taking time off from work duties and scheduling appointments were also commonly endorsed reasons for not utilizing mental health services.
- Among active component service members, regardless of need for or actual receipt of care, 34.2 percent indicated that seeking mental health treatment was damaging to one's military career.

Physical Health and Functional Limitations

Within this domain, we examined chronic health conditions (e.g., hypertension, high cholesterol, diabetes, etc.), physical symptoms, pain, TBI, mTBI, postconcussive symptoms, and self-reported health. Key findings include the following:

- Overall, 40.3 percent reported being told by a health care provider that they had at least one chronic condition. The most common conditions were bone, joint, or muscle injury and back pain. These conditions were significantly more common among senior enlisted and warrant officers, as well as members of the Army and Marine Corps.
- Rates of hypertension, high cholesterol, and diabetes were low.
- The most commonly reported physical symptoms included trouble sleeping and feeling tired or having low energy. These were more common among enlisted service members than officers. The Air Force and Coast Guard had the lowest rates of sleep problems and fatigue.
- Back pain and pain in the arms, legs, and joints were also common. Approximately 29.4 percent reported bodily pain, including headache. Rates of pain were highest among members of the Army and Marine Corps and among senior enlisted and warrant officers.
- Rates of physical symptoms were significantly lower in 2018 compared with the 2015 HRBS.
- An estimated 6.1 percent of service members screened positive for mTBI, with mTBI occurring more frequently among Army, Marine Corps, and Navy service members. An estimated 4.2 percent reported postconcussive symptoms.
- Approximately 52.3 percent of service members reported that their health was very good or excellent.
- On average, service members reported missing 0.62 days of work (i.e., absenteeism) and experiencing reduced productivity (i.e., presenteeism) on 2.19 days in the past 30 days. Members of the Air Force and Coast Guard reported significantly less presenteeism than members of the Army, Marine Corps, and Navy, and officers reported less absenteeism and presenteeism than enlisted personnel.

Sexual Behavior and Health

Within this domain, we examined past-year sexual risk behaviors, STIs and unintended pregnancies, use of and access to contraceptives, and HIV testing. Key findings include the following:

- Risky sexual behavior among service members was not uncommon: 19.3 percent reported having more than one sex partner in the past year, 34.9 percent had not used condoms with a new sex partner in the past year, and 21.8 percent were at high risk for HIV infection at the time of the survey. Rates of these behaviors were highest in the Marine Corps and among junior enlisted personnel (pay grades E1–E4).
- A total of 3.4 percent of service members reported having had an STI in the past year. Rates of STIs were highest among junior enlisted personnel (pay grades E1–E4) and were higher among women (7.0 percent) than men (2.7 percent).

- Among women, 5.5 percent reported an unintended pregnancy in the past year; for men, 2.4 reported causing an unintended pregnancy in the past year. Unintended pregnancy during deployment was rare (0.08 percent).
- A total of 16.8 percent of service members reported that they had not used any contraception during the most-recent time they had vaginal sex. Only 77 percent of women at risk for pregnancy had used contraception during the last time they had sex, nearly 15 percentage points short of the 91.6 percent HP2020 goal.
- Contraceptive methods that are less than highly effective (birth control pills, shots, patches, or rings; diaphragm, or condoms) were used by roughly one-third of service members and were the most common methods overall. Junior enlisted personnel (pay grades E1–E4) were the least likely to report using the most highly effective methods (sterilization, IUD, or contraceptive implant) and the most likely to report using other methods.
- Most service members did not receive any contraceptive counseling prior to deployment. Counseling rates were significantly lower for men (14.5 percent) than for women (39.0 percent).
- Most female service members who sought birth control before (86.4 percent) or during deployment (77.7 percent) were able to access the method they preferred, although this left a notable percentage (roughly 14 and 22 percent, respectively) without such access. In contrast, most male service members who sought birth control before or during deployment were unable to get their preferred method (13.5 percent were able to access it before deployment and 19.0 percent were able to access it during deployment).
- A total of 75.8 percent of service members reported past-year HIV testing. The services exceeded the HP2020 target of 68.4 percent for the percentage of MSM who reported past-year HIV testing (78.6 percent). Still, a notable percentage of both MSM (about 21 percent) and those at high risk for contracting HIV (about one in five service members) were not tested during this recommended period. *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

Sexual Orientation and Health

Within this domain, we provided an estimate of the percentage of servicemen and servicewomen who are gay, lesbian, or bisexual and key information about the health-related behavior and health status of LGB service members. Key findings include the following:

- Overall, 3.4 percent of servicemen and 9.9 percent of servicewomen reported one or more same-sex partners in the prior year.
- Just over six percent (6.3 percent) of all active component service members identified as LGB. Significantly more women (17.6 percent) than men (4.1 percent) identified as LGB.
- The Navy had the highest percentage of LGB service members, though it was significantly different from only the Coast Guard.
- LGB personnel tended to be younger (under age 35) and to be junior enlisted personnel and officers.

- Compared with their non-LGB counterparts, LGB service members were more likely to have engaged in binge drinking (39.1 versus 33.7 percent) and heavy drinking (13.9 versus 9.5 percent) in the past 30 days, have used e-cigarettes in the past 30 days (24.5 versus 15.7 percent), and have used any illicit drug in the past 30 days (3.4 versus 1.5 percent). LGB service members were less likely to use smokeless tobacco than other personnel (5.8 versus 13.9 percent).
- LGB service members also engaged in more risky sexual behavior and had more-negative sexual health outcomes on some measures. They were more likely to have had sex with a new partner without a condom in the past 12 months (43.5 versus 34.3 percent), more likely to have had more than one sex partner in the past 12 months (41.8 versus 17.8 percent), and more likely to have had an STI in the past 12 months (10.2 versus 2.9 percent) than their non-LGB peers. However, LGB personnel were more likely than non-LGB personnel to have had an HIV test in the past six months (43.1 versus 37.9 percent).
- LGB service members were more likely than their non-LGB peers to suffer from a host of mental and emotional health issues in the past year. These include serious psychological distress (30.5 versus 15.5 percent), probable PTSD (16.6 versus 11.2 percent), suicidal ideation (15.8 versus 7.7 percent), suicide attempts (3.2 versus 1.1 percent), and angry or aggressive behavior (54.4 versus 48.8 percent). Use of mental health services by LGB service members was also higher, including care from mental health care specialists (30.5 versus 17.3 percent) and general medical doctors (19.6 versus 13.0 percent). Use of medications for mental health issues in the past year was also more common among LGB service members (13.0 versus 8.1 percent). Finally, both perceived unmet need for treatment (13.8 versus 6.3 percent) and perceived career-related stigma (45.6 versus 33.5 percent) were greater among LGB service members.
- LGB service members were more likely than their non-LGB peers to indicate having experienced unwanted sexual contact both since joining the military (29.5 versus 8.2 percent) and in the past year (10.9 versus 1.9 percent). Similarly, LGB service members were more likely than their non-LGB peers to indicate having been physically assaulted both since joining the military (8.2 versus 5.1 percent) and in the past year (2.8 versus 1.0 percent).
- We did not find significant differences between LGB and non-LGB service members on the percentages of those who had a routine physical health assessment in the past year; the amount of physical exercise; the average amount of nightly sleep; use of prescription pain relievers in the past year; common chronic conditions (e.g., high blood pressure, diabetes, high cholesterol, and asthma); back pain; and bone, joint, or muscle injuries.

Deployment Experiences and Health

Within this domain, we examined the frequency and duration of deployments (including both combat and noncombat deployments), combat trauma exposure, and deployment experiences and health. Key findings include the following:

- Across all services, the majority of service members (60.4 percent) had been deployed at least once, either in a combat or noncombat environment. Roughly 40 percent (39.6 percent) reported never having deployed.

- Just over one-quarter (27.3 percent) of all service members who had ever deployed had never been on a combat deployment.
- Slightly more than half (54.3 percent) of previously deployed active component personnel reported that they had not deployed in the past 12 months.
- Overall, just over one-third (36.2 percent) of all service members had experienced at least one of the six types of combat traumas we measured. The most frequently endorsed trauma was knowing someone who was killed in combat (22.3 percent), and the least endorsed item was being wounded (3.0 percent).
- We examined a number of outcomes between service members who had and had not deployed in the past year. Both binge drinking and heavy drinking were more common among the recently deployed. Recent deployers were significantly more like to be current cigarette users, but there was no difference in current e-cigarette use. Significantly more recent deployers met the criteria for moderate psychological distress compared with those who did not recently deploy, but no difference in the prevalence of PTSD between the two groups was found.

Comparisons with Healthy People 2020 Goals

DoDI 1010.10 states that it is department policy to "[s]upport the achievement of the Department of Health and Human Services' vision for improving the health of all Americans as outlined in Healthy People 2020." As such, it is important to be able to compare results from the HRBS with HP2020 goals to see how well the military is doing compared with these goals. However, we caution readers that making direct comparisons between the military and civilian populations ignores the fact that the two groups are very different on some sociodemographic characteristics (e.g., gender, age) related to the health outcomes and health behaviors of interest.

Table 11.1 shows comparisons between HP2020 goals and findings from the 2018 HRBS. Green cells indicate where DoD is doing as well or better than the relevant HP2020 goal; red cells indicate where DoD is doing worse. The table only presents HP2020 goals where the HRBS is comparable (or nearly comparable). This means that for some areas where HP2020 has objectives but not concrete goals, we do not make comparisons (e.g., prescription drug misuse, diabetes, asthma).

DoD is doing well with respect to several HP2020 goals: obesity, physical activity, strength training, high blood pressure, high cholesterol, and HIV testing among MSM. However, on several HP2020 topics, active component service members fell short of HP2020 goals. Binge drinking, heavy drinking, and tobacco use (including cigarettes, cigars, and smokeless tobacco) are all areas where the prevalences of service members' behaviors are much higher than the goals set by HP2020. Adequate amounts of sleep are another potential area of concern, as the percentage of active component service members who achieve this metric is below the HP2020 goal. Finally, contraceptive use and prevention of unintended pregnancy are also areas where the active component could improve.

Table 11.1
Comparison of 2018 HRBS with Healthy People 2020 Goals for Select Outcomes

Topic	HP2020 Goal	2018 HRBS
Health promotion and disease prevention		
Obesity (ages 20+)	30.5% (or less)	15.1%
Normal weight (ages 20+)	(at least) 33.9%	33.3%
MPA at least 150 minutes per week or VPA at least 75 minutes per week	(at least) 47.9%	71.8%
MPA for more than 300 minutes per week or VPA for at least 150 minutes per week	(at least) 31.3%	45.3%
Muscle-strengthening activities on 3+ days per week[a]	(at least) 24.1%	49.6%
Sleep: 8 hours per 24-hour period for those 18–21 years of age, 7 hours per 24-hour period for those older than 21	(at least) 72.8%	33.3%
Substance use		
Binge drinking	24.2% (or less)	34.0%
Current cigarette smoking	12.0% (or less)	18.4%
Current cigar smoking	0.3% (or less)	10.0%
Current smokeless tobacco use	0.2% (or less)	13.4%
Physical health and functioning		
High blood pressure	26.9% (or less)	9.1%
High cholesterol	13.5% (or less)	4.2%
Sexual behavior and health		
Use of contraceptive during most-recent sex (ages 15–44)	91.6% (or higher)	77.0%[b]
Use of moderately effective or most-effective contraceptive (ages 20–44)	69.3% (or higher)	65.0%
Annual HIV testing among MSM	68.4% (or higher)	78.6%

NOTES: HP2020 goals can be found at Healthy People, 2020a–2020u. The 2018 HRBS data in this table come from the "Total DoD" column in the relevant tables in Chapters Four through Eight.

[a] The HP2020 goal is for two or more days per week, but the HRBS measure cannot be disaggregated in this way. Instead, the HRBS value represents strength training of three or more days per week, which thus underestimates the percentage of service members meeting the HP2020 goal.

[b] The HRBS estimate is for women ages 17 to 44 because women below that age are not eligible to join the military.

Comparisons Between the 2015 and 2018 HRBSs

Given methodological changes between the 2018 HRBS and earlier iterations, it was not possible to make direct comparisons. However, we did employ a regression model approach that allowed us to compare between the 2015 and 2018 versions of the HRBS when survey items were identical across years. It is important to note that not all of the methodological differences between the surveys can be accounted for by this method. Table 11.2 summarizes the results of these comparisons. Outcomes are grouped by substantive area, as they are in the main body of the report, and focus only on overall difference (i.e., across all service branches). Details about cross-survey differences by service branch, pay grade, and gender can be found in Chapters Four through Eight. Rather than focus on actual numbers, the chart below uses a color-coded approach—green topics indicate an improvement between 2015 and 2018, orange indicates no change, and red indicates a decline.[2] To be clear, none of the comparisons between the 2015 and 2018 surveys presented in this report are based on simple comparisons of raw percentages between the two survey years.

Health Promotion and Disease Prevention

Overall, weight problems continued in the military, with the percentage of normal-weight service members decreasing and the percentage of obese service members increasing. Similarly, exercise trends were negative, with increasing percentages of service members performing less exercise (i.e., fewer minutes) and decreasing percentages performing more exercise (i.e., more minutes). The same was true for strength training. We saw a decline in the percentage of service members who reported receiving their annual physical assessment. Lack of energy due to poor sleep, however, was one area of improvement in this domain.

Substance Use

In terms of alcohol and tobacco use, the trend story was mostly bad news. Binge drinking, heavy drinking, current cigarette smoking, current e-cigarette use, and current pipe or hookah use all increased between 2015 and 2018. Only current use of smokeless tobacco showed no change; however, rates of use in the military were much higher than in the civilian population. Prescription drug use showed an encouraging trend: Use of stimulants remained stable, but rates of use decreased for both sedatives and pain relievers. And use of illicit drugs, including marijuana, did not change across surveys. Use of illicit drugs remained quite low in the military.

Mental and Emotional Health

Over-time comparisons for mental and emotional health outcomes were mixed. We saw an increase in angry or aggressive behaviors and suicidal ideation over time but no changes in recurrent anger or aggression, suicide attempts, or career-related stigma associated with mental health service utilization. There was no change in past-year use of mental health services, while use of medications for mental health problems increased. It is not clear whether these

[2] When interpreting the ARRs and percentage changes presented in earlier chapters, it is important to keep in mind what the base for that increase is. That is, an ARR of 0.2 or a 20-percent increase for an outcome with a 2015 prevalence of 2 percent represents a much smaller increase in absolute value than the same ARR and percentage increase for an outcome with a 2015 prevalence of 25 percent (0.4 versus 5.0 percent). Thus, extremely large percentage increases (or decreases) across surveys are often substantively small even though the ARR and percentage change can appear quite large.

Table 11.2
Significant Differences Between the 2015 and the 2018 HRBSs for Select Outcomes

Health Promotion and Disease Prevention	Substance Use	Mental and Emotional Health	Physical Health and Functioning	Sexual Behavior and Health
Underweight	Binge drinking	Any angry behavior in the past 30 days	Bodily pain in the past 30 days (excluding headache)	2+ sex partners in past year
Normal weight	Heavy drinking	Angry behavior 5+ times in the past 30 days	Bodily pain in the past 30 days (including headache)	New-partner sex without condom use in past year
Overweight	Any productivity loss due to drinking	Past-year suicidal thoughts	High physical symptom severity	Condom use during most-recent vaginal sex
Obese	Current cigarette smoker	Past-year suicide attempt	Stomach or bowel problems	STI in past year
MPA <150mins/week	Current e-cigarette use	Past-year mental health care service utilization	Back pain	No contraceptive use at most-recent sex
MPA 150–299 mins/week	Current pipe or hookah user	Past-year use of medication for mental health problem	Pain in arms, legs, or joints	Used IUD at most-recent sex
MPA 300+mins/week	Current smokeless tobacco user	Perceived career-related stigma	Headaches	Used implant at most-recent sex
VPA <75 mins/week	Past-year prescription stimulant use		Chest pain or shortness of breath	Used moderately or most-effective birth control method (women 20–44 years old)
VPA 75–150 mins/week	Past-year prescription sedative use		Dizziness	HIV test in past year
VPA 150+ mins/week	Past-year prescription pain reliever use		Feeling tired or having low energy	High risk for HIV
Strength training 3+ days per week	Past-year drug use (including marijuana)		Trouble sleeping	High risk for HIV and tested in past year
Strength training 1–2 days per week	Past-year drug use (excluding marijuana)			Unintended pregnancy in past year
Strength training <1 day per week	Past-year marijuana use (including synthetics)			
Routine annual physical exam	Past-30-day drug use (including marijuana)			
Moderate to severe lack of energy due to poor sleep	Past-30-day drug use (excluding marijuana)			
	Past-30-day marijuana use (including synthetics)			

NOTES: Only identical survey items are compared across surveys. Green cells indicate improvement between the 2015 and the 2018 HRBSs. Orange indicates no change between surveys. Red indicates a decline over time.

are positive or negative trends. On the one hand, the finding that more service members are receiving medical attention for mental health problems is positive, suggesting progress toward reducing unmet needs. On the other hand, the finding that receipt of medications—which can be prescribed by nonspecialty medical practitioners—increased more than receipt of specialty mental health care may indicate greater demand for mental health care that is not being met by specialty providers. A recent report that analyzed survey data from mental health providers in military treatment facilities found that limited provider availability and service members' competing work duties were commonly endorsed barriers to providing specialty mental health care for service members (Hepner et al., 2017). Service members seeking mental health care might benefit from increased access to specialty care if those barriers are reduced.

Physical Health and Functioning

For all the physical health and functioning outcomes that we were able to compare across surveys, we saw improvements. Pain, both with and without headache; high physical symptom severity; and each of a set of eight physical symptoms (stomach or bowel problems; back pain; pain in arms, legs, or joints; headaches; chest pain or shortness of breath; dizziness; feeling tired or having low energy; and trouble sleeping) all decreased between 2015 and 2018.

Sexual Behavior and Health

Cross-survey comparisons on sexual behavior outcomes were mixed. The percentages of service members who had two or more sex partners in the past year, had sex with a new partner without a condom, used no contraceptive the most-recent time they had sex, used an IUD the most-recent time they had sex (a long-acting form of contraceptive), had an HIV test in the past year, and were at high risk for HIV at the time of the survey all showed improvement. Condom use the most-recent time they had sex, use of an implant the most-recent time they had sex (a long-acting form of contraceptive), current use of moderately effective or most-effective contraceptives, past-year HIV testing among those at high risk, and causing or experiencing an unintended pregnancy in the past year all remained stable. A lack of change in these outcomes could represent continued risk among service members. Finally, the percentage of service members reporting an STI in the past year was significantly higher in the 2018 HRBS than in the 2015 HRBS, mirroring trends in the civilian population.

Policy Implications and Recommendations

Force Readiness, Health, and Well-Being

One of the key uses of the HRBS is to assess the readiness of the force with respect to the health and health-related behavior of service members. As such, in the section below we offer several observations to help DoD and the Coast Guard identify immediate and future threats to readiness, and we outline relevant policy implications derived from those observations. We discuss these threats in the order of the chapters in the report.

Health Promotion and Disease Prevention

- Roughly 15 percent of the force is classified as obese according to the CDC's BMI categories, and there has been a 7-percent increase in obesity as compared with the 2015

HRBS. However, whether obesity represents an actual threat to readiness remains an open question because BMI may not accurately reflect physical health and conditioning (e.g., Nevill et al., 2006). DoD is currently reviewing DoDI 1308.3, which outlines how to assess physical fitness and body fat across the military, and the individual branches of service have been reviewing and making changes to their own physical fitness tests. **As part of these revisions, DoD, the services, and the Coast Guard should consider whether BMI is an appropriate measure of weight for service members.**

- Just one-third of service members meet HP2020 guidelines for adequate sleep, and roughly 36 percent rated their sleep as fairly bad or very bad. The issue is also significantly worse among the enlisted ranks. Difficulty sleeping and fatigue are important concerns that can impact the readiness of service members. Not only does poor sleep have downstream consequences for physical and mental health, but also, in the short term, both poor sleep and fatigue can affect performance. This is especially important to consider in the context of tasks that require quick decisionmaking and/or sustained attention, as both can be affected by fatigue and lack of quality sleep. **DoD, the services, and the Coast Guard should make efforts to educate service members on the importance of sleep, and these efforts should be especially be targeted to enlisted service members.**
- An annual checkup is required for all service members. However, nearly 30 percent of respondents had not had this annual medical appointment in the previous year. **By improving access to and emphasizing these appointments, DoD, the services, and the Coast Guard could have additional opportunity to address sleep and weight issues among service members and could improve the health of the force.**

Substance Use

- More than one-third of service members reported binge drinking in the past 30 days, and nearly 10 percent were categorized as heavy drinkers, which included multiple days of binge drinking in the past 30 days. Drinking could be addressed by targeting at-risk groups for prevention and intervention efforts. However, more than one-quarter (28 percent) of all service members reported that military culture was supportive of drinking, which indicates that such prevention and intervention efforts would likely need to address military culture at a systemic level. **DoD, the services, and the Coast Guard must better understand the culture and climate surrounding alcohol use and then take steps to shift the culture away from excessive use.**
- Over one-third of service members reported using tobacco in some form, such as through use of combustible cigarettes, e-cigarettes, cigars, smokeless tobacco, or pipes or hookahs. **Reducing tobacco use in all forms should be a high priority for DoD, the services, and the Coast Guard given the long-term health consequences of use.** Continued efforts to curtail such use are needed. Moreover, the research on e-cigarettes is still emerging and is beginning to reveal potential long-term consequences of vaping (Papaefstathiou, Stylianou, and Agapiou, 2019). Efforts to prevent e-cigarette use may be hindered by beliefs that using such devices is safer than smoking cigarettes and can aid in smoking cessation. Intervention and prevention approaches to address tobacco use will likely need to be informed by current evidence-based approaches used with civilians and target beliefs related to e-cigarettes as a replacement to traditional combustible cigarettes.

- **The rates of use of prescription stimulants, sedatives, and pain relievers were low (in an absolute sense), with just over 1 percent of service members reporting misuse of any prescription drugs in the past 12 months; however, given their potential for misuse, DoD, the services, and the Coast Guard should continue to monitor prescription drug availability in the military.** This might include monitoring the most-common sources of prescription drugs among service members, as well as monitoring prescribing practices among military prescribers. This is especially true for prescription pain relievers, which were most commonly misused. Relatedly, prescription pain reliever use and misuse should continue to be monitored, especially given that pain-related conditions were among the more prevalent physical health concerns. It will be valuable to have prevention and intervention efforts readily accessible to assist service members who begin to struggle with a transition from legitimate prescribed use of these drugs to misuse.

Mental and Emotional Health

- Findings from the 2018 HRBS indicate that symptoms of psychological distress are common among service members, with nearly one in ten individuals meeting criteria for current serious psychological distress. If untreated, these symptoms can persist and lead to significant functional impairments, which has major implications for service member well-being and force readiness. DoD already invests considerable resources into surveillance of service member mental health, studying factors associated with poor mental health status, and implementing programs to help mitigate the negative impacts of mental health conditions on service member well-being. **DoD, the services, and the Coast Guard should continue their efforts to monitor, understand, and support service member mental health.**
- Although a large percentage of service members receive mental health treatment, the process of seeking care remains a barrier. Practical challenges associated with scheduling an appointment and taking time off from work duties were commonly endorsed reasons for not utilizing mental health services. **DoD, the services, and the Coast Guard should continue their efforts to help mitigate challenges associated with scheduling and attending appointments for mental health treatment.** In addition to these practical barriers, the beliefs that treatment either was not needed or would not be effective were among the most common reasons for not seeking treatment. Furthermore, despite efforts to reduce stigma associated with mental health treatment, the belief that mental health treatment would harm one's military career remains widespread, reported by over one-third of active component service members. Improving availability of mental health care alone will not fully address these barriers to care. **Therefore, DoD, the services, and the Coast Guard should explore the potential for enhancing the role of peers and commanders as facilitators of treatment-seeking through mental health literacy training and dissemination of information about mental health resources.** Studies to determine the most-effective ways to address barriers related to service members' knowledge and beliefs about engaging in formal mental health treatment may help improve these programs and increase utilization of available treatment resources.
- Although specialty mental health providers were the most commonly endorsed source of mental health treatment, nearly half of mental health services were delivered by nonspecialists. **Additional research is needed to identify, improve, and evaluate the sources,**

quality, and outcomes of nonspecialty mental health services utilized by service members.

- We also found that a significant minority of service members—roughly 20 percent—received mental health care in a civilian facility. Insufficient access to high-quality services has the potential to negatively affect service member well-being, as well as force health and readiness. This also has significant implications for ensuring continuity of military mental health care. **Additional research is needed to understand the reasons why service members seek mental health care services outside the MHS, differences in types of services received by service members across civilian versus military facilities, and the impact of civilian services on continuity of military mental health care.**
- Over 8 percent of all service members reported having thoughts of suicide in the past year, a figure nearly twice as high as that observed among the general population (4.3 percent; Substance Abuse and Mental Health Services Administration, 2018). Women, younger service members, and junior enlisted service members demonstrated the highest rates of past-year suicide ideation. Efforts to target prevention strategies to these high-risk groups may be beneficial. **Despite an already substantial investment in funding to understand and prevent suicide among service members, additional efforts are needed to determine whether different prevention strategies are needed for different subgroups of service members (e.g., by level of risk, demographic or psychosocial characteristics, etc.).**
- In addition, although rates of suicide attempts remained stable, rates of suicidal ideation among all service members increased significantly (by 31 percent) from the 2015 HRBS; increases were observed for both men and women and within all branches except the Army. Because individuals are likely to have thought about suicide prior to an attempt, the increases in suicide ideation among service members from 2015 to 2018 are concerning. **In the context of increasing rates of suicide ideation, more information is urgently needed to identify early precursors to suicide to improve prevention efforts.** There is also a need for more-rigorous evaluation of suicide prevention strategies to better understand factors associated with successful implementation and effectiveness. Such data will allow the military to better tailor its prevention efforts and target its resources more effectively and efficiently.

Physical Health and Functioning

- Absenteeism was fairly low (0.5 missed days per month), but presenteeism averaged just over two days per month. Having reduced productivity across multiple days may have more of a negative impact on readiness than one missed day that allows for fuller recovery. **The underlying causes of absenteeism and presenteeism should be explored, as addressing these factors may be the most effective way to reduce lost productivity.**
- Pain was a commonly reported health condition by service members. Roughly 30 percent reported any bodily pain, including headache, in the past 30 days. Recent back pain and pain in the arms, legs, or joints were each reported by roughly one-fifth of service members. High levels of pain may be unsurprising given that musculoskeletal injuries in the military are common, especially given the nature of certain military careers. It is also perhaps not surprising that these effects seem to accumulate with time in service and age, and pain remains one of the most common presenting concerns among veter-

ans. As noted above, pain relievers were the most frequently misused prescription drug in the survey (though the rate was roughly 1 percent). The potential for pain to lead to misuse and abuse of prescription drugs makes it a potential area of concern for readiness. **Continued policy and program attention by DoD, the services, and the Coast Guard should be placed on both preventing pain (e.g., reducing musculoskeletal and overuse injuries) and treating it through a variety of approaches (e.g., medication; behavioral interventions, such as cognitive behavioral therapy; complementary and alternative medicine).**

Sexual Behavior and Health

- **DoD, the services, and the Coast Guard should consider ways to increase the proportion of personnel who receive predeployment contraceptive counseling.** The 2016 NDAA required DoD to "establish and disseminate clinical practice guidelines on standards of care" for contraceptive counseling and to provide comprehensive counseling (*National Defense Authorization Act for Fiscal Year 2016*, 2015). DoD adopted these guidelines at the end of 2016 with the publication of DHA-IPM 16-003. They were fully codified in May 2019 with DHA-PI 6200.02. The guidelines apply to servicemen and servicewomen and specifically include predeployment counseling and a requirement to provide access to the full range of current contraceptive methods. We expect that progress will be observed as providers become more familiar with these new guidelines. Although we cannot be certain why few service members report receiving counseling, it is possible that many service members and providers see the counseling as less relevant to their situations. Educational efforts should make clear to both MHS providers and service members that directives to provide contraceptive counseling are relevant for *all* personnel, including those who are not currently sexually active or do not intend to be during deployment, those who identify as LGB, and those who intend to have children in the near future. Sexual activity can be unplanned, hormonal contraceptives can be used for reasons other than birth control (including to suppress menstruation in the deployed environment), and long-acting methods of contraception (such as IUDs and implants) are reversible (when they are removed, fertility typically returns in about one month). These efforts might include informational campaigns directed at health care providers and service members and/or the promotion of the use of apps and informational websites designed to assist both providers and patients with contraceptive decisionmaking.
- **DoD, the services, and the Coast Guard should consider expanding efforts to provide contraceptive counseling specifically to men.** U.S. population data available from the 2006–2010 National Survey of Family Growth indicate that 60 percent of men could benefit from family planning services (with the highest need among men aged 20 to 29), but only 10 percent reported receiving counseling about contraception (Marcell et al., 2016). Research is ongoing to develop effective contraceptive counseling strategies that target men. Such strategies include counseling men on condom use and how to support their partners in using other methods, such as IUDs, as well as providing counseling services to couples.
- **DoD, the services, and the Coast Guard should explore mechanisms to increase the consistent and effective use of contraception.** Under the new contraceptive guidelines adapted by DoD, IUDs and implants are to be considered first-line methods of contra-

ception. However, providers and service members might need additional training and education about the benefits of the most-effective contraceptive methods, with the caveat that these methods may not be appropriate for all women. Thus, it is also important that service members receive enhanced educational support on consistent and correct use of whatever method they choose. This might occur at MHS clinics, in trainings, or through websites and apps.

- **To address the escalating rates of STI, DoD, the services, and the Coast Guard should ensure that condoms are easily available through TRICARE and available to service members, regardless of location, at no or reduced cost.** Evidence from school-based condom availability programs indicates that these programs result in increased use of condoms and decreased rates of STIs without promoting sexual activity or increasing numbers of sex partners (Algur et al., 2019; Scott-Sheldon et al., 2011). **DoD, the services, and the Coast Guard should also consider implementing regular testing for STIs, especially among women.** Servicewomen were significantly more likely to report a past-year STI than servicemen, and there are links between untreated chlamydia and infertility among women (Haggerty et al., 2010; Hafner, 2015). The CDC recommends annual testing for sexually active women under age 25, women with new or multiple partners, and sexually active gay and bisexual men (gay and bisexual men can benefit from testing as often as every three or every six months if they have multiple sex partners; CDC, 2019b).
- **Annual testing for HIV infection among those at high risk might be increased through better screening for risk as part of the PHA.** Although the current Form 3024 asks pertinent questions, it is not clear that information on various contributors to risk is combined to detect those in the highest risk category, nor is it clear that certain risks (e.g., MSM) or combinations of risks should consistently trigger more frequent (annual or biannual) testing for HIV infection.

Sexual Orientation and Health

- **Broadly targeted health promotion efforts by DoD, the services, and the Coast Guard should include LGB-specific considerations, as appropriate, recognizing that LGB individuals are part of the service.** Addressing LGB health disparities is unlikely to require the development of programs or policies targeted specifically to this group, with only a few exceptions. Indeed, making salient the higher rates of mental and sexual health issues among LGB personnel could increase the stigma of LGB status, strengthening the likely source of many of these disparities: minority stress (see Meyer, 2003).
- **DoD, the services, and the Coast Guard should address the unique mental health needs of LGB personnel.** Current and future campaigns to reduce stigma surrounding mental health and service utilization should include messaging and images relevant to LGB personnel (e.g., feeling isolated, lack of acceptance) and should be tested for acceptability and perceived effectiveness in this group of service members prior to implementation. Mental health service providers should also be sensitive to the unique needs of LGB service members.
- **Sexual health disparities, including the high rates of STI and HIV risk behavior, could be reduced through education of providers in the MHS.** It is unclear whether MHS providers are aware of the high percentage of LGB personnel identifying as bisex-

ual. Roughly 60 percent of LGB servicemen and 65 percent of LGB servicewomen are bisexual. Incorrect assumptions that bisexual service members are heterosexual or gay or lesbian based on the sex of their current sexual partners can lead to incomplete or incorrect counseling regarding use of condoms and other contraceptives and testing for STIs. Providers of women's health services should be aware that one in six of the servicewomen they see identify as LGB. Adaptation of patient screening and counseling protocols and clinic forms may also be appropriate to recognize the presence of LGB personnel as part of the patient mix.

Future Iterations of the HRBS

The HRBS has a long history within DoD, and with that history has come many changes to both survey content and survey implementation. The 2018 HRBS represents the fourth consecutive iteration to rely solely on internet administration. Over that same period, response rates have also declined. Below we offer some recommendations for future iterations of the HRBS, focusing on way to improve the efficiency and effectiveness of data collection.

Consider the use of survey incentives. The general consensus among those who study survey implementation is that there is a positive association between incentives and response rates (Singer and Ye, 2013). A 2015 meta-analysis by Mercer et al. found that prepaid incentives, rather than promised incentives that are received only after survey completion, had the highest return on investment, especially on mail surveys (Mercer et al., 2015). Notably absent from that analysis, however, are internet surveys. An older review of the literature found that providing monetary incentives for web surveys increased an individual's odds of response by 50 percent (Edwards et al., 2009).[3] Using a college student sample, Parsons and Manierre, 2014, also found that a prepaid incentive of a $2 bill was associated with increased response rates. Overall, there is no consensus on the size of an optimal incentive, regardless of whether it is given before or after participation. Nonetheless, experimental research has shown that a small preincentive can affect response rates (Sánchez-Fernández et al., 2010; Singer, Van Hoewyk, and Maher, 2000).

Whether such incentives could improve response rates, and thus reduce the possible nonresponse bias, among active component service members is an open question.[4] The HRBS could be used to answer this question. According to DoDI 3216.02, it is possible for a federal contractor to compensate service members, who are considered federal employees, for participation in a survey. The instruction is vague as to whether this includes pre- and postincentives. Further, approval is not automatic, as a DoD Institutional Review Board and the Office of General Counsel must approve the payment. Perhaps more importantly, service members who do receive compensation must be explicitly told that they cannot complete the survey during duty time. This requirement could have unintended consequences, as our data show that roughly two-thirds (65.4 percent) of respondents completed the 2018 HRBS between the hours of 7 a.m. and 6 p.m., Monday through Friday. Nonetheless, the next iteration of the HRBS should explore the use of targeted incentives, especially prepaid incentives that are not dependent on survey completion, to increase participation among certain groups with traditionally low response rates (e.g., junior enlisted personnel).

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[3] Note that this does *not* mean that overall response rates increased by 50 percent.

[4] At least one experimental study of recent U.S veterans found that a $5 preincentive improved response rates by 52 percent (e.g., Coughlin et al., 2011).

Shorten the survey and focus survey content. Though the 2018 HRBS was somewhat shorter than the 2015 version (measured in terms of time to complete), it is still a lengthy survey that can become tedious for the respondent, especially if they have recently answered similar survey items in other service-specific or DoD-wide surveys. Survey fatigue is a continued problem among service members, especially when it comes to health and health-behavior topics. Service members are required to complete the annual PHA (Defense Health Agency, 2016; Office of the Under Secretary of Defense for Personnel and Readiness, 2016). The PHA has three pieces, one of which is a service member survey.[5] Some, though not all, of the content in the survey overlaps with topics covered in the HRBS (e.g., chronic conditions, mental health, alcohol use). DoD should consider whether this duplication is necessary. On the one hand, overlapping surveys could be driving down response rates on the HRBS. On the other hand, the PHA is not anonymous or confidential; responses are directly tied to service members. This could incentivize service members not to be entirely truthful if they feel that their responses could potentially result in negative career-related consequences. As a first step, DoD should explore whether and how responses to the similar items differ across the PHA and the HRBS.

An alternative approach to reducing survey content could involve the use of modules. Modules would be based on content—for example, a tobacco use module or a pain and musculoskeletal injury module. In this approach, not every service member would receive every set of items on the survey but could be randomly (or purposively) assigned to receive a certain number or type of modules. Modules that address high-frequency topics might not need as many respondents as modules related to topics that occur with a much lower prevalence (e.g., drug use). And the same set of modules would need to be asked at every iteration of the HRBS, especially if trend data suggest little change over time. A module approach would also allow for period-specific topics to receive dedicated space on the survey. So if there were congressional or DoD interest in a particular topic during a particular survey year, it could be addressed through the use of a one-time module.

Explore the use of a service member panel for tracking risky behaviors over time. Finally, as a supplement to the HRBS, DoD should consider the use of a service member panel to gather information about certain health outcomes and health-related behaviors on a real-time basis. Panels are groups of individuals who agree to participate in a series of surveys for a period of time (e.g., six months, a year) and are replenished at regular intervals as members leave the panel. Panels do require constant maintenance to make sure they remain representative of some underlying population of interest. Furthermore, panels are generally not efficient when it comes to assessing the population prevalence of rare outcomes. Thus, a panel should be considered s supplement, not a wholesale replacement, of the HRBS. However, the use of a panel could be beneficial in terms of reducing the overall scope of the HRBS, which could positively impact response rates. Furthermore, a panel could be an attractive option because surveys would not necessarily have to be limited to health-related topics and could be used to study any number of topics that could impact retention or readiness.

[5] The other two pieces are an in-person interview with a health care provider and a record review of the service member's health care record.

Conclusion

The HRBS is used by DoD and the Coast Guard to assess the current health and well-being of the force and to identify possible threats to readiness. This report provided an overview of health outcomes and health-related behaviors across seven domains. The future of this study may face future challenges—declining response rates, overlapping content with other surveys, and competition for resources—but it remains an important source of data for tracking trends, informing policy, and making programmatic decisions.

APPENDIX A

2018 DoD Health Related Behaviors Survey

This appendix presents the survey as it was programmed for respondents to view on the internet. Text in brackets and italics refers to instructions for the survey programmers and was not seen by respondents.

[PROGRAMMING INSTRUCTIONS: PLEASE INCLUDE DATE AND TIME STAMPS FOR START AND END.]

[INCLUDE BOTH RAND AND WESTAT LOGO ON WEB SURVEY]
[INTRO SCREEN 1]

RCS # DD-HA(BE)2189

Expires: 02/28/2023

Welcome to the 2018 DoD Health Related Behaviors Survey (HRBS). Participation in the study is by invitation only. To participate in this study, login below with the unique ID code provided in your email or postal letter invitation.

Please enter your unique ID code to begin.

For more information on the 2018 DoD HRBS, please visit http://www.health.mil/2018HRBS

RCS # DD-HA(BE)2189

Expires: 02/28/2023

Welcome to the 2018 DoD Health Related Behaviors Survey

Dear Service Member:

Before you begin this web survey, please read the Privacy Advisory and informed consent statement that follows. Click the Frequently Asked Questions (FAQs) button at the bottom of this page if you want to read more details about the study.

PRIVACY ADVISORY

This survey is confidential. The Defense Manpower Data Center has provided certain information about you to allow the RAND Corporation and Westat to conduct this survey. Your name and contact information have been used to send you email and mail notifications about the survey. Only RAND and Westat will know who participated in the study or who did not. The data that RAND and Westat provide to DoD will be a reduced set of responses, treated in such a way as to make it difficult for DoD to identify any participant from his or her pattern of responses. Study staff have been trained to protect your individual survey responses and are subject to civil penalties for violating your confidentiality. DoD has agreed to these conditions to protect your privacy. To reduce the length of the survey, RAND will also collect demographic information about you such as your service branch, pay grade, age, and education level from the Defense Manpower Data Center and link it to your survey responses.

INFORMED CONSENT STATEMENT

Introduction: You are being asked to complete a confidential and voluntary DoD-approved survey. This survey is for research purposes.

Survey Contractors: DoD has contracted with the RAND Corporation and Westat to conduct the 2018 DoD Health Related Behaviors Survey. RAND is a private, nonprofit organization that conducts research and analysis to help improve public policy and decision-making. RAND's data collection contractor is Westat, an internationally known research and statistical survey organization. Westat manages the technical aspects of the web survey operations and can help you with any computer or technical problems.

Purpose: The purpose of this survey is to provide an assessment of the health-related behaviors and lifestyles of military personnel that have the potential to impact readiness. The information will be used in scientific research to inform DoD of potential health problems in the military and help suggest ways to solve or prevent them. DoD and the Services use the results from this survey to inform policies and programs to optimize individual and overall health status and fitness.

Selection: You were selected at random from a computer-generated list of all Active Duty, Reserve Component, National Guard, and Coast Guard personnel worldwide to represent your Service branch and component in this important research.

Length: This web survey will take approximately 20-25 minutes to complete.

Voluntary Participation: Your participation in this survey is voluntary. No negative action will be taken against you should you choose not to take part in the survey. You may skip questions you do not wish to answer and can stop participating in the survey at any point.

Confidentiality: Because of the sensitive nature of the information in the survey, RAND has taken several steps to allow your frank and honest responses. First, the survey is confidential. Only RAND and Westat will have identifying information about you. DoD, the Services, and your command will not know who did and did not complete the survey. Second, personal identifying information will not be linked to survey data. This means that all data obtained by RAND through DMDC, as well as data collected by Westat, will be linked using scrambled ID numbers, rather than actual names or social security numbers. The matching file that connects any individual to his or her data may only be accessed by individuals who work with the data and who have been trained to handle potentially sensitive data. Third, all data transfers between RAND and Westat will use an encryption program designed for the purpose of transferring potentially sensitive information. Fourth, both RAND and Westat have physical security measures in place to prevent unauthorized individuals from accessing hard copies of data as well as accessing computing resources where electronic data is stored. Finally, the information you provide will be combined with that from other military personnel to prepare statistical reports. At no time will your individual identifiable survey data be given to anyone outside the study team.

To help us protect your privacy, we have obtained a **Certificate of Confidentiality** from the National Institutes of Health. The researchers can use this Certificate to legally refuse to disclose information that may identify you in any federal, state, or local civil, criminal, administrative, legislative, or other proceedings, for example, if there is a court subpoena. The researchers will use the Certificate to resist any demands for information that would identify you.

Risks of Participation: Breach of confidentiality is a possible risk. However, as noted above, RAND and Westat have taken a number of steps to ensure the confidentiality of the data you provide.

Some of the questions asked are sensitive in nature. The survey asks about a range of health issues, such as physical and mental health, substance use, sexual practices, stress, deployment related health and combat exposure. You may feel discomfort or distress in answering one or more of these items. Therefore, we encourage you to take the survey in private, where others will not see your computer screen.

It is okay to forward the survey link to a personal email address and you may complete the survey from a non-government, non-CAC enabled computer. You may also take the survey on a smartphone or tablet.

[FREQUENTLY ASKED QUESTIONS] (hyperlink)

RCS # DD-HA(BE)2189

Expires: 02/28/2023

FREQUENTLY ASKED QUESTIONS (FAQs)

What is the purpose of the 2018 DoD Health Related Behaviors Survey (HRBS)? This survey assesses the health related behaviors and lifestyles of military personnel that have the potential to impact readiness. Results will be used to monitor service members' needs, develop policies, and improve health programs and services for military members and their families.

How long is the survey? This survey takes about 20-25 minutes.

Who is doing this study? The Department of Defense (DoD) asked the RAND Corporation and its data collection contractor, Westat, to conduct an independent, objective assessment of Service members' health status and health related behaviors.

Who is the RAND Corporation? RAND is a private, nonprofit organization that conducts research and analysis to help improve public policy and decision-making. For more information about RAND see: https://www.rand.org/

Who is Westat? Westat is an internationally known research and statistical survey organization. Westat manages the technical aspects of the web survey operations and can help you with any computer or technical problems. For more information about Westat see: https://www.westat.com/

Why did you pick me? You were randomly selected from all Active and Reserve Component and Coast Guard personnel to represent your Service branch in this important research.

How did you get my name? We obtained your name and basic demographic information (e.g., service branch, pay grade, age, education level) from the Defense Manpower Data Center [DMDC], which maintains DoD personnel records. Because we are doing an official, approved DoD survey, DMDC was authorized to give us military members' names and contact information for research purposes only. We are just using your name to send you information about the survey via email and mail. Only study staff will be able to link your survey responses to your contact information via a unique survey ID code. The survey is confidential.

How will the survey findings be used? RAND will report survey findings in a way that does not identify individuals to the Services, DoD, or the public. The information you provide will be combined with that from other military personnel to prepare statistical reports. At no time will your individual data be reported.

Why should I participate? This is your chance to be heard on issues that directly affect the health, well-being, and readiness of military members and their families. The survey results will help inform DoD of potential health problems in the military and help suggest ways to solve or prevent them.

Will my answers be kept private? Yes. As noted earlier, this survey is confidential. This means that RAND and Westat will not give DoD information about who participated in the study, or provide your responses to them in a way that can identify you. DoD has agreed to this condition to protect your privacy.

Can I complete the survey during duty hours / on a government computer? Yes. The Service Chiefs endorsement letters posted on the survey website indicate that you can use a computer at work to do the survey. You may also use a smartphone or tablet to complete the survey.

What do I do if I experience any discomfort or distress from filling out the survey? Some questions on the survey are sensitive in nature and it is possible that you may feel discomfort in answering one or more of these items. If you are having any suicidal thoughts, please seek help immediately. We encourage you to contact your unit's chaplain or a mental health professional. Other resources can be found below:

Military OneSource (http://www.militaryonesource.mil) is a free 24 hour service that is available 7 days a week to provide a full range of services, across the deployment cycle, to military personnel and their families, at no cost. They can be reached at:

Stateside: CONUS: 1-800-342-9647
Overseas: OCONUS Universal Free Phone: 800-342-6477 or 703-253-7500
Collect from Overseas: OCONUS Collect: 703-253-7599
En Español llame al: 800-342-9647
TTY/TDD: Dial 711 and give the toll-free number 800-342-9647

DoD Safe Helpline (https://www.safehelpline.org/) provides worldwide live, confidential support, 24/7. You can initiate a report and search for your nearest Sexual Assault Response Coordinator (SARC). You can find links to Service-specific reporting resources and access information about the prevention of and response to sexual assault on their website or by calling the hotline at 1-877-995-5247.

Military Crisis Line (http://veteranscrisisline.net/ActiveDuty.aspx) can also provide confidential support and consultation if you feel distressed. They can be reached at 1-800-273-8255 (then press 1). Or send a text to 838255.

You may also contact the **National Suicide Hotline** at 1-800-273-TALK (8255) or https://suicidepreventionlifeline.org/.

Do I have to take the survey? The survey is entirely voluntary. If you choose to take the survey, you may stop at any time.

Did I already answer these questions in earlier DoD surveys? Some Service members may have completed surveys like this one in the past. This survey is conducted approximately every three years to get a comprehensive update about the health behaviors of military members. Since DoD wants to understand trends in members' experiences in the Services, it is important that you participate in the 2018 Survey to tell us about your current health.

Who do I contact if I have questions or concerns about the survey?

- **Call the Westat Survey Helpdesk for computer, technical, or survey questions:** by phone toll free at 1-844-727-2018 or by email at support@dodhrbs.com
- **Contact RAND for questions about the overall study**: Email: 2018HRBS@rand.org
- **Questions about your rights as a participant in this study**: Contact RAND's Human Subjects Protection Committee toll-free at (866) 697-5620 or by emailing hspcinfo@rand.org. If possible, when you contact the Committee, please reference Study #2017-0459.

What do I need to do to fill out the web survey? You should go to the following website link: https://www.dodhrbs.com. If you have problems accessing the website, contact the Westat survey helpdesk listed above.

Do I have to complete the web survey in one sitting? You may use the weblink above and your unique identification code to re-start the survey wherever you stop at a time that is more convenient for you.

Will I ever see the results of the survey? Yes. When the survey results are available, an executive summary will be available.

[INTRO SCREEN 2]
[HELP button should also be programmed on each page of the survey taking respondents to a page that contains the info on this screen.]

Help
In the event that any of the questions in the survey may cause you discomfort, please remember that the following resources are available to you. You can also click on HELP at the bottom of each page for these resources.

Military OneSource (http://www.militaryonesource.mil) is a free 24 hour service that is available 7 days a week to provide a full range of services, across the deployment cycle, to military personnel and their families, at no cost. They can be reached at:

Stateside: CONUS: 1-800-342-9647
Overseas: OCONUS Universal Free Phone: 800-342-9647
Collect from Overseas: OCONUS Collect: 703-253-7599
En Español llame al: 800-342-9647
TTY/TDD: Dial 711 and give the toll-free number 800-342-9647

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You may also contact the **National Suicide Hotline** at 1-800-273-TALK (8255) or https://suicidepreventionlifeline.org/.

[INTRO SCREEN 3]

Who do you contact if you have questions or concerns about the survey?

- **Questions about computer, technical, or survey problems**: Please contact the Westat Survey Help Desk toll free at 1-844-727-2018 or email support@dodhrbs.com

- **Questions about the overall study or RAND**: Contact the RAND team by email at 2018HRBS@rand.org.

- **Questions about your rights as a participant in this study**: Contact RAND's Human Subjects Protection Committee toll-free at (866) 697-5620 or by emailing hspcinfo@rand.org. If possible, when you contact the Committee, please reference Study #2017-0459.

- **Questions about the licensing of the survey:** Information about DoD surveys can be found at http://www.dtic.mil/whs/directives/collections/index.html; this survey's RCS # is DD-HA(BE)2189 and the expiration date is 02/28/2023.

You can print a copy of this Informed Consent Statement by clicking the following button:

INFORMED CONSENT [hyperlink]

Click the Next button if you agree to participate in the survey.

NEXT [hyperlink]

[SURVEY START SCREEN]
[SURVEY INSTRUCTIONS button should be programmed at bottom of each page with this information]

Survey Instructions

- If you prefer not to answer a specific question for any reason, just leave it blank.
- If you have selected a response and then want to change it, just click on another response. If you want to clear a response, you can double-click the response to remove it.
- Use the navigation button (Next; Previous) to move to the next question. Please do NOT use your browser's forward and back buttons.
- If you need to leave the survey at any time, please select the "Save and continue later" button on the survey screen. To pick up where you left off, you may click on the link below or go to the survey website and re-enter your unique survey code.

Remember, the survey is confidential. No one in the military will be able to match your answers back to your name or other identifying information.

START SURVEY NOW

[GENERAL SKIP PROGRAMMING INSTRUCTIONS:

If a respondent skips an item, show screen with "You did not provide a response to this question. Please select a response below. Note that skipped items may result in you being asked questions later in the survey that do not apply to you."

If respondent again selects the forward option, skip the item.

General Rule: Show all items that require a fill if the fill item is skipped.]

DEMOGRAPHICS IDENTIFIED THROUGH DMDC: Service branch, component, current Reserve/Guard status, YOS (both Active and R/G), pay grade, education level, race, ethnicity, gender, age, and number of dependent children.

DMDC VARIABLES USED IN SURVEY:
CURRENT RESERVE/GUARD STATUS

SERVICE BRANCH

SKIPS AND PROGRAMMING INFORMATION IN RED
VARIABLE NAMES IN BLUE
RESPONSE VALUES IN GREEN

Q1. Which of the following best describes where you currently live? Select one response. Q1

Dorms/Barracks **1**
Military housing (including privatized), ON main base/installation **2**
Military housing (including privatized), OFF main base/installation **3**
Civilian housing that you own or pay mortgage on **4**
Civilian housing that you rent, off base **5**
Some other living situation (e.g., living with parents, temporary housing) **6**

Q2. What is your current marital status? Select one response. Q2

Married **[Skip to Q4] 1**
Separated **2**
Divorced **3**
Widowed **4**
Never married **5**

[IF Q2 = MISSING, CONTINUE TO Q3]

Q3. Are you currently living or cohabiting with a partner? Q3

Yes **1**
No **2**

Q4. Are you male or female? Select one response. Q4

Male **1**
Female **2**
Other **3**

IF NOT RESERVE COMPONENT OR NATIONAL GUARD SKIP TO Q9.

Q5. What is your current work status? Select one response. [Ask only if Reserve Component or National Guard.] Q5

Working full-time; that is, 35 or more hours per week in one or more jobs; including self-employment **1 [Skip to Q7]**
Working part-time (less than 35 hours per week) **2 [Skip to Q7]**
I do not currently have a job **3**

[IF Q5 = MISSING, SKIP TO Q7]

Q6. What is the reason why you do not currently have a job? Select one response. [Ask only if Reserve Component or National Guard and Q5 = 3 (I do not currently have a job).] Q6

Full-time homemaker/parent **1**
Full-time student **2**
Retired **3**
Disabled **4**
Looking for work, but unemployed **5**
Not looking for work in a job **6**
Other **7**

Q7. Are you currently covered by any type of health insurance plan? [Ask only if Reserve Component or National Guard.] Q7

Yes **1**
No **2 [Skip to Q9]**

[IF Q7 = MISSING, CONTINUE TO Q8]

Q8. Are you currently covered by any of the following health insurance plans? [Ask only if Reserve Component or National Guard.]

	Yes 1	No 2
TRICARE or other military health insurance Q8A		
Veterans Affairs (VA), including CHAMPVA Q8B		
Private insurance through an employer, union, or school or purchased directly through an insurance company or exchange/marketplace Q8C		
A government insurance program provided to lower income individuals and families, such as Medicaid Q8D		

Q9. How tall are you without shoes on? Please type in your height in feet and inches.

Q9A: Feet: _____ **(1 digit; 4–7) Q9A**
Q9B: Inches: _____ **(2 digits; 0–11) Q9B**

[Soft check: Q9A < 5 and Q9B <= 0 and Male; Q9A <= 4 and Q9B < 6 and Female; Q9A <= 4 and Q9B < 6 and gender missing or other.) Q9-Height: "You entered __ feet __ inches. If this is correct, please hit NEXT below to continue. If this is not correct, please change your answer below."**]**

Q10. How much do you weigh without shoes on? Please type your weight in pounds.
(**IF FEMALE SHOW:** If you are currently pregnant, what was your typical weight before pregnancy?) Please type in your weight in pounds.

Pounds: _____ **(3 digits; 0–500) Q10**

[Soft check: Q10 < 95 AND Q10 > 275 and Male; Q10 < 95 and Q10 > 200 and Female; Q10 < 95 or > 275 and gender missing or other.) Q10-Weight: "You entered __ pounds. If this is correct, please hit NEXT below to continue. If this is not correct, please change your answer below."**]**

Q11. During the PAST 30 DAYS, how often did you do the following kinds of physical activity?

	About every day 1	5-6 days a week 2	3-4 days a week 3	1-2 days a week 4	Less than 1 day a week 5	Not at all in the past 30 days 6
Moderate Physical Activity—exertion that raises heart rate and breathing, but you should be able to carry on a conversation comfortably during the activity Q11A						
Vigorous Physical Activity—exertion that is high enough that you would find it difficult to carry on a conversation during the activity Q11B						
Strength Training—including using weights or resistance training to increase muscle strength Q11C						

Q12. During the PAST 30 DAYS, on the days you did the following, how long PER DAY did you typically do each?

[Items in Q12 should show only if the parallel item in Q11 = 1, 2, 3, 4, or 5 (any response other than not at all in the past 30 days).]

	60 or more minutes 1	30 to 59 minutes 2	20 to 29 minutes 3	Less than 20 minutes 4
Moderate Physical Activity—exertion that raises heart rate and breathing, but you should be able to carry on a conversation comfortably during the activity Q12A				
Vigorous Physical Activity—exertion that is high enough that you would find it difficult to carry on a conversation during the activity Q12B				
Strength Training—including using weights or resistance training to increase muscle strength Q12C				

Q13. Over the PAST 30 DAYS, on average, how many HOURS PER DAY did you spend using a device with a screen for activities OTHER THAN FOR WORK OR SCHOOL? Include use of a desktop or laptop computer, television, smartphone, tablet (e.g., iPad, Kindle) or other handheld device or gaming system. Select one response. Q13

None **1**
Less than 1 hour **2**
1-2 hours **3**
3-4 hours **4**
5-10 hours **5**
11 hours or more **6**

Q14. Now you will be asked about certain medical conditions. In the PAST 12 MONTHS has a doctor or other health professional told you that you had...?

	Yes 1	No 2
High blood pressure Q14A		
High blood sugar or diabetes Q14B		
High cholesterol Q14C		
Asthma Q14D		
Angina or coronary heart disease Q14E		
Heart attack, also called myocardial infarction Q14F		
Back pain Q14G		
Bone, joint, or muscle injury or condition (including arthritis) Q14H		

Q15. Would you say your overall physical health is… Q15

Excellent **1**
Very good **2**
Good **3**
Fair **4**
Poor **5**

Q16. During the PAST 30 DAYS, how much have you been bothered by any of the following problems? (Randomize.)

	Not bothered at all 1	Bothered a little bit 2	Bothered a lot 3
Stomach or bowel problems Q16A			
Back pain Q16B			
Pain in your arms, legs, or joints Q16C			
Headaches Q16D			
Chest pain or shortness of breath Q16E			
Dizziness Q16F			
Feeling tired or having low energy Q16G			
Trouble sleeping Q16H			

Q17. Have you visited a doctor for a routine check-up within the PAST 12 MONTHS? A routine check-up is a general physical exam, not an exam for a specific injury, illness, or condition. Q17

Yes **1**
No **2 [Skip to Q19]**

[IF Q17 = MISSING, SKIP TO Q19]

Q18. During that visit, did you and a care provider talk about the pros and cons of using various birth control methods? [Ask only if Q17 = Yes (1).] Q18

Yes, and the care provider was PART OF the Military Health System **1**
Yes, and the care provider was from OUTSIDE the Military Health System **2**
No **3**

Q19. Please indicate whether you agree or disagree with each of the following statements. [Ask of all respondents.]

	Agree 1	Disagree 2
It's hard to "fit in" in my command if you don't drink. Q19A		
Drinking is part of being in my unit. Q19B		
At parties or social functions at this installation, everyone is encouraged to drink. Q19C		
Leadership is tolerant of off-duty alcohol intoxication or drunkenness. Q19D		

Q20. These next questions are about drinks of alcoholic beverages. Throughout these questions, by a "drink," we mean a can or bottle of beer, a glass of wine or a wine cooler, a shot of liquor, or a mixed drink with liquor in it. We are not asking about times when you only had a sip or two from a drink.

In the PAST 12 MONTHS, have you had a drink of any type of alcoholic beverage? Q20

Yes **1**
No **2 [Skip to Q22b]**

[IF Q20 = MISSING, CONTINUE TO Q21]

Q21. Here are some things that might happen to people while or after drinking, or because of using alcohol. In the PAST 12 MONTHS did any of the following happen to you? Remember, the survey is completely confidential. [Randomize.]

	Yes 1	No 2
I found it harder to handle my problems because of drinking. Q21A		
I received military punishment (e.g., Court Martial, Article 15, Captain's Mast, Office Hours, Letter of Reprimand, etc.) because of my drinking. Q21B		
I was arrested for a drinking incident not related to driving. Q21C		
I got a lower score on my efficiency report or performance rating because of my drinking. Q21D		
I hit my spouse/significant other after having too much to drink. Q201E		
I got into a fight where I hit someone other than a member of my family when I was drinking. Q21F		
I did something sexually that I regretted. Q21G		
I was arrested for driving under the influence of alcohol. Q21H		
I was hurt in an accident because of my drinking (e.g., vehicle, work, other). Q21I		
My drinking caused an accident where someone else was hurt or property was damaged. Q21J		

Q22. In the PAST 12 MONTHS did any of the following happen to you?

	Yes 1	No 2
I drove a car or other vehicle when I had too much to drink. Q22A		
I rode in a car or other vehicle driven by someone who had too much to drink. Q22B [Asked of all respondents even if they have not had alcohol in past 12 months. After responding to this item if Q20 = 2 (No) skip to Q27]		

[IF Q20 = MISSING, CONTINUE TO Q23]

Q23. In the PAST 12 MONTHS, did any of the following things happen to you? [Randomize.]

	Yes 1	No 2
I was hurt in an on-the-job accident because of my drinking. Q23A		
I was late for work or left work early because of drinking, a hangover, or an illness caused by drinking. Q23B		
I did not come to work at all because of a hangover, an illness, or a personal accident caused by drinking. Q23C		
I worked below my normal level of performance because of drinking, a hangover, or an illness caused by drinking. Q23D		
I was drunk while working. Q23E		
I was called in during off-duty hours and reported to work feeling drunk. Q23F		

Q24. Think specifically about the PAST 30 DAYS, up to and including today. In the past 30 days, on how many days did you drink one or more drinks of an alcoholic beverage?

_____ **(2 digits; 0–30) Q24**

[If 0 (no drinking in the past 30 days), skip to Q27.]

Q25. On the day or days that you drank in the PAST 30 DAYS, how many drinks did you usually have each day? Count as a drink a can or bottle of beer; a wine cooler or a glass of wine, champagne, or sherry; a shot of liquor; or a mixed drink or cocktail. Q25

_____ **(2 digits; 1–90)**

Q26. During the PAST 30 DAYS, on how many days did you have (If male or other (Q4 = 1 OR 3 OR MISSING), insert "5"; if female (Q4 = 2), insert "4") or more drinks of beer, wine, or liquor on the same occasion? Select one response. Q26

About every day **1**
5 to 6 days a week **2**
3 to 4 days a week **3**
1 to 2 days a week **4**
2 to 3 days in the past 30 days **5**
1 day in the past 30 days **6**
Not at all in the past 30 days **7**

Q27. Next we would like to ask you some questions about your own use of cigarettes and other tobacco products. Please DO NOT INCLUDE electronic cigarettes or e-cigarettes in your answers, unless we specifically ask you about them.

Have you smoked at least one full cigarette in the PAST 12 MONTHS? Q27

Yes **1**
No **2 [Skip to Q31]**

[IF Q27 = MISSING, CONTINUE TO Q28]

Q28. On how many of the PAST 30 DAYS did you smoke a cigarette?

Number of Days: _____ **(2 digits; 0–30) Q28**

[If Q28 = 0 (no cigarettes in the past 30 days), skip to Q31.]

Q29. On average, on the days that you smoked in the PAST 30 DAYS, how many cigarettes did you smoke a day?

_____ **(2 digits; 0–99) Q29**

Q30. During the PAST 12 MONTHS, have you stopped smoking for more than one day BECAUSE YOU WERE TRYING TO QUIT SMOKING? Select one response. Q30

Yes, 1 time **1**
Yes, 2 or more times **2**
No **3**

Q31. In the PAST 12 MONTHS have you used chewing tobacco or snuff? Q31

Yes **1**
No **2 [Skip to Q33]**

[IF Q31 = MISSING, CONTINUE TO Q32]

Q32. During the PAST 30 DAYS, on how many days did you use chewing tobacco or snuff?

_____ **(2 digits; 0–30) Q32**

Q33. In the PAST 12 MONTHS have you smoked cigars, cigarillos, or little cigars, even one or two puffs? Q33

Yes **1**
No **2 [Skip to Q35]**

[IF Q33 = MISSING, CONTINUE TO Q34]

Q34. During the PAST 30 DAYS, on how many days did you smoke cigars, cigarillos, or little cigars?

_____ **(2 digits; 0–30) Q34**

Q35. In the PAST 12 MONTHS have you smoked tobacco in a pipe or hookah, even one or two puffs? Q35

Yes **1**
No **2 [Skip to Q37]**

[IF Q35 = MISSING, CONTINUE TO Q36]

Q36. During the PAST 30 DAYS, on how many days did you smoke tobacco in a pipe or hookah?

_____ **(2 digits; 0–30) Q36**

Q37. Have you in the PAST 12 MONTHS used electronic cigarettes, e-cigarettes, or "vaping," even just one time? Q37

Yes **1**
No **2 [Skip to Q40]**

[IF Q37 = MISSING, CONTINUE TO Q38]

Q38. During the PAST 30 DAYS, on how many days did you use electronic cigarettes, e-cigarettes, or "vaping"?

_____ **(2 digits; 0–30) Q38**

Q39. This is a list of possible reasons people sometimes give for using e-cigarettes. Thinking of all the times you used e-cigarettes, why did you use e-cigarettes? Select all that apply.

Because they are healthier for me than smoking cigarettes. **Q39_1**
Because they help me to quit smoking cigarettes. **Q39_2**
Because they can be used in places where cigarette smoking is not allowed. **Q39_3**
None of the above **Q39_4**

Next, we have some questions about your experience with a number of different substances. Remember, your responses are confidential.

Q40. In the PAST 12 MONTHS have you used the following?

	Yes 1	No 2
a. Marijuana or hashish (such as pot, joints, blunts, chronic, weed, edibles) Q40A		
b. Synthetic cannabis (such as spice, K2, herbal smoking blend) Q40B		
c. Other illegal drugs (such as cocaine or crack, LSD or acid, PCP or angel dust, MDMA or ecstasy, methamphetamine or speed, heroin or smack, GHB or liquid ecstasy) Q40C		
d. Inhalants to get high (such as aerosol sprays, gasoline, poppers, snappers, rush, whippets) Q40D		
e. Synthetic stimulants (such as bath salts) Q40E		
f. Non-prescription cough or cold medicine (robos, DXM, etc.) to get high Q40F		
g. Non-prescription Anabolic steroids Q40G		

Q41. Which of the following substances did you use in the PAST 12 MONTHS? Select all that apply. [Ask only if Q40c = 1 (Yes).]

Cocaine (e.g., crack) Q41_1
LSD (e.g., acid, boomers, yellow sunshine) Q41_1
PCP (e.g., angel dust, ozone, wack, rocket fuel) Q41_3
MDMA or ecstasy (e.g., molly, XTC, X, Adam) Q41_4
Methamphetamine (e.g., meth, crystal meth, uppers, speed, ice, chalk, crystal, class, fire, crank) Q41_5
Heroin (e.g., smack, H, junk skag) Q41_6
GHB (e.g., Grievous Bodily Harm, Liquid Ecstasy, Georgia Home Boy) Q41_7
None of the above Q41_8

Q42. Did you use the following substances in the PAST 30 DAYS? [Ask only if corresponding item in Q40a-g = 1 (Yes).]

	Yes 1	No 2
Marijuana or hashish (such as pot, joints, blunts, chronic, weed, edibles) Q42A		
Synthetic cannabis (such as spice, K2, herbal smoking blend) Q42B		
Other illegal drugs (such as cocaine or crack, LSD or acid, PCP or angel dust, MDMA or ecstasy, methamphetamine or speed, heroin or smack, GHB or liquid ecstasy) Q42C		
Inhalants to get high (such as aerosol sprays, gasoline, poppers, snappers, rush, whippets) Q42D		
Synthetic stimulants (such as bath salts) Q42E		
Non-prescription cough or cold medicine (robos, DXM, etc.) to get high Q42F		
Non-prescription Anabolic steroids Q42G		

Q43. In the PAST 12 MONTHS have you used the following? [Randomize.]

	Yes 1	No [If no to Q43a-c skip to Q46] 2
Prescription stimulants or attention enhancers ("go drugs," such as Adderall, amphetamines, Ritalin, prescription diet pills, etc.) Q43A		
Prescription sedatives, tranquilizers, muscle relaxers, or barbiturates ("no go drugs," such as Ambien, Quaalude, Valium, Xanax, Rohypnol, Phenobarbital, Ketamine, etc.) Q43B		
Prescription pain relievers (OxyContin/ Oxycodone, Percocet, codeine, Methadone, hydrocodone, Vicodin, etc.) Q43C		

Q44. In the PAST 12 MONTHS, did you use the following drugs in any way not directed by a doctor (including use without a prescription of your own, or using it in greater amounts, more often, or longer than you were told to take it)? [Ask only if corresponding item in Q43 = Yes (1). Within respondent, keep same order as Q43.]

	Yes 1	No 2
Prescription stimulants or attention enhancers ("go drugs," such as Adderall, amphetamines, Ritalin, prescription diet pills, etc.) Q44A		
Prescription sedatives, tranquilizers, muscle relaxers, or barbiturates ("no go drugs," such as Ambien, Quaalude, Valium, Xanax, Rohypnol, Phenobarbital, Ketamine, etc.) Q44B		
Prescription pain relievers (OxyContin/ Oxycodone, Percocet, codeine, Methadone, hydrocodone, Vicodin, etc.) Q44C		

Q45. How did you obtain the following in the PAST 12 MONTHS? If you obtained it from more than one source, select all that apply. [Ask only if corresponding item in Q43 = Yes (1). Within respondent, keep same order as Q43.]

	Military health care provider or pharmacy/ mail order drug service	VA health care provider or pharmacy/ mail order drug service	Civilian (non-military, non-VA) health care provider or pharmacy/ mail order drug service	Other
Prescription stimulants or attention enhancers ("go drugs," such as Adderall, amphetamines, Ritalin, prescription diet pills, etc.)	Q45A_1	Q45A_2	Q45A_3	Q45A_4
Prescription sedatives, tranquilizers, muscle relaxers, or barbiturates ("no go drugs," such as Ambien, Quaalude, Valium, Xanax, Rohypnol, Phenobarbital, Ketamine, etc.)	Q45B_1	Q45B_2	Q45B_3	Q45B_4
Prescription pain relievers (OxyContin/ Oxycodone, Percocet, codeine, hydrocodone, Vicodin, etc.)	Q45C_1	Q45C_2	Q45C_3	Q45C_4

Q46. This next set of questions asks about sexual behavior. Please remember that your answers are strictly confidential. In the PAST 12 MONTHS, with how many different people did you have sexual intercourse, either vaginal or anal? Select one response. Q46

5 or more people **1**
2–4 people **2**
1 person **3**
I did not have vaginal or anal sex in the past 12 months **4 [Skip to Q48]**

[IF Q46 = MISSING, CONTINUE TO Q47]

Q47. In the PAST 12 MONTHS, how often did you use a condom when having sexual intercourse (vaginal or anal) with a NEW sex partner? A new sex partner is someone you were having sex with for the first time. Select one response. Q47

Always **1**
Often **2**
Sometimes **3**
Seldom **4**
Never **5**
I did not have a new vaginal or anal sex partner in the past 12 months. **6**

Q48. In the PAST 12 MONTHS, how many of your partners for ORAL, ANAL or VAGINAL sex were male? Select one response. Q48

5 or more male partners **1**
2–4 male partners **2**
1 male partner **3**
No male partners in the past 12 months **4**

Q49. In the PAST 12 MONTHS, how many of your partners for ORAL, ANAL or VAGINAL sex were female? Select one response. Q49

5 or more female partners **1**
2–4 female partners **2**
1 female partner **3**
No female partners in the past 12 months **4**

Q50. The last time you had vaginal sex in PAST 12 MONTHS, did you or your partner use any form of birth control? Select all that apply. [If 1–4 are selected, 5–12 cannot be selected.]

I have not had vaginal sex in the past 12 months Q50_1 **[CANNOT SELECT THIS OPTION WITH ANY OTHER OPTION]**
No, we didn't use any form of birth control Q50_2
No, I/my partner was already pregnant Q50_3
No, I/my partner was trying to get pregnant Q50_4
Yes, female sterilization (e.g. tubal ligation, hysterectomy) Q50_5
Yes, male sterilization (vasectomy) Q50_6
Yes, an IUD Q50_7
Yes, a contraceptive implant (e.g. Implanon, Nexplanon) Q50_8
Yes, birth control pills Q50_9
Yes, birth control shots, birth control patch, contraceptive ring, or a diaphragm Q50_10
Yes, condoms Q50_11
Yes, some other method Q50_12

[IF Q50 = MISSING, CONTINUE TO Q51]

Q51. In the PAST 12 MONTHS, did you cause or did you have an unintended pregnancy? Select one response. Q51

Yes **1**
No **2 [SKIP to Q53]**
Unsure **3 [Show only if male (Q4 = 1) or other (Q4 = 3).] [Skip to Q53]**

[IF Q51 = MISSING, SKIP TO Q53]

Q52. At the time that the unintended pregnancy occurred, were you or your partner using any form of birth control? (If there was more than one unintended pregnancy in the past 12 months, answer for the most recent one). Select all that apply.

No, we were not using any form of birth control **Q52_1**
Yes, female sterilization (e.g. tubal ligation, hysterectomy) **Q52_2**
Yes, male sterilization (vasectomy) **Q52_3**
Yes, an IUD **Q52_4**
Yes, a contraceptive implant (e.g. Implanon, Nexplanon)**Q52_5**
Yes, birth control pills **Q52_6**
Yes, birth control shots, birth control patch, contraceptive ring, or a diaphragm **Q52_7**
Yes, condoms **Q52_8**
Yes, some other method **Q52_9**

Q53. When was your last HIV test? Select one response. Q53

Within the past 6 months. **1**
More than 6 months ago but within the past 12 months. **2**
More than 12 months ago. **3**
I have never had an HIV test. **4**

Q54. In the PAST 12 MONTHS, have you had a sexually transmitted infection—such as gonorrhea, syphilis, chlamydia, HPV, or genital herpes? Q54

Yes **1**
No **2**
Have not been tested in past 12 months **3**

Q55. These next questions ask how you have been feeling during the past month. During the PAST 30 DAYS, how much of the time did you feel:

	All of the time 1	Most of the time 2	Some of the time 3	A little of the time 4	None of the time 5
…so sad nothing could cheer you up? Q55A					
…nervous? Q55B					
…restless or fidgety? Q55C					
…hopeless? Q55D					
…that everything was an effort? Q55E					
…worthless? Q55F					

PROGRAMMER: CREATE Q55_SCORE WHERE '5 – ORIGINAL ITEM VALUE = SCORE VALUE' AND SUM SCORE.

Q56. The last questions asked about how you have been feeling during the past 30 days. Now think about the past 12 months. Was there a month in the PAST 12 MONTHS when you felt MORE depressed, anxious, or emotionally stressed than you felt during the past 30 days? Q56

Yes **1**
No **2 [Skip to Q58]**

Q57. Think of one month in the PAST 12 MONTHS when you were the most depressed, anxious, or emotionally stressed. During that month, how much of the time did you feel:

	All of the time 1	Most of the time 2	Some of the time 3	A little of the time 4	None of the time 5
…so sad nothing could cheer you up? Q57A					
…nervous? Q57B					
…restless or fidgety? Q57C					
…hopeless? Q57D					
…that everything was an effort? Q57E					
…worthless? Q57F					

PROGRAMMER: CREATE Q57_SCORE WHERE '5 – ORIGINAL ITEM VALUE = SCORE VALUE' AND SUM SCORE.

Q58. How many times in the PAST 30 DAYS did you . . . ?

	Never 1	One time 2	Two times 3	Three or four times 4	Five or more times 5
Get angry at someone and yell or shout at them. Q58A					
Get angry with someone and kick or smash something, slam the door, punch the wall, etc. Q58B					
Threaten someone with physical violence. Q58C					
Get into a fight with someone and hit the person. Q58D					

Q59. How important is spirituality in your life? By spirituality we mean a set of beliefs, principles, or practices that strengthen your connectedness with sources of hope, meaning, and purpose. Q59

Very important **1**
Somewhat important **2**
Not too important **3**
Not at all important **4**

Q60. Thinking about any mental or physical symptoms you may have, on how many days in the PAST 30 DAYS…

	Number of days
Did your symptoms cause you to miss school or work or leave you unable to carry out your normal daily responsibilities? Q60A	
Did you feel so impaired by your symptoms that, even though you went to school or work, your productivity was reduced? Q60B	

Q61. In the PAST 12 MONTHS did you have any injury(ies) from any of the following events? Answer for any injury you had, whether or not it was military or work related. Select all that apply.

I was struck by a flying object or fragment **Q61_1**
I was wounded by a bullet **Q61_2**
I was in a vehicle accident/crash (any vehicle, including bicycle, boat, motorcycle, car, aircraft) **Q61_3**
I took a hard fall **Q61_4**
I was injured in a blast or explosion **Q61_5**
I was injured in another way **Q61_6**
I did not have an injury **Q61_7 [Skip to Q64; CANNOT SELECT THIS OPTION WITH ANY OTHER OPTION]**

[IF Q61 = MISSING, SKIP TO Q64]

Q62. As a result of the events in the previous question, did you receive a jolt or blow to your head that IMMEDIATELY resulted in the following? [If Q62a through Q62g all No (2) skip to Q64.]

	Yes 1	No 2
Lost consciousness or got "knocked out" for less than a minute Q62A		
Lost consciousness or got "knocked out" for 1 to 20 minutes Q62B		
Lost consciousness or got "knocked out" for more than 20 minutes Q62C		
Felt dazed, confused, or "saw stars" Q62D		
Did not remember the event Q62E		
Concussion or symptoms of a concussion (such as headache, dizziness, irritability, etc.) Q62F		
Head injury Q62G		

Q63. Over the PAST 30 DAYS, have you been bothered by any of the following problems that you relate to this jolt or blow to the head? [Randomize.]

	Yes 1	No 2
Headaches Q63A		
Dizziness Q63B		
Memory problems (or lapses) Q63C		
Balance problems Q63D		
Ringing in the ears Q63E		
Irritability Q63F		
Sleep problems Q63G		
Sensitivity to light Q63H		

Q64. The next question is about unwanted sexual contact, meaning times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration. Since joining the military, have you ever experienced unwanted sexual contact? Q64

Yes **1**
No **2 [Skip to Q66]**

[IF Q64 = MISSING, SKIP TO Q66]

Q65. Did this unwanted sexual contact occur in the PAST 12 MONTHS? Q65

Yes **1**
No **2**

Q66. Since joining the military, have you been physically abused, punished, or beaten such that you received bruises, cuts, welts, lumps, or other injuries, whether or not it was work-related? Q66

Yes **1**
No **2 [Skip to Q68]**

[IF Q66 = MISSING, CONTINUE TO Q67]

Q67. Did you have an experience where you were physically abused, punished, or beaten such that you received bruises, cuts, welts, lumps, or other injuries in the PAST 12 MONTHS? Q67

Yes **1**
No **2**

Q68. Sometimes things happen to people that are unusually or especially frightening, horrible, or traumatic. For example, a serious accident or fire, a physical or sexual assault or abuse, an earthquake or flood, a war, seeing someone be killed or seriously injured, having a loved one die through homicide or suicide. Have you ever experienced this kind of event? Q68

Yes **1**
No **2 [Skip to Q70]**

[IF Q68 = MISSING, SKIP TO Q70]

Q69. In the PAST 30 DAYS have you…

	Yes 1	No 2
Had nightmares about the event(s) or thought about the event(s) when you did not want to? Q69_1		
Tried hard not to think about the event(s) or went out of your way to avoid situations that reminded you of the event(s)? Q69_2		
Been constantly on guard, watchful, or easily startled? Q69_3		
Felt numb or detached from people, activities, or your surroundings? Q69_4		
Felt guilty or unable to stop blaming yourself or others for the event(s) or any problems the event(s) may have caused? Q69_5		

Q70. In the PAST 12 MONTHS, have you seen any of the following professionals about problems with stress, your emotions, or mental health, or for problems with your use of alcohol or drugs?

	Yes 1	No [If no for Q70a-c skip to Q73] 2
Mental health provider (e.g., psychiatrist, psychologist, social worker, mental health nurse, other provider) Q70A		
General medical provider (e.g., doctor, physician assistant or PA, nurse practitioner) Q70B		
Chaplain, clergy, or pastor Q70C		

[IF Q670a-c = MISSING, SKIP TO Q73]

Q71. Where was/were the professional(s) you saw about problems with stress, your emotions, or mental health, or for problems with your use of alcohol or drugs located? [Ask only if ANY Q70a-c = 1 (Yes).]

	Yes 1	No 2
Military facility Q71A		
VA facility Q71B		
Non-VA civilian facility or office Q71C		

Q72. In the PAST 12 MONTHS, how many times did you see that/those professional(s) about problems with stress, your emotions, or mental health, or for problems with your use of alcohol or drugs? If you have not seen a provider in the past 12 months, please enter zero. [Ask only if any Q70a-c = 1 (Yes) and any Q71a-c =1 (yes). Show all permutations that apply.]

a. **[DISPLAY IF Q70A = 1 AND Q71A = 1]** Mental health provider at a military facility or office **Q72A**
b. **[DISPLAY IF Q70A = 1 AND Q71B = 1]** Mental health provider at a VA facility **Q72B**
c. **[DISPLAY IF Q70A = 1 AND Q71C = 1]** Mental health provider at a non-VA civilian facility or office **Q72C**
d. **[DISPLAY IF Q70B = 1 AND Q71A = 1]** General medical provider at a military facility **Q72D**
e. **[DISPLAY IF Q70B = 1 AND Q71B = 1]** General medical provider at a VA facility **Q72E**
f. **[DISPLAY IF Q70B = 1 AND Q71C = 1]** General medical provider at a non-VA civilian facility or office **Q72F**
g. **[DISPLAY IF Q70C = 1 AND Q71A = 1]** Military chaplain at a military facility **Q72G**
h. **[DISPLAY IF Q70C = 1 AND Q71B = 1]** Clergy or other pastoral counselor at a VA facility **Q72H**
i. **[DISPLAY IF Q70C = 1 AND Q71C = 1]** Clergy or other pastoral counselor at non-VA civilian facility or office **Q72I**

Q73. During the PAST 12 MONTHS, did you take any medication that was prescribed for you to treat problems with your emotions, nerves or mental health, or for problems with your use of alcohol or drugs? Q73

Yes **1**
No **2**

Q74. During the PAST 12 MONTHS, was there ever a time that you needed treatment for an emotional or mental health problem or for your use of alcohol or drugs but did not get it? Q74

Yes **1**
No **2**

Q75. Which of these statements explain why you did not get mental health treatment or counseling in the PAST 12 MONTHS? [Ask if Q74 = 1 (Yes) OR sum of Q55 >= 8 and no items endorsed on Q70 OR sum of Q57>=8 and no items endorsed on Q70.]

	Yes 1	No 2
I did not think treatment would help. Q75A		
I did not know where to get help. Q75B		
It was too difficult to schedule an appointment. Q75C		
It would have harmed my career. Q75D		
I could have been denied security clearance in the future. Q75E		
I could not afford the cost. Q75F		
My supervisor/unit leadership might have a negative opinion of me or treat me differently. Q75G		
Members of my unit might have less confidence in me. Q75H		
I was concerned that the information I gave the counselor might not be kept confidential. Q75I		
It would have negatively affected my family life. Q75J		
It was too difficult to get time off work for treatment. Q75K		
It was too difficult to get childcare. Q75L		
My commanders or supervisors discourage the use of mental health services. Q75M		
I did not think I needed it. Q75N [Only show if Q55>=8 or Q57>=8 and no items endorsed on Q70.]		

Q76. In general, do you think it would damage a person's military career if the person were to seek counseling or mental health therapy/treatment through the military, regardless of the reason for seeking counseling? Q76

Yes **1**
No **2**

Q77. At any time in the PAST 12 MONTHS, did you seriously think about trying to kill yourself? Q77

Yes **1**
No **2** **[Skip to Q79]**

[IF Q77 = MISSING, Continue TO Q78]

Q78. During the PAST 12 MONTHS, did you make any plans to kill yourself? Q78

Yes **1**
No **2**

[IF Q78 = MISSING, Continue TO Q79]

Q79. During the PAST 12 MONTHS, did you try to kill yourself? Q79

Yes **1**
No **2**

Q80. Next, we have some questions concerning ALL of your deployments while serving in the military. These could include both combat and non-combat deployments. How many times have you been deployed? Select one response. Q80

1 time **1**
2 times **2**
3 or more times **3**
I have never been deployed **4 [SKIP to Q89]**

[IF Q80 = MISSING, SKIP TO Q89]

Q81. Adding up ALL of your deployments while serving in the military, how long in TOTAL have you been deployed? Include both combat and non-combat zone deployments. Select one response. Q81

1 to 6 months **1**
7 to 12 months **2**
13 to 24 months **3**
25 to 48 months **4**
49 months or more **5**

Q82. Thinking about ALL of your deployments while serving in the military, how many were COMBAT zone deployments? (The term "combat zone deployment," as used in this questionnaire, refers to a deployment where you received imminent danger pay (IDP), hazardous duty pay, and/or combat zone tax exclusion benefits.) Select one response. Q82

I have not had any combat zone deployments **1**
1 deployment **2**
2 deployments **3**
3 or more deployments **4**

Q83. During ALL of your deployments while in the military, both combat and non-combat, did any of the following EVER happened to you? [Randomize.]

	Yes 1	No 2
I worked with landmines or other unexploded ordnance. Q83A		
I witnessed members of my unit or an ally unit being seriously wounded or killed. Q83V		
Someone I knew well was killed in combat. Q83C		
I witnessed or engaged in acts of cruelty, excessive force, or acts violating rules of engagement. Q83D		
I was wounded in combat. Q83E		
I witnessed civilians being seriously wounded or killed. Q83F		

Q84. In the PAST 12 MONTHS, approximately how many months were you away in total for ALL deployments, both combat and non-combat zone deployments? Select one response. Q84

I did not deploy in the past 12 months **1 [Skip to Q89]**
Less than 1 month **2**
1 to 3 months **3**
4 to 6 months **4**
7 to 9 months **5**
10 to 12 months **6**

[IF Q84 = MISSING, SKIP TO Q89]

Q85. Previously in the survey you indicated that you had or [if Q51 = unsure (3) insert "may have"] caused an unintended pregnancy in the past 12 months. Did that unintended pregnancy occur during a deployment? [Ask if Q51 is Yes (1) or unsure (3) and Q84 > 1.] Q85

Yes **1**
No, before I was deployed **2**
No, after the end of the deployment **3**

Q86. Before you deployed, did you and a care provider from the Military Health System talk about the pros and cons of using various birth control methods in a deployed environment? (For example, how easy they are to use or obtain, their effects on menstrual periods, or other factors.) Q86

Yes **1**
No **2**

Q87. BEFORE YOU DEPLOYED, were you able to get or refill your preferred method of birth control? Q87

Yes **1**
No **2**
I did not try to get birth control before I deployed. **3**

Q88. WHILE YOU WERE DEPLOYED, were you able to get or refill your preferred method of birth control? Q88

Yes **1**
No **2**
I did not try to get or refill birth control while deployed **3**

Q89. Do you consider yourself to be…? Select one response. Q89

Heterosexual or straight **1**
Gay or lesbian **2**
Bisexual **3**

Q90. On average, over the PAST 30 DAYS, how many hours of actual sleep do you get in a 24-hour period? This may be different from the number of hours you spent in bed. Please type in the number of hours. Q90

_____ Hours **(2 digits; 0–24)**

Q91. During the PAST 30 DAYS, how would you rate your overall sleep quality? Select one response. Q91

Very good **1**
Fairly good **2**
Fairly bad **3**
Very bad **4**

Q92. In the past week, how much were you bothered by lack of energy because of poor sleep? Select one response. Q92

Not bothered at all **1**
Slightly bothered **2**
Moderately bothered **3**
Severely bothered **4**

Q93. During the PAST 30 DAYS, how often did you use the following TO HELP YOU STAY AWAKE?

	Never during the past 30 days 1	Less than once a week 2	Once or twice a week 3	Three or more times a week 4	Daily 5
Energy drinks (e.g., Monster, Red Bull, Rockstar, 5-Hour-Energy) Q93A					
Caffeinated beverages besides energy drinks (e.g., coffee, soda, tea) Q93B					
Over-the-counter (OTC) medications (e.g., Vivarin, NoDoz) Q93C					
Prescription medications (e.g., Adderall, Ritalin) Q93D					

Q94. During the PAST 30 DAYS, how often did you take prescription or over-the-counter (OTC) medications TO HELP YOU SLEEP? Q94

Never during the past 30 days **1**
Less than once a week **2**
Once or twice a week **3**
Three or more times a week **4**
Daily **5**

Q95. In the PAST 12 MONTHS, have you ever had to lie to people important to you about how much you gambled? Q95

Yes **1**
No **2**

Q96. In the PAST 12 MONTHS, have you ever felt the need to bet more and more money? Q96

Yes **1**
No **2**

Q97. The following questions will ask you about events that happened IN THE PAST 12 MONTHS. Remember, all the information you share will be kept completely confidential. In the PAST 12 MONTHS have you…

	Yes 1	No 2
Fondled, kissed, or rubbed up against the private areas of someone's body (lips, breast, crotch, penis, inner thighs, or anus) when the person did not agree. Q97A		
Had oral sex with someone or had someone perform oral sex on you when the person did not agree. Q97B		
Put your penis, fingers, or objects into someone's vagina or anus when the person did not agree. Q97C		
TRIED to have oral, anal, or vaginal sex with someone when the person did not agree. Q97D		

[CLOSING SCREEN]

You have finished the 2018 DoD Health Related Behaviors Survey (HRBS)! Thank you for taking the time to complete this important survey. Your participation, and your Service to our country, is greatly appreciated.

In the event that any of the questions in the survey may have caused discomfort, we would like to remind you of several resources that are available.

Military OneSource (http://www.militaryonesource.mil) is a free 24 hour service that is available 7 days a week to provide a full range of services, across the deployment cycle, to military personnel and their families, at no cost. They can be reached at:

Stateside: CONUS: 1-800-342-9647
Overseas: OCONUS Universal Free Phone: 800-342-9647
Collect from Overseas: OCONUS Collect: 703-253-7599
En Español llame al: 800-342-9647
TTY/TDD: 866-607-6794

The **DoD Safe Helpline** (https://www.safehelpline.org/) provides worldwide live, confidential support, 24/7. You can initiate a report and search for your nearest Sexual Assault Response Coordinator (SARC). You can find links to Service-specific reporting resources and access information about the prevention of and response to sexual assault on their website or by calling the hotline at 1-877-995-5247.

The **Military Crisis Line** (http://veteranscrisisline.net/ActiveDuty.aspx) can also provide confidential support and consultation if you feel distressed. They can be reached at 1-800-273-8255 (then press 1). Or send a text to 838255.

You may also contact the **National Suicide Hotline** at 1-800-273-TALK (8255) or https://suicidepreventionlifeline.org/.

APPENDIX B

Invitation Letter and Letters of Support

This appendix reproduces recruitment materials, including the invitation letter from RAND and Westat, as well as the letters of support from the DoD services and the Coast Guard.

Invitation Letter

RAND CORPORATION

1776 MAIN STREET
P.O. BOX 2138
SANTA MONICA, CA
90407-2138

TEL 310.393.0411
FAX 310.393.4818

RCS # DD-HA(BE)2189
Expiration Date: 02/28/2023

[Month 2018]

12345
{SALUTE and NAME}
{ADDRESS 1}
{ADDRESS 2}
{CITY}, {STATE} {ZIP CODE}

Subject: Invitation to Participate in the 2018 DoD Health Related Behaviors Survey (HRBS)

Dear [Salute] [Insert Service Member name]:

You have been randomly selected to participate in the **2018 DoD Health Related Behaviors Survey (HRBS)**. We would like to invite you to fill out this **confidential** survey on the Internet. The survey results will be used by the Department of Defense (DoD) to improve health behavior programs and policies that maintain a ready Total Force. Results from previous rounds of the HRBS have resulted in changes to tobacco policy, screening for alcohol use, and interventions to reduce prescription drug abuse. Results have also been presented to the White House as well as Congress. To make the results of the 2018 DoD HRBS as valid and reliable as possible, we need your support!

Please note that:

- This is a legitimate, **DoD-approved research study**, endorsed by the Services. Links to the letters of support from each Service can be found at: http://www.health.mil/2018HRBS.
- The survey is **confidential**: No one at DoD, the Services, or your command will know who completed a survey. Only RAND staff and staff at our survey subcontractor Westat can link your individual survey responses to your name, personal identity, or military records.
- Study staff have been trained to **protect your individual survey responses**.
- You can complete the **web survey** on a computer at home or at work, or on a smartphone or tablet. It takes about 20-25 minutes to fill out the survey.

RESEARCH AREAS
Children and Families
Education and the Arts
Energy and Environment
Health and Health Care
Infrastructure and Transportation
International Affairs
Law and Business
National Security
Population and Aging
Public Safety
Science and Technology
Terrorism and Homeland Security

OFFICES
Santa Monica, CA
Washington, DC
Pittsburgh, PA
New Orleans, LA
Jackson, MS
Boston, MA
Cambridge, UK
Brussels, BE

www.rand.org

Please don't miss this opportunity to help DoD develop and enhance health promotion programs that will help service members improve their health, well-being, and overall fitness. The survey results will have a direct impact on policies of interest to you, the Services, and DoD.

For more information, please read the **FREQUENTLY ASKED QUESTIONS** on the back of this letter about the 2018 DoD HRBS and why your participation is so important to the success of this study.

You can complete the survey now by going to the following secure website maintained by Westat, our data collection contractor. You will need to use the unique ID code provided below to access the survey.

Survey website: https://dodhrbs.com

Unique ID Code: [insert code]

Computer or technical questions about the website? Please contact the Westat Survey Help Desk toll free at 1-844-727-2018 or email support@dodhrbs.com

We greatly appreciate your time and cooperation in this important effort.

Sincerely,

Charles C. Engel, MD, MPH, RAND Project Co-Leader

Sarah O. Meadows, PhD, RAND Project Co-Leader

OBJECTIVE ANALYSIS. EFFECTIVE SOLUTIONS.

M1

THE ASSISTANT SECRETARY OF DEFENSE

1200 DEFENSE PENTAGON
WASHINGTON, DC 20301-1200

HEALTH AFFAIRS

JUL 0 9 2018

Dear Service Member:

You are invited to participate in the 2018 Department of Defense (DoD) Health Related Behaviors Survey, which we have asked the independent, non-profit RAND Corporation to design, implement, and analyze. This health survey is important to the DoD and the Services, and I strongly encourage you to participate.

The purpose of this web-based survey is to assess the health related behaviors and lifestyles of military personnel that have the potential to impact readiness. We use data from this survey to improve education, training, treatment, and counseling to support the Services and optimize individual and overall health status and fitness.

The survey is confidential. This means that no one within DoD or the Services, including your immediate chain of command, will know who participated in the survey or will have access to your individual responses to survey items. Only the survey contractors, RAND and Westat, will be able to use unique identification codes to distinguish who has been selected to participate in the survey. Survey results will be presented in such a way that your individual survey responses cannot otherwise be linked back to you. DoD and the Services have agreed to this condition to protect your privacy so you can feel comfortable answering the survey questions truthfully and honestly.

Although your participation in the survey is voluntary, I hope you will recognize its importance and find time to sit down and answer these questions about your health. This survey can be completed online using a government computer during duty hours, a home computer, a smartphone or a tablet.

For further information about the survey and instructions for accessing and completing the survey on the Internet, please read the enclosed RAND Corporation letter and Frequently Asked Questions. Thank you for your continued service to our country and thank you in advance for your time and assistance in this important effort.

Sincerely,

Tom McCaffery
Acting

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC

OFFICE OF THE ASSISTANT SECRETARY

MEMORANDUM FOR U.S. AIR FORCE SURVEY PARTICIPANTS

FROM: Principal Deputy Assistant Secretary (Manpower and Reserve Affairs)

SUBJECT: 2018 Department of Defense Survey of Health Related Behaviors among Active Duty Personnel

The Department of Defense has asked the RAND Corporation and Westat, independent research organizations, to conduct the **2018 DoD Health Related Behaviors Survey (HRBS).** This survey is being conducted with randomly selected military members from all Service branches and all components.

The 2018 HRBS asks about health-related behaviors such as exercise, mental health, substance use and other health issues related to readiness. Some of the questions are personal. **To protect your privacy, the survey is confidential.** DoD, the Air Force, and your chain of command will not know whether you complete the survey or not. Only RAND and Westat will be able to identify who has completed a survey and they will not provide any data to DoD or the Air Force that is linked to your name, other personal identifiers, or your military records.

The RAND Corporation and Westat will send you instructions via mail and email for accessing and completing the 2018 HRBS if you are randomly selected to participate. The survey will take about 20-25 minutes to finish. It can be completed on the web using a government computer during duty hours or a home computer with Internet access. You may also complete the survey on a mobile device, such as smartphone or tablet.

Your participation in the 2018 HRBS is critical to assessing health-related readiness and for making program and policy decisions that sustain a healthy and ready force. Although your participation in the survey is entirely voluntary, I hope you will choose to support this vital effort by responding promptly if you are asked.

Thank you in advance for your time and assistance in this important effort.

DANIEL R. SITTERLY, SES, DAF
Principal Deputy Assistant Secretary
(Manpower and Reserve Affairs)

BREAKING BARRIERS...SINCE 1947

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
MANPOWER AND RESERVE AFFAIRS
111 ARMY PENTAGON
WASHINGTON DC 20310-0111

SAMR-MPQ 1 August 2018

MEMORANDUM FOR Service Member Participants of the 2018 Department of Defense Health Related Behaviors Survey

SUBJECT: 2018 DoD Health Related Behaviors Survey Participation

1. The DoD has asked the RAND Corporation and Westat (independent research organizations) to conduct the 2018 DoD Health Related Behaviors Survey (HRBS). This survey is being conducted with randomly selected military members from all Service branches and components.

2. The 2018 HRBS asks about health-related behaviors such as exercise, stress, substance use, and other health issues related to readiness; some of the questions are personal. To protect your privacy, the survey is completely confidential. Individual survey responses will not be linked with your name or other personal identifiers. The Army or DoD will not know who did or did not complete the survey.

3. If you are randomly selected to participate, the RAND Corporation and Westat will send you instructions via mail and e-mail for accessing and completing the 2018 HRBS. The survey will take about 20-25 minutes to finish and can be completed on the web using a government computer during duty hours or a home computer with internet access. You may also complete the survey on a mobile device, such as smartphone or tablet.

4. Your Participation in the 2018 HRBS is critical to assessing health-related readiness and for making program and policy decisions that sustain a healthy and ready Force. Although your participation in the survey is entirely voluntary, I hope you will choose to support this vital effort by responding promptly if you are asked. Thank you in advance for your time and assistance in this important effort.

5. The Army point of contact for this survey is Ms. Laura Mitvalsky, Army Public Health Center, 410-436-4654, or e-mail laura.a.mitvalsky.civ@mail.mil.

DONALD G. SALO, JR
Deputy Assistant Secretary of the Army
(Military Personnel and Quality of Life)

DEPARTMENT OF THE NAVY
HEADQUARTERS, UNITED STATES MARINE CORPS
3280 RUSSELL ROAD
QUANTICO VA 22134-5103

IN REPLY REFER TO:
6260
MF
MAY 0 8 2018

From: Commandant of the Marine Corps

Subj: 2018 DEPARTMENT OF DEFENSE HEALTH RELATED BEHAVIORS SURVEY

1. The Department of Defense (DoD) has asked the RAND Corporation and Westat, independent research organizations, to conduct the 2018 DoD Health Related Behaviors Survey (HRBS). This survey is being conducted with randomly selected military members from all Service branches and all components.

2. The 2018 HRBS asks about health-related behaviors, such as exercise, mental health, substance use, and other health issues related to readiness. Some of the questions are personal. To protect your privacy, the survey is confidential. The DoD, the Marine Corps, and your chain of command will not know whether you complete the survey or not. Only RAND and Westat will be able to identify who has completed a survey; they will not provide any data to the DoD or the Marine Corps that is linked to your name, other personal identifiers, or your military records.

3. The RAND Corporation and Westat will send you instructions via mail and email for accessing and completing the 2018 HRBS if you are randomly selected to participate. The survey will take about 20-25 minutes to finish. It can be completed on the web using a government computer during duty hours or a home computer with Internet access. You may also complete the survey on a mobile device, such as a smartphone or tablet.

4. Your participation in the 2018 HRBS is critical to assessing health-related readiness and for making program and policy decisions that sustain a healthy and ready force. Although your participation in the survey is entirely voluntary, I hope you will choose to support this vital effort by responding promptly if you are asked.

5. Thank you in advance for your time and assistance in this important effort.

S. M. ISAACSON
Sergeant Major
Marine and Family
Programs Division

M. C. BALOCKI
Director
Marine and Family
Programs Division

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

4730
Ser N17/U 021
2 May 18

From: Director, 21st Century Sailor Office (OPNAV N17)
To: U.S. Navy Survey Participant

Subj: 2018 DEPARTMENT OF DEFENSE SURVEY OF HEALTH RELATED BEHAVIORS AMONG ACTIVE DUTY PERSONNEL

1. If you have been randomly selected to participate in the 2018 Department of Defense (DoD) Health Related Behaviors Survey (HRBS) for Active Duty personnel, I strongly encourage you to support this vital effort by responding promptly when asked to complete the survey.

2. The DoD asked the RAND Corporation and Westat, independent research organizations, to conduct the 2018 DoD HRBS. This survey is being conducted with randomly selected military members from all Service branches and all components.

3. The 2018 HRBS asks about health-related behaviors such as exercise, mental health, substance use and other health issues related to readiness. Some of the questions are personal. To protect your privacy, the survey is confidential. DoD, the Navy, and your chain of command will not know whether you complete the survey or not. Only RAND and Westat will be able to identify who has completed a survey and they will not provide any data to DoD or the Navy that is linked to your name, other personal identifiers, or your military records.

4. The RAND Corporation and Westat will send you instructions via mail and email for accessing and completing the 2018 HRBS if you are randomly selected to participate. The survey will take about 20-25 minutes to finish. It can be completed on the web using a government computer during duty hours or a home computer with Internet access. You may also complete the survey on a mobile device, such as smartphone or tablet.

5. Your participation in the 2018 HRBS is critical to assessing health-related readiness and for making program and policy decisions that sustain a healthy and ready force. Although your participation in the survey is entirely voluntary, I hope you will choose to support this vital effort by responding promptly if you are asked.

6. I want to thank you in advance for your time and participation in this important study effort.

K. O. THOMAS

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. S.E.
Washington, DC 20593-7581
Staff Symbol: CG-11
Phone: (202) 475-5130

6500

JAN - 6 2018

MEMORANDUM

From: Erica G. Schwartz, RADM
CG-11

Reply to Attn of: Mark Mattiko
(202) 475-5148

To: ACTIVE DUTY & RESERVE MEMBERS OF THE COAST GUARD

Subj: PARTICIPATION IN THE 2018 HEALTH RELATED BEHAVIORS SURVEY

1. The Department of Defense (DoD) has asked the RAND Corporation and Westat, independent research organizations, to conduct the **2018 DoD Health Related Behaviors Survey (HRBS).** This survey is being conducted with randomly selected military members from all Service branches and all components.

2. The 2018 HRBS asks about health-related behaviors such as exercise, mental health, substance use and other health issues related to readiness. Some of the questions are personal. **To protect your privacy, the survey is confidential.** DoD, the United States Coast Guard (USCG) and your chain of command will not know whether you complete the survey or not. Only RAND and Westat will be able to identify who has completed a survey and they will not provide any data to DoD or the USCG that is linked to your name, other personal identifiers, or your military records.

3. The RAND Corporation and Westat will send you instructions via mail and email for accessing and completing the 2018 HRBS if you are randomly selected to participate. The survey will take about 20-25 minutes to finish. It can be completed on the web using a government computer during duty hours or a home computer with Internet access. You may also complete the survey on a mobile device, such as smartphone or tablet.

4. Your participation in the 2018 HRBS is critical to assessing health-related readiness and for making program and policy decisions that sustain a healthy and ready force. Although your participation in the survey is entirely voluntary, I hope you will choose to support this vital effort by responding promptly if you are asked.

5. Thank you in advance for your time and assistance in this important effort.

#

APPENDIX C

Description of Measures Used in the 2018 DoD Health Related Behaviors Survey

This appendix provides details for key measures used in each chapter. Only measures that did not come from survey data, that required significant recoding, or that are combinations of multiple survey items are shown. When applicable, we provide references for existing scales or indexes.

Chapter Three: Demographics

Housing status (Q1). Housing status included the following four categories:

- housing off an installation: military housing (including privatized) off main base (Q1 = 3), civilian housing that you own or pay mortgage on (Q1 = 4), and civilian housing that you rent, off base (Q1 = 5)
- living in dorms or barracks on an installation: dorms/barracks (Q1 = 1)
- other housing on an installation: military housing (including privatized) on main base (Q1 = 2)
- other living situation: some other living situation (e.g., living with parents, temporary housing; Q1 = 6).

Marital status (Q2, Q3). Marital status included the following four categories:

- *married (Q2 = 1)*
- *cohabiting (Q2 = 2, 3, 4, or 5 and Q3 = 1)*
- *never married (Q2 = 5)*
- *separated, divorced, widowed (Q2 = 2, 3, or 4)*

Gender. Gender was derived from administrative data provided by DMDC during the sampling process. Gender was coded as male or female. Self-reported gender from the survey (Q4) was used only if gender was missing in the administrative data.

Pay grade. Pay grade was derived from administrative data provided by DMDC during the sampling process. Pay grade included the following six categories: E1–E4, E5–E6, E7–E9, W1–W5, O1–O3, and O4–O6.

Education level. Education level was derived from administrative data provided by DMDC during the sampling process. Education included the following three categories:

- high school or less: 12 years or less of schooling (no diploma), high school graduate—traditional diploma, or high school graduate—alternative diploma
- some college: some college credit but no degree or associate's degree
- bachelor's degree or more: bachelor's degree or graduate or professional degree.

Race/ethnicity. Race/ethnicity was derived from administrative data provided by DMDC during the sampling process. Racial/ethnic categories included the following:

- Hispanic, including Mexican, Mexican-American, Chicano, Puerto Rican, Cuban, or other Spanish/Hispanic/Latino
- non-Hispanic white
- non-Hispanic black
- non-Hispanic Asian, including Indian, Chinese, Filipino, Japanese, Korean, or Vietnamese
- other: not Spanish/Hispanic/Latino and American Indian or Alaska Native, Native Hawaiian or other Pacific Islander (e.g., Samoan, Guamanian, Chamorro), or more than one race.

Parental status. Parental status was derived from administrative data provided by DMDC during the sampling process. Parental status was defined as "1" if the respondent had at least one dependent under the age of 18.

Chapter Four: Health Promotion and Disease Prevention

Weight status (Q9, Q10). Two standard items asked respondents to report their height (Q9) and weight (Q10). Weight status was based on BMI, which was calculated as

$$\frac{Weight(lbs) \times 703}{Height(in)^2}$$

For service members aged 20 or older, we categorized BMI using CDC criteria (CDC, 2015a), and for service members younger than age 20, we used age- and sex-specific definitions established by the CDC (CDC, 2015b).

Weight was categorized as follows for service members aged 20 or older:

- underweight: BMI < 18.5 kg/m^2
- normal: BMI 18.5–24.99 kg/m^2
- overweight: BMI 25.00–29.99 kg/m^2
- obese: BMI ≥ 30.0 kg/m^2.

Weight was categorized as follows for service members younger than age 20:

- underweight: BMI < 5th percentile for age or gender
- normal: BMI 5th–84th percentile for age or gender
- overweight: BMI 85th–94th percentile for age or gender
- obese: BMI ≥ 95th percentile for age or gender.

Physical Activity (Q11, Q12). Respondents were asked about the frequency (Q11) and duration (Q12) of MPA and VPA in the past 30 days. These two questions were combined into two categorical measures of MPA and VPA and are modeled after items on the NHANES (National Center for Health Statistics, 2016).

MPA was categorized as

- < 150 minutes per week
- 150–299 minutes per week
- 300+ minutes per week.

VPA was categorized as

- < 75 minutes per week
- 75–149 minutes per week
- 150+ minutes per week.

Screen time (Q13). A single item asked respondent to indicate the average daily amount of time they spent on a device with a screen, excluding work or school, over the past 30 days. Device examples included a desktop or laptop computer, television, smartphone, tablet (e.g., iPad, Kindle), or other handheld device or gaming system. Response options included none, less than one hour, 1–2 hours, 3–4 hours, 5–10 hours, and 11 hours or more. We collapsed these categories into three groupings: less than one hour, 1–4 hours, and 5+ hours. This item is similar to an item on the NHANES (National Center for Health Statistics, 2016).

Annual Physical Assessment (Q17). A single item asked respondents whether they had a routine checkup in the past 12 months. The exam was described as a general physical exam, not for specific injury, illness, or condition. Response options include yes and no. This measure is similar to an item included in the 2015 HRBS.

Average Daily Sleep Amount (Q90). Respondents were asked about the average amount of sleep they had gotten in the past 30 days in hours. The item had an open-ended response option (i.e., respondents directly typed in the number of hours) and was modeled after a similar item in the BRFSS (CDC, 2018c).

Sleep Quality (Q91). Respondents were asked to rate their sleep quality over the past 30 days. Response options included very good, fairly good, fairly bad, and very bad. This item was based on an item in the Pittsburgh Insomnia Rating Scale (Moul et al., 2002).

Lack of Energy Due to Sleep Problems (Q92). Respondents were asked how much they had been bothered by a lack of energy due to poor sleep over the past week. Response options included not bothered at all, slightly bothered, moderately bothered, and severely bothered. We collapsed across response options to create a single group that was moderately or severely bothered. This item was also based on an item in the Pittsburgh Insomnia Rating Scale (Moul et al., 2002).

Use of Medications to Sleep (Q93). Respondents were asked how often they had used the following medications to stay awake in the past 30 days: energy drinks (e.g., Monster, Red Bull, Rockstar, 5-Hour Energy), caffeinated beverages other than energy drinks (e.g., coffee, soda, or tea), OTC medications (e.g., Vivarin, NoDoz), and prescription medications (e.g., Adderall, Ritalin). Response options included not in the past 30 days, less than once a week, once or twice a week, three or more times a week, and daily. We collapsed across categories to create three groups based on use: never, 1–2 times per week (includes less than once per week), and three or more times per week. This measure was developed for the 2018 HRBS.

Use of Substances to Sleep (Q94). A single item asked respondents how often they had used prescription or OTC medications to help them sleep over the past 30 days. Response options included not in the past 30 days, less than once a week, once or twice a week, three or more times a week, and daily. We collapsed across categories to create three groups: never, 1–2 times per week, and three or more times per week. This item was based on a similar item in the 2015 HRBS but used different response options.

Chapter Five: Substance Use and Health

Binge drinking, past 30 days (Q26). Respondents who binge drank at least once in the past 30 days (Q26 ≤ 6)—that is, men who drank five or more drinks and women who drank four or more drinks on the same occasion at least once in the past 30 days—were classified as current binge drinkers. Note that only past-30-days drinkers (Q24 > 1) received this item. This item was taken from the NSDUH (Substance Abuse and Mental Health Services Administration, 2019a).

Heavy drinking, past 30 days (Q26). Respondents who reported binge drinking at least 1 or 2 days a week during the past 30 days (Q26 ≤ 4) were classified as heavy drinkers. Note that only past-30-day drinkers (Q24 > 1) received this item. This definition is similar to the heavy drinking definition used by the NSDUH (Substance Abuse and Mental Health Services Administration, 2019a), which is binge drinking on five or more days in the past 30 days. The 2018 HRBS used a slightly lower threshold given the categorical response options presented to service members as compared with the actual number of days in the past 30 days a person engaged in binge drinking on the NSDUH.

Any serious drinking consequences (Q21). Respondents who endorsed any of Q21a through Q21j were classified as experiencing serious drinking consequences in the past year. Only past-year drinkers (Q20 = yes) received this item. This item was modified from the 2015 HRBS (Meadows et al., 2018).

Any risky drinking and driving (Q22). Respondents who endorsed either Q22a or Q22b were categorized as engaging in risky drinking and driving behaviors in the past year. Note that subitem Q22a was only asked of past-year drinkers (Q20 = yes), but Q22b was asked of all respondents regardless of whether they endorsed drinking in the past 12 months or not. This item was modified from the 2015 HRBS (Meadows et al., 2018).

Productivity loss from drinking (Q23). Respondents who endorsed any item in Q23a through Q23f were considered to have experienced past-year job-related productivity loss from drinking. Only past-year drinkers (Q20 = yes) received this item. This item was modified from the 2015 HRBS (Meadows et al., 2018).

Military drinking culture (Q19). Respondents who reported that they agreed with any of Q19a through Q19d were classified as perceiving the military culture as supportive of drinking. This item was modified from the 2015 HRBS (Meadows et al., 2018).

Current cigarette smokers (Q27, Q28). Respondents who reported smoking in the past 30 days (Q28 ≥ 1) were classified as current cigarette smokers. Past-30-day users also had to indicate that they had smoked cigarettes in the past 12 months (Q27 = yes) to be presented with Q28. This measure is from the NHIS (National Center for Health Statistics, 2019).

Current e-cigarette user (Q37, Q38). Respondents who reported using e-cigarettes in the past 30 days (Q38 ≥ 1) were classified as current e-cigarette users. Past-30-day users also had to indicate that they had used e-cigarettes in the past 12 months (Q37 = yes) to be presented with Q38. This measure was modified from the NHIS (National Center for Health Statistics, 2019).

Current cigar smoker (Q33, Q34). Respondents who reported using cigars, cigarillos, or little cigars in the past 30 days (Q34 ≥ 1) were classified as current cigar users. Past-30-day users also had to indicate that they had used cigars, cigarillos, or little cigars in the past 12 months (Q33 = yes) to be presented with Q34. This measure was modified from the NHIS (National Center for Health Statistics, 2019).

Current smokeless tobacco user (Q31, Q32). Respondents who reported using smokeless tobacco (i.e., chewing tobacco or snuff) in the past 30 days (Q32 ≥ 1) were classified as current smokeless tobacco users. Past-30-day users also had to indicate that they had used smokeless tobacco in the past 12 months (Q31 = yes) to be presented with Q32. This measure was added to the 2018 HRBS be consistent with the other tobacco-related items.

Current pipe or hookah user (Q35, Q36). Respondents who reported smoking tobacco in a pipe or hookah in the past 30 days (Q36 ≥ 1) were classified as current pipe or hookah users. Past-30-day users also had to indicate that they had used a pipe or hookah in the past 12 months (Q35 = yes) to be presented with Q36. This measure was modified from the NHIS (National Center for Health Statistics, 2019).

Past-year drug use (Q40). Respondents who reported that they had used any of the substances assessed in subitems Q40a through Q40e were classified as using any drugs in the past year. The five drug categories marijuana, synthetic cannabis, inhalants to get high, synthetic stimulants, and other illegal drugs. These drug use categories were comparable to the 2015 HRBS (Meadows et al., 2018).

Past-year marijuana or synthetic cannabis use (Q40a, Q40b). Respondents who reported that they had used any marijuana or hashish in item Q40a and/or any synthetic cannabis in item Q40b were classified as using marijuana in the past year.

Past-year drug use other than marijuana (Q40c–Q40e). Respondents who reported that they had used any of the substances assessed in subitems Q40c through Q40e was classified as using any drugs other than marijuana in the past year.

Past-year nonprescription cough or cold medicine use (Q40f). Respondents who reported that they had used nonprescription cough or cold medicine to get high in subitem Q40f were classified as using nonprescription cough or cold medicine in the past year.

Past-year nonprescription anabolic steroids (Q40g). Respondents who reported that they had used nonprescription anabolic steroids in subitem Q40g were classified as using nonprescription steroids in the past year.

Past-year prescription drug use (Q43). Respondents who said yes to any of items Q43a through Q43c were categorized as having used any prescription drugs in the past year. We also reported on the proportion who indicated yes to each of these items separately. This measure was modified from the 2015 HRBS (Meadows et al., 2018).

Past-year prescription drug misuse (Q44). Respondents who said yes to any of items Q44a through Q44c were categorized as having misused any prescription drugs in the past year. Note that only those who responded yes to corresponding items Q43a through Q43c received items Q44a through Q44c. This measure was modified from the NSDUH (Substance Abuse and Mental Health Services Administration, 2019a).

Chapter Six: Mental and Emotional and Health

Serious psychological distress (past 30 days: Q55; past 12 months: Q56, Q57). Respondents completed the K6 scale (Kessler, Andrews, et al., 2002; Kessler, Barker, et al., 2003), a self-administered brief measure of serious psychological distress that is widely used in general population surveys. The K6 ascertained how much of the time service members had experienced common symptoms of nonspecific psychological distress (five-point response scale: none of the time to all of the time) in the past 30 days (Q55) or the past 12 months (Q56, Q57). Symptoms include the following: feeling "so sad that nothing could cheer you up," feeling nervous, feeling restless or fidgety, feeling hopeless, feeling that everything was an effort, or feeling worthless (e.g., Q55a–Q55f). Respondents were asked if there was a month in the past 12 months during which they felt more depressed, anxious, or emotionally stressed than they had during the past

30 days (Q56); if yes (Q56 = 1), respondents were asked to rate their symptoms during the month that they felt the worst (Q57). Scores of 13 or higher on the K6 indicate serious psychological distress and discriminate highly between individuals with and without a clinical diagnosis of serious mental illness in the general population (Kessler, Barker, et al., 2003; Kessler, Berglund, et al., 2004). Respondents with sum scores greater than or equal to 13 were categorized as having serious psychological distress during the past 30 days (Q55) and/or during the past 12 months (Q57); respondents with sum scores greater than or equal to 8 were categorized as having moderate psychological distress during the past 30 days (Q55) and/or during the past 12 months (Q57). The K6 replaces items from the PHQ-9 (probable depression) and GAD-7 (probable generalized anxiety disorder) that were included in the 2015 HRBS.

Aggressive behavior (Q58). To assess levels of aggressive behavior, respondents were asked to report how often in the past 30 days they had expressed anger in explosive or aggressive ways, as illustrated in four scenarios (e.g., threatened someone with physical violence, got angry at someone and yelled or shouted at them; Q58a–Q58d). Responses for each item ranged from never to five or more times in the past 30 days. This four-item measure has been used extensively in the Army's Land Combat Study to characterize aggressive behavior among service members (see, for example, Killgore et al., 2008; Thomas et al., 2010; Wilk et al., 2013). Two categories of aggressive behavior were calculated based on responses. If personnel responded that they had expressed any of the behaviors at least once, they were categorized as showing any aggressive behavior in the past 30 days. If personnel responded that they had expressed any of the behaviors five or more times, they were categorized as showing aggressive behavior 5+ times in the past 30 days.

Unwanted sexual contact (Q64, Q65). To assess experience of unwanted sexual experiences among service members since joining the military, respondents were asked if they had experienced a time "when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you" or any sexual contact (i.e., "sexual touching as well as oral, anal or vaginal penetration") when they did not consent or could not consent. If respondents answered yes (Q64 = 1), a follow-up question asked whether the unwanted sexual contact had occurred during the past 12 months. These items were modified from those used in the 2015 HRBS to focus exclusively on experiences that had occurred since joining the military and during the past 12 months (lifetime experience of unwanted sexual contact is no longer asked) and to more clearly define unwanted sexual contact. These items cannot be directly compared with other civilian or military surveys, including the WGRA.

Physical abuse (Q66, Q67). To assess experiences of physical abuse since joining the military, respondents were asked whether they had ever been "physically abused, punished, or beaten such that you received bruises, cuts, welts, lumps, or other injuries?" If respondents answered yes (Q66 = 1), a follow-up question asked if the physical abuse had occurred during the past 12 months. These items were refined from those used in the 2015 HRBS to focus exclusively on experiences that have occurred since joining the military and during the past 12 months (lifetime experience of physical abuse is no longer asked in the 2018 HRBS).

Probable PTSD (Q68, Q69). To assess probable PTSD, respondents were asked to complete the PC-PTSD-5 (Prins et al., 2016). The PC-PTSD-5 is a brief, standardized rating scale for PTSD.

Respondents were first asked whether they had experienced a traumatic event in their lifetime (Q68). If yes (Q68 = 1), respondents were asked whether in the past month (or 30 days) they had experienced five symptoms that correspond to cardinal symptoms of PTSD (nightmares, re-experiencing, and/or intrusive thoughts about the event; avoidance; hypervigilance; emotion numbness; persistent feelings of guilt or blame surrounding the event). The PC-PTSD-5 is a revised version of the original Primary Care PTSD Screen (Prins et al., 2004), which was developed to more closely correspond to DSM-5 diagnostic criteria for PTSD. The PC-PTSD-5 has a variety of purposes, including screening individuals for PTSD in clinical settings, diagnosis, and monitoring symptom change during and after treatment. Past research has shown that the Primary Care PTSD Screen (on which the PC-PTSD-5 is based) performs similarly to longer PTSD screening measures (i.e., PCL-C; Bliese et al., 2008). A preliminary validation study conducted with a sample of 398 veterans also showed that the PC-PTSD-5 had excellent predictive utility with respect to clinical diagnosis of PTSD (Prins et al., 2016). The PC-PTSD-5 replaces the 17-item PCL-C, which was included in the 2015 HRBS. Respondents with sum scores greater than or equal to 3 were categorized as having probable PTSD.

Suicide ideation (Q77), suicide plans (Q78), and suicide attempts (Q79). Respondents were asked whether they had seriously thought about trying to kill themselves in the past 12 months ("At any time in the PAST 12 MONTHS, did you seriously think about trying to kill yourself?"; Q77). Respondents who indicated that they had seriously thought about trying to kill themselves (Q77 = 1) were then asked whether they had made any plans to kill themselves in the past 12 months. Respondents who reported suicide ideation (Q77 = 1) were also asked, "During the PAST 12 MONTHS, did you try to kill yourself?" These items were refined from the 2015 HRBS; they now focus exclusively on experiences during the past 12 months and map directly to questions from the NSDUH (Substance Abuse and Mental Health Services Administration, 2019a).

Problem gambling (Q95, Q96). The Lie-Bet Questionnaire (Johnson et al., 1997) was used to assess problem gambling. The questionnaire consists of two questions about lifetime experience of problems associated with gambling. The questions ask whether respondents have (1) "ever felt the need to bet more and more money?" or (2) "ever had to lie to people important to you about how much you gambled?" Respondents who answered yes to either of these items were considered to have problem gambling. Problem gambling has not been assessed in prior years of the HRBS.

Mental health treatment utilization (Q70–73). A series of questions assessed respondents' utilization of mental health services within the past 12 months. Respondents were asked to indicate whether they had received treatment for "problems with stress, your emotions, or mental health, or for problems with your use of alcohol or drugs" from different types of providers (mental health provider; general medical provider; chaplain, clergy, or pastor; Q70a–Q70c). If individuals indicated that they had received treatment for a mental health or substance use–related problem from a given type of provider (Q70a–Q70c = 1), they were subsequently asked to indicate the setting (military facility; VA facility; non-VA civilian facility) in which they received that treatment (Q71a-c). Respondents who indicated that they had received treatment in the past 12 months (Q70a–Q70c = 1 and Q71a–Q71c = 1) were then asked to indicate the number of times that they had seen a provider in the past 12 months for each applicable provider type/

setting combination (Q72a–Q72i). All individuals were asked whether they had taken any prescribed medication to treat a mental health or substance use problem (Q73). These items have been refined from similar items included in the 2015 HRBS, such that the number of response options has been reduced by combining similar provider categories (Q70) and settings (Q71), and the items now focus exclusively on treatment within the past 12 months.

Unmet mental health need (Q74, Q75). Respondents were asked to indicate whether, during the past 12 months, there was ever a time when they "needed treatment for an emotional or mental health problem or for your use of alcohol or drugs but did not get it" (Q74). This item replaces two separate items pertaining to perceived mental health treatment need on the 2015 HRBS and is slightly modified from a similar item included in the NSDUH which has been used in the research literature. Individuals who indicated that they needed treatment in the past 12 months but did not get it (Q74 = 1) were asked to indicate reasons why they did not pursue treatment (Q75). In addition, individuals with sum scores of 8 or higher on the K6 (i.e., those with moderate psychological distress) who did not indicate receiving mental health treatments in the past 12 months were asked to indicate reasons for not getting mental health treatment (Q75). Response options included "I did not think treatment would help," "It would have harmed my career," "I could not afford the cost," and "I did not think I needed it," among others (Q75a–Q75n). Question wording and response options were modified from a comparable item on the 2015 HRBS to accommodate changes to the survey skip patterns that determined which respondents received this item.

Belief that mental health services would damage a person's career (Q76). Respondents were asked to indicate whether they believed that seeking mental health would harm an individual's career based on the following question: "In general, do you think it would damage a person's military career if the person were to seek counseling or mental health therapy/treatment through the military, regardless of the reason for seeking counseling?" This item was previously included in the 2015 HRBS.

Chapter Seven: Physical Health and Functioning

Physician-diagnosed chronic conditions (Q14). Prevalence of each condition was calculated based on the proportion of respondents who responded yes for each of the subitems (Q14a–Q14h = 1). A variable was also developed to indicate the total number of conditions each respondent endorsed as yes using the following categories: no conditions; 1–2 conditions; 3+ conditions. This measure was modified from the BRFSS (CDC, 2019a).

Physical symptoms (Q16). The proportion of respondents indicating that they were "bothered a lot" by each symptom was calculated. In addition, two pain-related variables were derived. The first variable reflected individuals who reported that they were "bothered a lot" by back pain or pain in the arms, legs, or joints (Q16b, Q16c). The second variable included individuals who reported that that they were "bothered a lot" by back pain; pain in the arms, legs, or joints; or headaches (Q16b, Q16c, or Q16d). Finally, a variable was derived to reflect high physical symptom severity. First, each symptom was assigned a score of 0 (not bothered at all), 1 (bothered a little bit), or 2 (bothered a lot). The values were added across all eight symptoms

(score range = 0–16). Respondents whose summary score was 8 or more were categorized as having high physical symptom severity. This measure was modified from the Patient Health Questionnaire-15 (Kroenke et al., 2002).

Injury (Q61). The proportion of individuals reporting that they had experienced any of the injuries listed in this item were identified as having experienced an injury in the past 12 months. This item was modified from the Brief Traumatic Brain Injury Screen (Schwab et al., 2006).

TBI (Q62). Respondents who answered that they had experienced an injury in Q61 and indicated that, as a result of the event, they lost consciousness or got "knocked out" for less than a minute (Q62a = 1); lost consciousness or got "knocked out" for 1 to 20 minutes (Q62b = 1); felt dazed, confused, or "saw stars" (Q62d = 1); or didn't remember the event (Q62e = 1) were categorized as screening positive for probable mTBI. Respondents who answered that they had an injury in Q61 and indicated that they lost consciousness or got "knocked out" for more than 20 minutes (Q62c = 1) were categorized as screening positive for probable moderate to severe TBI. Individuals who did not experience an injury in Q61 were coded as not screening positive for TBI. This item was modified from the Brief Traumatic Brain Injury Screen (Schwab et al., 2006).

Postconcussive symptoms (Q63). A positive screen for postconcussive symptoms required a positive screen for mTBI or moderate to severe TBI (Q61 and Q62; see above) and either (1) endorsement of four or more of the symptoms in Q63 (headaches, dizziness, memory problems or lapses, balance problems, ringing in the ears, irritability, sleep problems, sensitivity to light) or (2) a positive response for "concussion or symptoms of a concussion (such as headache, dizziness, irritability)" in Q62. Individuals who did not experience an injury in Q61 were coded as not experiencing postconcussive symptoms. This item was modified from the Brief Traumatic Brain Injury Screen (Schwab et al., 2006).

Self-rated health (Q15). The proportion of respondents endorsing each category (excellent, very good, good, fair, poor) was calculated. This item is from the SF-36 (Ware and Sherbourne, 1992).

Absenteeism and presenteeism (Q60). For absenteeism, the mean number of days (out of the past 30) that symptoms caused the respondent to miss work or school was calculated (Q60a). For presenteeism, the mean number of days that symptoms caused the respondent to experience reduced productivity was calculated (Q60b). These measures are from the Sheehan Disability Scale (Sheehan, Harnett-Sheehan, and Raj, 1996).

Chapter Eight: Sexual Behavior and Health

More than one sex partner in the past 12 months (Q46). The item was adapted from the 2010 National HIV Behavioral Surveillance System Questionnaire. A version appeared in the 2015 HRBS with slightly different response options but was used to derive a comparable measure. Respondents providing a response of at least two people (Q46 ≤ 3) were categorized as having more than one sex partner in the past 12 months.

Past-year sex with a new sex partner without using a condom (Q47). The item appeared in the 2015 HRBS. Those who gave responses of never, seldom, sometimes, or often (Q47 = 2, 3, 4, or 5) were categorized as having sex with a new partner without using a condom.
Used a condom during most-recent vaginal sex (Q50). This measure was used in the 2015 HRBS. Respondents were asked whether they used any form of birth control the most-recent time they had vaginal sex. Those who responded "yes, condoms" (Q50 = 11) were categorized as using a condom during their most-recent vaginal sex.

Used highly effective contraception, other contraception, or no contraception during most-recent vaginal sex (Q50). This item was in the 2015 HRBS, and a comparable measure derived, but highly effective contraception was labeled "used sterilization or long-acting contraception," and "other contraception" was labeled "short-acting contraception" in 2015. Those who were pregnant or trying to become pregnant were excluded from the "no contraception" category.

Method of contraception at time of past-year unintended pregnancy (Q52). This item and measure were new to the 2018 HRBS. Respondents were asked whether they had used any form of birth control the most-recent time they had vaginal sex. Those responding "yes, female sterilization" (Q52 = 2); "yes, male sterilization" (Q52 = 3); "yes, an IUD" (Q52 = 4); or "yes, a contraceptive implant" (Q52 = 5) were classified as using highly effective contraception. Those responding with "yes, birth control pills" (Q52 = 6); "yes, birth control shots, birth control patch, contraceptive ring, or a diaphragm" (Q52 = 7); "yes, condoms" (Q52 = 8); or "yes, some other method" (Q52 = 9) were classified as using "other contraception," and those responding "no, we were not using any form of birth control" (Q52 = 1) were categorized as not using any method of contraception during their most-recent vaginal sex. Individuals using *both* highly effective and other contraception were categorized as using highly effective contraception.

Past-year unintended pregnancy (Q51). Respondents were asked whether they caused or had an unintended pregnancy in the past 12 months. Those responding yes (Q51 = 1) were categorized as causing or experiencing an unintended pregnancy in the past year.

Past-year unintended pregnancy during deployment (Q85). Questions for deriving this variable were asked only for those who had a past-year unintended pregnancy and a past-year deployment (Q84 > 1). This group was asked whether their unintended pregnancy had occurred during the deployment. If Q85 = 1 (yes), respondents were categorized as having a past-year unintended pregnancy during employment. All those who responded no or who did not have an unintended pregnancy or a past-year deployment were categorized as not having a past-year unintended pregnancy during deployment.

Contraceptive counseling prior to deployment (Q86). This variable was defined only for those with a past-year deployment (Q84 > 1). Respondents were asked whether a provider from the Military Health System had talked with them, prior to deploying, about using birth control in a deployed environment. Those responding yes (Q86 = 1) were classified as getting such counseling prior to deployment.

Could not access preferred contraception prior to deployment (Q87). This variable was defined only for those with a past-year deployment (Q84 > 1) and who had tried to get birth control

prior to that deployment (Q87 < 3). Those indicating that they could get or refill their preferred method (Q87 = 1) were classified as such.

Could not access preferred contraception during deployment (Q88). This variable was defined only for those with a past-year deployment (Q84 > 1) and who had tried to get birth control during that deployment (Q88 < 3). Those indicating that they could get or refill their preferred method (Q88 = 1) were classified as such.

Past-year HIV test (Q53). Past-year HIV test was derived comparably to the 2015 measure of this construct. (Q53 was asked as part of the 2015 HRBS, with slightly different response options.) Respondents were asked when their last HIV test occurred. Those responding "within the past 6 months" (Q53 = 1) or "more than 6 months ago but within the past 12 months" (Q53 = 2) were categorized as having an HIV test in the past year.

Past-six-months HIV test (Q53). Q53 was asked as part of the 2015 HRBS, with slightly different response options. The derived past-six-months measure based on it is new to the HRBS in 2018. Respondents were asked when their last HIV test occurred. Those responding "within the past 6 months" (Q53 = 1) were categorized as having an HIV test in the past six months.

Past-year STI (Q54). This is a revision of an item from the 2015 HRBS yielding a comparable derived variable. Respondents were asked whether in the past 12 months they had an STI. Those responding yes (Q54 = 1) were categorized as having a past-year STI.

Men who had sex with men in the past year (DMDC gender, same-sex activity). Service members whose gender was male and met criteria for same-sex activity (see Chapter Nine derived variables) were categorized as men who had sex with men. This measure differs from that used by the 2015 HRBS only in the use of DMDC gender rather than self-reported gender.

High risk for HIV infection (DMDC gender, Q46, Q54, men who had sex with men in the past year). Those at high risk for HIV infection were defined as those who had vaginal or anal sex with more than one partner in the past year (Q46 <= 3), who had a past-year STI (Q54 = 1), or who were classified as men who had sex with men. The same measure was included in the 2015 HRBS.

Chapter Nine: Sexual Orientation and Health

Same-sex activity (DMDC gender, Q48, Q49). This measure was derived based on DMDC recorded gender, Q47 (sexual activity with male partners), and Q87 (sexual activity with female partners). Men providing any response to Q48 other than "no male partners in the past 12 months" (Q48 = 4) were categorized as having one or more same-sex partners. All other men responding to Q48 were categorized as not having such a partner. Women providing any response to Q49 other than "no female partners in the past 12 months" (Q49 = 4) were categorized as having one or more same-sex partners. All other women responding to Q49 were categorized as not having such a partner. Q48, Q49 were used to derive a comparable measure in the 2015 HRBS, but these questions were revised in 2018 to include fewer response options.

In addition, 2015 HRBS used self-reported rather than DMDC gender to derive same-sex activity.

Sexual identity (Q89). This item was chosen based on recommendations by the Sexual Minority Assessment Research Team expert panel (Sexual Minority Assessment Research Team, 2009). Service members giving a response of "gay or lesbian" (Q89 = 2) or "bisexual" (Q89 = 3) were categorized as LGB. Sexual identity was measured in the same way in the 2015 HRBS (Meadows et al., 2018).

Chapter Ten: Deployment Experience and Health

Lifetime number of deployments (Q80). All service members were asked to identify the number of times they had been deployed while serving in the military, to include both combat and noncombat deployments. Response options included 1 time, 2 times, 3 or more times, and "I have never been deployed." Those service members who indicated that they had never deployed were skipped out of the rest of the deployment section survey items.

Lifetime number of combat deployments (Q82). Service members who had prior deployment experience were asked how many combat zone deployments they had been on. The survey defined combat zone deployments as "a deployment where you received imminent danger pay (IDP), hazardous duty pay, and/or combat zone tax exclusion benefits." This definition is similar to the one used in DMDC's Status of Forces Survey. Response options included "I have not had any combat zone deployments," 1 deployment, 2 deployments, and 3 or more deployments.

Lifetime duration of deployments (Q81). Service members who had prior deployment experience were asked how long in total they had been deployed, to include both combat and noncombat deployments. Response options included 1–6 months, 7–12 months, 13–24 months, 25–48 months, and 49 months or more.

Duration of recent deployments (Q84). Service members who had prior deployment experience were asked how many months they had been deployed in the past 12 months, to include both combat and noncombat deployments. Response options included "I did not deploy in the past 12 months," less than one month, 1–3 months, 4–6 months, 7–9 months, and 10–12 months.

Lifetime combat trauma exposure (Q83). Service members who had ever deployed (to include both combat and noncombat deployments) were asked to indicate whether they had experienced six different traumas. The list of experiences is based on the 2015 HRBS; however, it only uses those items that independently predicted a set of deployment-related health conditions (e.g., probable PTSD and probable major depression) in a regression model using data from the 2015 HRBS. The final set of six items asks about working with landmines or unexploded ordnance, witnessing members of one's own unit being seriously wounded or killed, knowing someone who was killed in combat, witnessing acts of violence or excessive force that violated rules of engagement, being wounded in combat, and witnessing civilians being seriously wounded or killed.

APPENDIX D

Key Outcomes by Race/Ethnicity and Age Group

This appendix provides the key outcomes described in Chapters Three through Ten by race/ethnicity and age group.

Chapter Four: Health Promotion and Disease Prevention

Weight Status

Table D.1
Weight Status, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
HP2020 goals					
Obesity among those age 20+ (HP2020 target: <30.5 percent)	13.4%[b,c] (12.4–14.5)	19.5%[a] (17.2–21.8)	16.9%[a] (14.5–19.2)	14.9% (11.7–18.1)	16.3% (12.5–20.2)
Normal weight among those age 20+ (HP2020 target: >33.9 percent)	33.7%[c] (32.2–35.1)	35.0%[c] (31.6–38.4)	27.6%[a,b,d] (24.8–30.5)	37.7%[c] (33.2–42.1)	32.4% (27.1–37.6)
Weight categories					
Underweight[x]	0.6% (0.3–0.8)	0.6% (0.0–1.3)	0.4% (0.2–0.7)	1.2% (0.0–2.7)	3.0% (0.0–6.8)
Normal weight	36.2% (34.7–37.8)	37.3% (33.9–40.7)	31.5%[d] (28.4–34.5)	40.5%[c] (35.8–45.3)	33.3% (28.1–38.5)
Overweight	50.3%[b] (48.8–51.9)	43.3%[a,c] (40.0–46.5)	52.7%[b,d] (49.5–55.9)	44.4%[c] (39.6–49.1)	47.7% (42.3–53.2)
Obese	12.9%[b] (11.9–13.9)	18.8%[a] (16.5–21.1)	15.4% (13.2–17.6)	13.9% (10.9–16.9)	16.0% (12.2–19.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

Table D.2
Weight Status, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
HP2020 goals				
Obesity among those age 20+ (HP2020 target: <30.5 percent)	8.9% [b,c,d] (7.3–10.6)	15.8% [a,c,d] (14.5–17.1)	22.8%[a,b] (21.4–24.2)	21.9%[a,b] (19.1–24.7)
Normal weight among those age 20+ (HP2020 target: >33.9 percent)	45.6%[b,c,d] (42.9–48.2)	30.5%[a,c,d] (28.9–32.1)	20.7%[a,b] (19.4–21.9)	20.8%[a,b] (18.4–23.3)
Weight categories				
Underweight	1.1%[c,d] (0.4–1.8)	0.5%[d] (0.3–0.7)	0.3%[a,d] (0.2–0.5)	0.03%[a,b,c] (0.0–0.1)
Normal weight	50.6%[b,c,d] (48.1–53.2)	30.5%[a,c,d] (28.9–32.1)	20.7%[a,b] (19.4–21.9)	20.8%[a,b] (18.4–23.3)
Overweight	40.3% [b,c,d] (37.8–42.8)	53.2%[a] (51.5–54.9)	56.2%[a] (54.6–57.8)	57.2%[a] (54.1–60.3)
Obese	8.0% [b,c,d] (6.5–9.4)	15.8%[a,c,d] (14.5–17.1)	22.8%[a,b] (21.4–24.2)	21.9%[a,b] (19.1–24.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Physical Activity

Moderate and Vigorous Physical Activity

Table D.3
Moderate and Vigorous Physical Activity in Past 30 Days, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
HP2020 goals					
MPA for at least 150 mins/week or VPA for at least 75 mins/week (HP2020 target: 47.9%)[z]	72.3% (70.9–73.6)	71.3% (68.4–74.2)	73.7% (71.0–76.3)	69.8% (65.7–73.9)	66.0% (61.2–70.9)
MPA for more than 300 mins/week or VPA for at least 150 mins/week (HP2020 target: 31.3%)[z]	45.6% (44.0–47.2)	44.6% (41.3–47.9)	47.1% (43.9–50.3)	43.2% (38.3–48.0)	41.2% (35.6–46.9)
MPA					
<150 mins/week[z]	36.7% (35.2–38.1)	36.4% (33.3–39.6)	35.6% (32.6–38.6)	37.1% (32.7–41.5)	40.9% (35.8–46.1)
150–299 mins/week[z]	39.7% (38.2–41.2)	40.7% (37.4–43.9)	42.1% (39.0–45.3)	41.4% (36.7–46.1)	37.0% (31.6–42.3)
300+ mins/week[z]	23.6% (22.1–25.1)	22.9% (20.0–25.8)	22.3% (19.4–25.1)	21.5% (17.1–26.0)	22.1% (16.9–27.3)
VPA					
<75 mins/week[z]	51.5% (49.9–53.0)	54.2% (50.9–57.5)	51.1% (47.9–54.3)	55.6% (50.8–60.5)	58.3% (52.7–63.9)
75–149 mins/week[x]	9.5% (8.6–10.5)	7.8% (5.9–9.6)	8.3% (6.4–10.1)	6.2% (4.4–8.1)	6.0% (3.7–8.3)
150+ mins/week[z]	39.0% (37.4–40.6)	38.1% (34.8–41.3)	40.6% (37.4–43.8)	38.1% (33.2–43.1)	35.7% (30.0–41.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.4
Moderate and Vigorous Physical Activity in Past 30 Days, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
HP2020 goals				
MPA for at least 150 mins/week or VPA for at least 75 mins/week (HP2020 target: 47.9%)[z]	73.1% (70.9–75.2)	71.8% (70.3–73.3)	70.0% (68.5–71.4)	69.0% (66.0–72.1)
MPA for more than 300 mins/week or VPA for at least 150 mins/week (HP2020 target: 31.3%)	48.5%[b,c,d] (45.9–51.0)	44.1%[a] (42.4–45.8)	42.7%[a] (41.1–44.3)	40.6%[a] (37.5–43.6)
MPA				
<150 mins/week	35.1%[d] (32.7–37.5)	36.9%[d] (35.3–38.5)	38.8% (37.3–40.4)	41.6%[a,b] (38.5–44.7)
150–299 mins/week[z]	37.7%[b,c] (35.2–40.1)	41.8%[a] (40.1–43.5)	42.3%[a] (40.7–43.9)	39.3% (36.3–42.2)
300+ mins/week	27.2%[b,c,d] (24.8–29.7)	21.3%[a] (19.8–22.7)	18.8%[a] (17.5–20.2)	19.2%[a] (16.6–21.8)
VPA				
<75 mins/week	50.9%[d] (48.3–53.4)	52.5% (50.8–54.2)	54.2% (52.6–55.8)	57.2%[a] (54.1–60.2)
75–149 mins/week[z]	8.9% (7.4–10.4)	9.0% (8.1–10.0)	7.7% (6.8–8.5)	8.4% (6.9–9.8)
150+ mins/week[z]	40.2% (37.7–42.7)	38.4% (36.8–40.1)	38.1% (36.6–39.7)	34.5% (31.5–37.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Strength Training

Table D.5
Strength Training in the Past 30 Days, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
HP2020 goal					
Muscle-strengthening activities on 3+ days/week (HP2020 target [2+ days/week]: 24.1%)[q]	47.1%[c] (45.6–48.7)	52.0% (48.7–55.3)	55.7%[a] (52.6–58.8)	52.2% (47.5–57.0)	47.3% (41.7–52.8)
Strength training					
<1 day/week	26.6%[d] (25.3–27.9)	22.8%[e] (20.1–25.4)	23.1%[e] (20.6–25.6)	19.6%[a,e] (16.0–23.1)	30.6%[b,c,d] (25.8–35.4)
1–2 days/week	26.3%[c] (24.9–27.6)	25.2% (22.4–28.1)	21.2%[a,d] (18.8–23.6)	28.2%[c] (24.1–32.3)	22.2% (18.2–26.2)
3+ days/week	47.1%[c] (45.6–48.7)	52.0% (48.7–55.3)	55.7%[a] (52.6–58.8)	52.2% (47.5–57.0)	47.3% (41.7–52.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[e] Statistically significantly different from Coast Guard estimate.

[q] The HP2020 goal is for two or more days per week, but the HRBS measure cannot be disaggregated this way. Instead, it represents strength training of three or more days per week, which thus underestimates the percentage of service members meeting the HP2020 goal.

Table D.6
Strength Training in the Past 30 Days, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
HP2020 goal				
Muscle-strengthening activities on 3+ days/week (HP2020 target [2+ days/week]: 24.1%)[q]	53.3%[c,d] (50.8–55.9)	50.1%[c,d] (48.4–51.9)	43.0%[a,b] (41.4–44.6)	38.8%[a,b] (35.9–41.7)
Strength training				
<1 day/week	23.9%[c,d] (21.8–26.0)	24.1%[c,d] (22.7–25.5)	28.7%[a,b] (27.2–30.1)	32.9%[a,b] (29.7–36.1)
1–2 days/week	22.8%[c,d] (20.7–24.9)	25.7% (24.2–27.2)	28.4%[a] (26.9–29.8)	28.3%[a] (25.6–31.0)
3+ days/week	53.3%[c,d] (50.8–55.9)	50.1%[c,d] (48.4–51.9)	43.0%[a,b] (41.4–44.6)	38.8%[a,b] (35.9–41.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[q] The HP2020 goal is for two or more days per week, but the HRBS measure cannot be disaggregated this way. Instead, it represents strength training of three or more days per week, which thus underestimates the percentage of service members meeting the HP2020 goal.

Screen Time

Table D.7
Hours per Day of Screen Time, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
< 1 hour per day[z]	6.3% (5.6–6.9)	5.5% (4.0–7.1)	5.6% (4.2–7.0)	6.0% (4.1–7.8)	7.1% (2.9–11.2)
1–4 hours per day	71.2%[b,c,d,e] (69.7–72.6)	57.7%[a,c] (54.3–61.0)	64.1%[a,b] (61.0–67.1)	60.8%[a] (56.1–65.5)	59.5%[a] (53.9–65.2)
5+ hours per day	22.5%[b,c,d,e] (21.2–23.9)	36.8%[a,c] (33.5–40.1)	30.4%[a,b] (27.4–33.3)	33.2%[a] (28.5–37.9)	33.4%[a] (28.1–38.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.8
Hours per Day of Screen Time, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
< 1 hour per day	3.7%[b,c,d] (2.7–4.6)	6.4%[a,c,d] (5.5–7.3)	8.7%[a,b,d] (7.8–9.5)	12.3%[a,b,c] (10.4–14.1)
1–4 hours per day	61.6%[b,c,d] (59.1–64.1)	69.5%[a] (67.9–71.2)	70.9%[a] (69.4–72.4)	69.6%[a] (66.7–72.5)
5+ hours per day	34.7%[b,c,d] (32.3–37.2)	24.1%[a,c,d] (22.6–25.6)	20.4%[a,b] (19.1–21.8)	18.1%[a,b] (15.5–20.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Annual Physical Assessment

Table D.9
Past-Year Routine Medical Checkup, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Routine checkup in past year	72.1%[c,d] (70.7–73.6)	69.1% (65.9–72.2)	66.4%[a] (63.3–69.5)	64.4%[a] (59.8–69.1)	73.2% (67.8–78.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

Table D.10
Past-Year Routine Medical Checkup, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Routine checkup in past year	63.9%[b,c,d] (61.4–66.3)	71.0%[a,c,d] (69.3–72.6)	79.3%[a,b] (78.0–80.5)	82.4%[a,b] (79.5–85.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Sleep Health

Average Daily Sleep Amount

Table D.11
Past 30 Days Average Daily Hours of Sleep, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
HP2020 goals					
8 hours/24-hour period for those 18–21 years of age, 7 hours/24-hour period for those older than 21 (HP2020 target: 72.8%)	35.6%[b] (34.2–37.0)	26.2%[a,c] (23.4–29.1)	32.8%[b] (29.8–35.7)	32.2% (27.9–36.6)	33.3% (28.3–38.3)
Hours sleep/24-hour period					
≤ 4 hours	9.6%[b] (8.5–10.6)	14.3%[a,c] (11.9–16.7)	9.9%[b] (8.0–11.8)	10.5% (7.7–13.2)	9.4% (6.7–12.1)
5–6 hours[x]	52.5% (50.9–54.0)	57.5% (54.2–60.8)	53.4% (50.2–56.5)	52.2% (47.5–57.0)	56.7% (51.3–62.0)
7+ hours	37.9%[b] (36.5–39.4)	28.2%[a,c,d] (25.3–31.1)	36.7%[b] (33.6–39.9)	37.3%[b] (32.5–42.1)	33.9% (28.9–38.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from Air Force estimate.

[b] Statistically significantly different from Army estimate.

[c] Statistically significantly different from Marine Corps estimate.

[d] Statistically significantly different from Navy estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

Table D.12
Past 30 Days Average Daily Hours of Sleep, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
HP2020 goals				
8 hours/24-hour period for those 18–21 years of age, 7 hours/24–hour period for those older than 21 (HP2020 target: 72.8%)	30.4%[b] (28.2–32.6)	36.7%[a,c] (35.1–38.4)	31.6%[b] (30.1–33.1)	34.4% (31.5–37.3)
Hours sleep/24-hour period				
≤ 4 hours[z]	11.4% (9.7–13.0)	9.6% (8.4–10.7)	10.4% (9.4–11.4)	9.4% (7.6–11.3)
5–6 hours	51.0%[c] (48.5–53.6)	53.7%[c] (52.0–55.4)	58.0%[a,b] (56.4–59.5)	56.2% (53.1–59.2)
7+ hours	37.6%[c] (35.2–40.0)	36.7%[c] (35.1–38.4)	31.6%[a,b] (30.1–33.1)	34.4% (31.5–37.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Sleep Quality

Table D.13
Sleep Quality in Past 30 Days, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Very good[z]	9.6% (8.7–10.5)	8.4% (6.5–10.2)	9.8% (7.8–11.9)	8.1% (5.8–10.4)	6.7% (4.5–8.8)
Fairly good[z]	55.3% (53.7–56.8)	52.5% (49.2–55.8)	56.2% (53.0–59.3)	58.9% (54.3–63.5)	52.0% (46.5–57.4)
Fairly bad[z]	29.6% (28.1–31.1)	31.1% (28.0–34.2)	28.9% (26.1–31.7)	25.3% (21.3–29.3)	34.2% (29.1–39.2)
Very bad[x]	5.5% (4.7–6.3)	8.0% (6.2–9.9)	5.1% (3.9–6.4)	7.7% (5.2–10.2)	7.2% (3.4–11.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.14
Sleep Quality in the Past 30 Days, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Very good[z]	9.6% (8.1–11.1)	9.1% (8.2–10.1)	8.3% (7.4–9.1)	11.3% (9.5–13.0)
Fairly good[z]	54.2% (51.6–56.7)	56.2% (54.5–57.9)	54.3% (52.7–56.0)	53.9% (50.8–57.0)
Fairly bad[z]	29.6% (27.3–32.0)	29.1% (27.4–30.7)	31.1% (29.6–32.6)	29.9% (27.0–32.8)
Very bad[z]	6.6% (5.3–8.0)	5.6% (4.7–6.5)	6.3% (5.5–7.1)	5.0% (3.5–6.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Lack of Energy Due to Poor Sleep

Table D.15
Lack of Energy Due to Poor Sleep in the Past Week, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Moderate to severe lack of energy due to poor sleep[z]	26.7% (25.3–28.2)	29.0% (26.0–32.0)	27.1% (24.3–29.8)	28.2% (23.9–32.4)	28.7% (23.7–33.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.16
Lack of Energy Due to Poor Sleep in the Past Week, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Moderate to severe lack of energy due to poor sleep[z]	28.4% (26.0–30.7)	26.6% (25.0–28.2)	27.9% (26.5–29.4)	25.0% (22.4–27.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Use of Medications to Sleep

Table D.17
Use of Sleep Medication in Past 30 Days, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Never (not in past 30 days)[z]	80.8% (79.6–82.0)	80.3% (77.8–82.8)	82.0% (79.7–84.2)	84.2% (81.5–87.0)	81.3% (77.5–85.1)
Occasionally (less than once per week, 1–2 times per week)[z]	10.8% (9.8–11.7)	10.7% (8.7–12.7)	11.4% (9.5–13.3)	8.8% (6.8–10.7)	11.4% (8.3–14.5)
Frequently (3 or more times per week)[z]	8.4% (7.5–9.3)	9.0% (7.3–10.7)	6.6% (5.3–7.9)	7.0% (5.1–8.9)	7.3% (4.9–9.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.18
Use of Sleep Medication in Past 30 Days, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Never (not in past 30 days)	83.1%[c,d] (81.3–85.0)	80.3% (78.8–81.7)	78.8%[a] (77.5–80.2)	77.9%[a] (75.4–80.3)
Occasionally (less than once per week, 1–2 times per week)[z]	10.6% (9.1–12.1)	11.5% (10.4–12.7)	9.8% (8.9–10.7)	10.1% (8.5–11.6)
Frequently (3 or more times per week)	6.2%[c,d] (5.0–7.5)	8.2%[c,d] (7.2–9.2)	11.3%[a,b] (10.3–12.4)	12.1%[a,b] (10.0–14.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Use of Substances to Stay Awake

Table D.19
Use of Substances to Stay Awake in the Past 30 Days, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Past 30-day use of energy drinks to stay awake					
Never (not in past 30 days)	51.3%[b] (49.7–52.9)	61.1%[a,e] (57.8–64.5)	55.2% (52.0–58.4)	55.6% (50.9–60.4)	47.6%[b] (42.1–53.1)
1–2 times per week[z]	29.8% (28.3–31.2)	28.4% (25.3–31.6)	30.5% (27.5–33.5)	29.1% (24.8–33.5)	35.4% (30.2–40.5)
3 or more times per week	18.9%[b,c] (17.6–20.3)	10.5%[a,e] (8.4–12.5)	14.3%[a] (12.3–16.4)	15.2% (11.6–18.9)	17.1%[b] (13.1–21.0)
Past 30-day use of other caffeinated beverages to stay awake					
Never (not in past 30 days)	22.7%[b,c] (21.3–24.1)	41.8%[a,c,d,e] (38.5–45.0)	28.4%[a,b,e] (25.3–31.4)	26.8%[b] (21.9–31.7)	20.2%[b,c] (16.1–24.3)
1–2 times per week	23.8%[b,c] (22.4–25.2)	30.5%[a] (27.4–33.7)	28.9%[a] (26.0–31.9)	25.8% (21.9–29.7)	26.0% (21.0–31.0)
3 or more times per week	53.5%[b,c] (52.0–55.1)	27.7%[a,c,d,e] (24.8–30.6)	42.7%[a,b,e] (39.7–45.8)	47.4%[b] (42.7–52.1)	53.9%[b,c] (48.4–59.3)
Past 30-day use of OTC medications to stay awake					
Never (not in past 30 days)	96.9%[b] (96.3–97.4)	94.8%[a] (93.2–96.4)	96.1% (94.8–97.4)	96.4% (94.9–97.9)	97.7% (96.4–99.0)
1–2 times per week[z]	2.1% (1.6–2.6)	3.5% (2.2–4.7)	2.7% (1.5–4.0)	2.4% (1.2–3.7)	1.8% (0.5–3.0)
3 or more times per week[z]	1.1% (0.8–1.4)	1.8% (0.8–2.8)	1.2% (0.7–1.7)	1.2% (0.4–2.0)	0.5% (0.1–1.0)
Past 30-day use of prescription medications to stay awake					
Never (not in past 30 days)	98.1%[b] (97.7–98.4)	95.8%[a] (94.3–97.3)	97.1% (96.0–98.2)	97.9% (97.0–98.8)	98.2% (96.8–99.5)
1–2 times per week	0.4%[b,c] (0.3–0.6)	1.3%[a] (0.6–2.1)	1.4%[a] (0.5–2.3)	0.7% (0.2–1.1)	0.4% (0.0–1.1)
3 or more times per week[x]	1.5% (1.1–1.9)	2.9% (1.6–4.2)	1.5% (0.8–2.2)	1.5% (0.6–2.3)	1.4% (0.3–2.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.20
Use of Substances to Stay Awake in the Past 30 Days, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Past 30-day use of energy drinks to stay awake				
Never (not in past 30 days)	49.0%[c,d] (46.5–51.6)	50.9%[c,d] (49.2–52.6)	63.7%[a,b,d] (62.2–65.3)	81.0%[a,b,c] (78.8–83.2)
1–2 times per week	32.5%[c,d] (30.1–34.8)	32.0%[c,d] (30.3–33.6)	23.1%[a,b,d] (21.7–24.5)	12.8%[a,b,c] (11.0–14.7)
3 or more times per week	18.5%[c,d] (16.5–20.6)	17.2%[c,d] (15.8–18.5)	13.1%[a,b,d] (12.0–14.3)	6.2%[a,b,c] (4.9–7.5)
Past 30-day use of other caffeinated beverages to stay awake				
Never (not in past 30 days)	32.0%[b,c,d] (29.6–34.4)	24.0%[a] (22.5–25.5)	22.3%[a,d] (20.9–23.6)	27.2%[a,c] (24.6–29.8)
1–2 times per week	29.8%[c,d] (27.5–32.1)	26.3%[c,d] (24.8–27.9)	18.8%[a,b] (17.5–20.1)	16.0%[a,b] (13.2–18.8)
3 or more times per week	38.2%[b,c,d] (35.7–40.6)	49.6%[a,c,d] (47.9–51.4)	58.9%[a,b] (57.3–60.5)	56.8%[a,b] (53.7–59.9)
Past 30-day use of OTC medications to stay awake				
Never (not in past 30 days)[z]	96.4% (95.4–97.4)	96.3% (95.6–97.0)	96.7% (96.1–97.3)	96.9% (95.9–97.8)
1–2 times per week[z]	2.8% (1.9–3.7)	2.3% (1.8–2.8)	1.7% (1.3–2.2)	2.0% (1.2–2.7)
3 or more times per week[x]	0.7% (0.3–1.2)	1.4% (1.0–1.8)	1.6% (1.2–2.0)	1.1% (0.6–1.7)
Past 30-day use of prescription medications to stay awake				
Never (not in past 30 days)	97.7% (96.9–98.5)	97.9%[c,d] (97.4–98.4)	96.8%[b] (96.2–97.4)	96.2%[b] (95.0–97.3)
1–2 times per week[z]	0.9% (0.4–1.4)	0.6% (0.4–0.8)	0.9% (0.5–1.2)	0.4% (0.1–0.8)
3 or more times per week	1.4%[d] (0.8–2.1)	1.5%[d] (1.1–1.9)	2.3% (1.8–2.9)	3.4%[a,b] (2.3–4.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Chapter Five: Substance Use and Health

Alcohol

Binge Drinking and Heavy Drinking

Table D.21
Alcohol Use in Past 30 Days, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Binge drinking	36.0%[b] (34.5–37.6)	27.0%[a,c,e] (24.0–30.1)	34.1%[b] (31.0–37.1)	30.3%[e] (26.1–34.6)	41.5%[b,d] (36.0–47.1)
Heavy drinking[z]	10.2% (9.1–11.3)	7.5% (5.7–9.4)	10.5% (8.5–12.6)	9.4% (6.9–12.0)	12.8% (8.9–16.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.22
Alcohol Use in Past 30 Days, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Binge drinking	38.0%[c,d] (35.5–40.4)	34.3%[c,d] (32.7–36.0)	28.3%[a,b,d] (26.8–29.8)	20.5%[a,b,c] (17.9–23.0)
Heavy drinking	12.0%[b,c,d] (10.3–13.7)	9.3%[a,c,d] (8.3–10.4)	7.3%[a,b] (6.5–8.2)	5.3%[a,b] (3.8–6.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Table D.23
Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any alcohol consequences[z]	6.7% (5.8–7.5)	5.3% (3.8–6.9)	6.9% (5.2–8.5)	2.9% (1.5–4.3)	7.0% (2.7–11.2)
Risky drinking and driving behavior	5.4%[d] (4.5–6.2)	4.7%[d] (3.0–6.3)	3.8% (2.6–5.0)	1.9%[a,b,e] (0.9–2.9)	5.5%[d] (3.0–8.0)
Any productivity loss due to drinking[x]	6.6% (5.8–7.3)	3.9% (2.4–5.4)	4.6% (3.2–6.0)	3.2% (1.5–4.9)	8.7% (4.3–13.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.24
Alcohol Consequences, Risky Drinking and Driving Behaviors, and Productivity Loss from Drinking, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any alcohol consequences	9.1%[b,c,d] (7.7–10.6)	5.3%[a,c,d] (4.5–6.1)	3.4%[a,b,d] (2.8–4.0)	1.3%[a,b,c] (0.8–1.9)
Risky drinking and driving behavior	5.8%[c,d] (4.5–7.2)	4.8%[d] (4.0–5.6)	3.6%[a,d] (3.0–4.2)	2.2%[a,b,c] (1.4–2.9)
Any productivity loss due to drinking	6.8%[c,d] (5.5–8.2)	5.6%[c] (4.8–6.3)	4.2%[a,b] (3.5–4.8)	2.9%[a] (1.5–4.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Military Drinking Culture

Table D.25
Perception of Military Drinking Culture, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Military culture supportive of drinking	30.8%[b,c,d] (29.3–32.3)	23.4%[a,e] (20.4–26.5)	25.8%[a,d] (22.8–28.8)	18.9%[a,c,e] (15.3–22.6)	32.5%[b,d] (26.9–38.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

Table D.26
Perception of Military Drinking Culture, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Military culture supportive of drinking	36.6%[b,c,d] (34.1–39.0)	27.4%[a,c,d] (25.8–28.9)	16.3%[a,b] (15.0–17.5)	12.5%[a,b] (10.0–15.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Tobacco

Cigarette, E-Cigarette, Cigar, and Smokeless Tobacco Use

Table D.27
Current Tobacco Use, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Current cigarette smoking	19.8%[b] (18.4–21.3)	13.5%[a] (11.1–15.8)	18.1% (15.6–20.6)	17.7% (13.7–21.7)	18.8% (13.9–23.8)
Current e-cigarette use[x]	16.9% (15.5–18.4)	13.3% (10.7–15.8)	17.3% (14.6–20.0)	12.7% (9.1–16.3)	18.0% (13.8–22.1)
Current cigar smoking	10.4% (9.4–11.5)	10.2% (8.2–12.3)	8.9% (7.2–10.6)	6.2%[e] (3.7–8.7)	12.6%[d] (8.8–16.3)
Current smokeless tobacco use	17.7%[b,c,d] (16.3–19.1)	4.3%[a,c,d,e] (2.9–5.6)	8.6%[a,b] (6.6–10.6)	10.3%[a,b] (6.8–13.8)	13.3%[b] (8.5–18.1)
Current pipe or hookah smoker	4.3%[b] (3.6–5.0)	8.0%[a,d] (6.1–9.9)	5.9% (4.3–7.4)	3.1%[b] (1.7–4.5)	6.6% (4.3–8.9)
Any current tobacco or nicotine use[1]	41.2%[b,c,d] (39.6–42.8)	29.4%[a,e] (26.3–32.5)	34.8%[a] (31.7–37.9)	33.5%[a] (28.8–38.2)	41.4%[b] (35.9–47.0)
Any current tobacco or nicotine smoking[2]	34.1%[b] (32.5–35.7)	27.8%[a,e] (24.8–30.9)	31.9% (28.9–35.0)	28.5% (24.0–33.0)	37.3%[b] (31.8–42.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[1] Includes cigarettes, e-cigarettes, cigars, pipes or hookahs, and smokeless tobacco.

[2] Includes cigarettes, e-cigarettes, cigars, and pipes or hookahs; excludes smokeless tobacco.

Table D.28
Current Tobacco Use, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Current cigarette smoking	23.1%[b,c,d] (20.9–25.4)	17.4%[a,c,d] (16.0–18.8)	13.2%[a,b,d] (12.0–14.3)	6.8%[a,b,c] (5.4–8.2)
Current e-cigarette use	27.9%[b,c,d] (25.5–30.2)	11.3%[a,c,d] (10.2–12.5)	6.0%[a,b,d] (5.1–6.8)	1.9%[a,b,c] (1.2–2.6)
Current cigar smoking	11.7%[c,d] (10.0–13.4)	9.3% (8.3–10.3)	8.3%[a] (7.4–9.2)	7.5%[a] (6.0–8.9)
Current smokeless tobacco use	16.3%[b,c,d] (14.2–18.4)	13.0%[a,c,d] (11.8–14.3)	9.6%[a,b,d] (8.6–10.6)	6.1%[a,b,c] (4.8–7.4)
Current pipe or hookah smoker	7.4%[b,c,d] (6.1–8.7)	4.7%[a,c,d] (4.0–5.5)	2.5%[a,b,d] (2.0–3.0)	0.9%[a,b,c] (0.4–1.4)
Any current tobacco or nicotine use[1]	45.7%[b,c,d] (43.2–48.3)	36.1%[a,c,d] (34.4–37.7)	29.4%[a,b,d] (27.9–30.9)	18.9%[a,b,c] (16.7–21.1)
Any current tobacco or nicotine smoking[2]	41.8%[b,c,d] (39.2–44.3)	29.8%[a,c,d] (28.2–31.5)	23.4%[a,b,d] (22.0–24.8)	14.3%[a,b,c] (12.4–16.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[1] Includes cigarettes, e-cigarettes, cigars, pipes or hookahs, and smokeless tobacco.

[2] Includes cigarettes, e-cigarettes, cigars, and pipes or hookahs; excludes smokeless tobacco.

Smoking Cessation

Table D.29
Past-Year Smoking Cessation Attempts Among Current Smokers, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Attempted to quit smoking	45.1%[b] (41.0–49.3)	60.0%[a,c] (51.1–68.9)	41.8%[b] (34.2–49.4)	43.3% (31.0–55.7)	53.5% (38.7–68.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

Table D.30
Past-Year Smoking Cessation Attempts Among Current Smokers, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Attempted to quit smoking[z]	46.0% (40.4–51.5)	49.5% (45.0–54.0)	40.3% (35.7–44.9)	39.5% (29.3–49.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Reasons for Use of E-Cigarettes

Table D.31
Reasons for E-Cigarette Use, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Perceived to be healthier than smoking cigarettes	34.9%[b] (30.8–38.9)	21.0%[a] (14.3–27.8)	35.4% (28.0–42.9)	NR (20.8–51.3)	35.7% (24.4–47.0)
Used to help quit smoking cigarettes[z]	32.6% (28.7–36.5)	24.8% (16.8–32.9)	30.9% (23.5–38.2)	31.0% (19.1–42.9)	28.0% (18.2–37.8)
Able to use in places where cigarette smoking is not allowed[z]	29.2% (25.3–33.1)	26.2% (18.2–34.1)	25.1% (18.4–31.7)	21.6% (10.1–33.0)	35.0% (24.2–45.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.32
Reasons for E-Cigarette Use, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Perceived to be healthier than smoking cigarettes[z]	33.5% (29.2–37.9)	31.6% (27.2–35.9)	38.4% (32.4–44.5)	NR (17.1–47.5)
Used to help quit smoking cigarettes	27.1%[c] (23.1–31.1)	33.5%[c] (28.9–38.0)	52.6%[a,b] (46.4–58.9)	NR (35.0–67.0)
Able to use in places where cigarette smoking is not allowed[z]	28.5% (24.5–32.6)	26.9% (22.3–31.5)	28.2% (22.3–34.2)	31.9% (17.1–46.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Drug Use and Prescription Drug Use and Misuse

Past-Year Drug Use

Table D.33
Past-Year Drug Use, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any drug use[z]	1.3% (0.8–1.8)	0.9% (0.1–1.7)	1.2% (0.4–1.9)	0.3% (0.0–0.6)	3.3% (0.0–7.2)
Any use of nonprescription cough or cold medicine to get high[z]	0.3% (0.1–0.5)	0.8% (0.2–1.5)	0.4% (0.0–0.7)	0.2% (0.0–0.5)	0.7% (0.0–1.5)
Any nonprescription anabolic steroid use[x]	0.3% (0.0–0.5)	0.03% (0.0–0.1)	0.04% (0.0–0.1)	0.1% (0.0–0.4)	0.04% (0.0–0.1)
Any marijuana or synthetic cannabis use[z]	0.8% (0.5–1.2)	0.7% (0.0–1.5)	0.9% (0.2–1.5)	0.3% (0.0–0.6)	3.2% (0.0–7.1)
Any drug use, excluding marijuana[x]	1.0% (0.5–1.4)	0.3% (0.0–0.6)	0.4% (0.1–0.7)	0.3% (0.0–0.6)	2.4% (0.0–6.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.34
Past-Year Drug Use, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any drug use	2.2%[b,c,d] (1.3–3.1)	0.9%[a,d] (0.6–1.3)	0.5%[a] (0.2–0.8)	0.2%[a,b] (0.0–0.4)
Any use of nonprescription cough or cold medicine to get high[z]	0.6% (0.2–0.9)	0.4% (0.1–0.6)	0.2% (0.1–0.4)	0.3% (0.0–0.7)
Any nonprescription anabolic steroid use[z]	0.3% (0.0–0.6)	0.1% (0.0–0.2)	0.1% (0.0–0.2)	0.05% (0.0–0.1)
Any marijuana or synthetic cannabis use	1.7%[b,c,d] (0.8–2.5)	0.6%[a] (0.3–0.9)	0.4%[a] (0.1–0.7)	0.1%[a] (0.0–0.2)
Any drug use, excluding marijuana	1.5%[b,c,d] (0.7–2.3)	0.5%[a] (0.2–0.8)	0.3%[a] (0.0–0.6)	0.1%[a] (0.0–0.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Past-30-Day Drug Use

Table D.35
Past-30-Day Drug Use, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any drug use[z]	0.6% (0.3–0.9)	0.4% (0.0–1.1)	0.4% (0.1–0.7)	0.0% (0.0–0.7)	0.4% (0.0–1.1)
Any marijuana or synthetic cannabis use[z]	0.4% (0.1–0.7)	0.4% (0.0–1.1)	0.2% (0.0–0.3)	0.0% (0.0–0.7)	0.4% (0.0–1.1)
Any drug use, excluding marijuana[z]	0.4% (0.1–0.6)	0.0% (0.0–0.3)	0.3% (0.0–0.5)	0.0% (0.0–0.7)	0.1% (0.0–0.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.36
Past-30-Day Drug Use, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any drug use	0.8%[c,d] (0.2–1.4)	0.4% (0.2–0.6)	0.1%[a] (0.0–0.2)	0.1%[a] (0.0–0.2)
Any marijuana or synthetic cannabis use	0.6%[c] (0.1–1.2)	0.2% (0.1–0.3)	0.1%[a] (0.0–0.2)	0.05% (0.0–0.1)
Any drug use, excluding marijuana[z]	0.4% (0.0–0.8)	0.2% (0.1–0.4)	0.1% (0.0–0.1)	0.04% (0.0–0.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Prescription Drug Use

Table D.37
Past-Year Prescription Drug Use, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any prescription drug use[z]	16.4% (15.3–17.6)	17.6% (15.3–19.9)	17.7% (15.3–20.0)	12.6% (9.7–15.6)	20.5% (15.8–25.3)
Prescription stimulants[z]	2.5% (2.0–3.0)	2.7% (1.7–3.8)	2.8% (1.7–3.9)	1.2% (0.5–1.8)	5.3% (1.2–9.3)
Prescription sedatives[z]	6.9% (6.2–7.7)	6.9% (5.5–8.3)	6.6% (5.2–8.0)	3.8% (2.6–5.0)	6.8% (4.7–9.0)
Prescription pain[z] relievers	11.8% (10.7–12.8)	13.0% (11.0–15.0)	12.4% (10.4–14.3)	10.9% (8.0–13.8)	14.9% (10.4–19.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.38
Past-Year Prescription Drug Use, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any prescription drug use	13.7%[c,d] (12.0–15.5)	16.7%[c,d] (15.4–18.0)	21.5%[a,b] (20.2–22.9)	24.3%[a,b] (21.6–27.0)
Prescription stimulants[z]	2.4% (1.5–3.4)	2.4% (1.9–2.9)	3.7% (3.1–4.4)	3.1% (2.1–4.0)
Prescription sedatives	4.1%[b,c,d] (3.1–5.0)	7.2%[a,c,d] (6.3–8.0)	10.1%[a,b] (9.0–11.1)	10.6%[a,b] (9.0–12.2)
Prescription pain relievers	10.6%[c,d] (9.1–12.2)	11.6%[c,d] (10.5–12.7)	14.7%[a,b] (13.5–15.8)	18.1%[a,b] (15.5–20.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Prescription Drug Misuse

Table D.39
Past-Year Prescription Drug Misuse, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any prescription drug misuse[x]	1.1% (0.7–1.5)	1.1% (0.6–1.7)	2.1% (1.1–3.0)	0.7% (0.2–1.2)	3.4% (0.0–7.2)
Prescription stimulant misuse	0.4% (0.1–0.6)	0.1%[e] (0.0–0.2)	0.5% (0.0–1.1)	0.2%[e] (0.0–0.4)	2.6%[b,d] (0.0–6.5)
Prescription sedative misuse[z]	0.4% (0.1–0.7)	0.2% (0.1–0.3)	0.7% (0.1–1.2)	0.2% (0.0–0.3)	0.4% (0.0–0.9)
Prescription pain reliever misuse[z]	0.7% (0.4–1.0)	1.0% (0.4–1.6)	1.2% (0.7–1.7)	0.6% (0.1–1.0)	2.8% (0.0–6.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[b] Statistically significantly different from non-Hispanic black estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.40
Past-Year Prescription Drug Misuse, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any prescription drug misuse[z]	1.7% (0.9–2.4)	1.0% (0.7–1.4)	1.3% (0.7–1.8)	2.4% (1.0–3.9)
Prescription stimulant misuse	0.9%[b,c] (0.2–1.6)	0.2%[a] (0.1–0.4)	0.1%[a] (0.0–0.1)	0.4% (0.0–0.7)
Prescription sedative misuse[z]	0.4% (0.0–0.8)	0.3% (0.1–0.4)	0.6% (0.1–1.1)	0.7% (0.3–1.2)
Prescription pain reliever misuse[z]	1.0% (0.4–1.6)	0.8% (0.5–1.1)	0.9% (0.5–1.2)	1.7% (0.4–3.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Chapter Six: Mental and Emotional and Health

Mental Health Status

Serious Psychological Distress

Table D.41
Serious Psychological Distress, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Past-month serious psychological distress (K6 score ≥13) [z]	9.3% (8.2–10.4)	9.4% (7.5–11.3)	9.5% (7.6–11.4)	11.5% (8.5–14.6)	8.9% (6.0–11.8)
Past-year serious psychological distress (K6 score ≥13) [z]	16.4% (15.1–17.7)	16.2% (13.8–18.5)	15.5% (13.1–17.9)	16.4% (13.0–19.8)	18.6% (13.8–23.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.42
Serious Psychological Distress, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Past-month serious psychological distress (K6 score ≥13)	12.1%[b,c,d] (10.4–13.8)	9.3% [a,c,d] (8.2–10.5)	6.0% [a,b] (5.2–6.8)	4.3% [a,b] (3.2–5.5)
Past-year serious psychological distress (K6 score ≥13)	20.6% [b,c,d] (18.5–22.7)	15.4% [a,c,d] (14.1–16.8)	11.8% [a,b,d] (10.7–12.9)	8.4% [a,b,c] (6.6–10.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Probable PTSD

Table D.43
Probable PTSD, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Probable PTSD (PC-PTSD-5 score ≥3)[x]	10.7% (9.8–11.7)	13.8% (11.6–16.1)	11.5% (9.7–13.4)	9.8% (7.4–12.3)	15.3% (11.7–18.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

Table D.44
Probable PTSD, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Probable PTSD (PC-PTSD-5 score ≥3)	9.5%[c,d] (8.1–10.9)	10.6% [c,d] (9.4–11.7)	16.5%[a,b] (15.3–17.8)	17.4% [a,b] (15.0–19.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Angry and Aggressive Behaviors

Table D.45
Angry and Aggressive Behaviors, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any angry or aggressive behavior in the past 30 days	50.0%[c] (48.4–51.5)	51.4%[c] (48.1–54.7)	44.6%[a,b] (41.5–47.8)	44.6% (39.9–49.3)	52.5% (47.1–57.9)
Angry or aggressive behavior 5+ times in the past 30 days	7.5%[c] (6.6–8.5)	7.5% (5.9–9.1)	5.0%[a] (3.9–6.1)	6.7% (4.1–9.4)	8.2% (5.7–10.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

Table D.46
Angry and Aggressive Behaviors, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any angry or aggressive behavior in the past 30 days	46.0%[c] (43.5–48.6)	48.8% [c] (47.1–50.6)	56.1% [a,b,d] (54.5–57.7)	49.2%[c] (46.1–52.3)
Angry or aggressive behavior 5+ times in the past 30 days[z]	6.9% (5.6–8.1)	6.8% (5.9–7.7)	8.6% (7.7–9.5)	5.8% (4.5–7.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Unwanted Sexual Contact

Table D.47
Unwanted Sexual Contact, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Unwanted sexual contact since joining the military	9.2%[e] (8.4–10.0)	10.5%[d] (8.8–12.3)	10.2%[d] (8.5–11.8)	6.3%[b,c,e] (4.6–8.0)	14.5%[a,d] (11.4–17.5)
Unwanted sexual contact, past 12 months	2.2% (1.7–2.6)	2.8% (1.7–3.8)	3.7%[d] (2.4–5.0)	1.1%[c,e] (0.5–1.7)	3.9%[d] (2.2–5.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses. The exact question wording in the 2018 HRBS is "The next question is about unwanted sexual contact, meaning times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration. Since joining the military, have you ever experienced unwanted sexual contact?" and "Did this unwanted sexual contact occur in the past 12 months?"

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

Table D.48
Unwanted Sexual Contact, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Unwanted sexual contact since joining the military[z]	9.2% (8.0–10.4)	10.2% (9.3–11.1)	9.4% (8.5–10.2)	7.2% (5.9–8.4)
Unwanted sexual contact, past 12 months	4.4%[b,c,d] (3.5–5.3)	1.8%[a,c,d] (1.4–2.2)	0.7%[a,b] (0.4–0.9)	0.2%[a,b] (0.0–0.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses. The exact question wording in the 2018 HRBS is "The next question is about unwanted sexual contact, meaning times when someone has touched you in a sexual way, had sex with you, or attempted to have sex with you when you did not consent or could not consent. By sexual contact we mean any sexual touching as well as oral, anal or vaginal penetration. Since joining the military, have you ever experienced unwanted sexual contact?" and "Did this unwanted sexual contact occur in the past 12 months?"

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Physical Assault

Table D.49
Physical Assault, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Physically assaulted since joining the military[z]	5.5% (4.8–6.3)	5.1% (3.9–6.3)	4.9% (3.8–5.9)	3.9% (2.5–5.4)	7.8% (5.4–10.1)
Physically assaulted, past 12 months[z]	0.9% (0.5–1.2)	1.6% (0.8–2.3)	1.3% (0.7–1.8)	1.2% (0.2–2.2)	1.6% (0.4–2.8)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.50
Physical Assault, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Physically assaulted since joining the military	4.5%[c,d] (3.5–5.5)	5.0%[c,d] (4.3–5.8)	7.0%[a,b] (6.2–7.8)	8.0%[a,b] (6.0–10.1)
Physically assaulted, past 12 months	1.7%[b,c,d] (1.1–2.3)	0.9%[a] (0.6–1.2)	0.5%[a] (0.3–0.8)	0.3%[a] (0.0–0.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Suicide

Table D.51
Suicide, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Suicidal ideation, past 12 months[z]	8.3% (7.3–9.3)	8.0% (6.0–10.0)	7.9% (6.0–9.7)	6.6% (4.1–9.0)	9.1% (5.9–12.3)
Suicide plan, past 12 months[z]	3.0% (2.4–3.6)	2.0% (1.3–2.7)	2.9% (1.7–4.1)	2.3% (1.0–3.5)	2.0% (0.7–3.3)
Suicide attempt, past 12 months[z]	1.2% (0.8–1.7)	1.5% (0.5–2.4)	1.4% (0.5–2.4)	0.8% (0.2–1.4)	1.0% (0.2–1.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.52
Suicide, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Suicidal ideation, past 12 months	11.1%[b,c,d] (9.5–12.7)	7.3%[a,c,d] (6.2–8.4)	5.6%[a,b,d] (4.8–6.3)	3.1%[a,b,c] (2.0–4.1)
Suicide plan, past 12 months	4.1%[b,c,d] (3.2–5.1)	2.0%[a,d] (1.5–2.4)	1.9%[a,d] (1.5–2.4)	0.9%[a,b,c] (0.5–1.3)
Suicide attempt, past 12 months	2.5%[b,c,d] (1.6–3.3)	0.5%[a] (0.3–0.7)	0.6%[a] (0.3–0.8)	0.3%[a] (0.0–0.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Problematic Gambling

Table D.53
Past-Year Gambling Problem, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Past-year gambling problem (positive Lie-Bet screen)	1.2%[d] (0.9–1.5)	1.6%[d] (0.9–2.3)	1.7%[d] (1.0–2.3)	5.3%[a,b,c,e] (2.9–7.7)	1.1%[d] (0.2–2.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

Table D.54
Past-Year Gambling Problem, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Past-year gambling problem (positive Lie-Bet screen)[z]	1.4% (0.9–1.8)	1.9% (1.4–2.4)	1.5% (1.1–1.9)	0.7% (0.3–1.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Mental Health Services

Past-Year Mental Health Service Utilization

Table D.55
Past-Year Mental Health Service Utilization, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any mental health service use	25.7% (24.3–27.1)	28.1%[c] (25.2–31.0)	22.5%[b] (20.0–25.0)	23.2% (19.4–27.0)	24.6% (19.7–29.5)
Saw mental health provider[x]	18.3% (17.0–19.5)	20.6% (18.0–23.2)	16.2% (14.0–18.5)	15.6% (12.4–18.8)	16.6% (13.1–20.1)
Saw general medical provider[z]	13.1% (11.9–14.2)	14.9% (12.5–17.2)	12.2% (10.3–14.1)	15.4% (12.0–18.8)	11.2% (8.4–14.0)
Any mental health services from specialty mental health or medical provider[z]	22.4% (21.1–23.8)	24.7% (22.0–27.5)	20.2% (17.8–22.7)	21.7% (17.9–25.4)	19.4% (15.7–23.1)
Saw clergy, chaplain, or pastor[z]	8.5% (7.5–9.4)	10.6% (8.5–12.7)	7.7% (6.2–9.2)	6.3% (3.8–8.8)	10.2% (5.8–14.6)
Only saw clergy (no medical)[z]	3.2% (2.6–3.9)	3.4% (2.1–4.6)	2.3% (1.6–2.9)	1.5% (0.8–2.2)	5.2% (1.2–9.3)
Mental health services at a military facility (excluding clergy)	18.2% (17.0–19.5)	21.0%[c] (18.4–23.6)	16.3%[b] (14.1–18.4)	17.4% (14.0–20.9)	17.1% (13.5–20.6)
Mental health services at a VA facility (excluding clergy)	1.0%[b] (0.6–1.3)	2.4%[a] (1.1–3.8)	1.0% (0.4–1.6)	0.8% (0.2–1.4)	1.6% (0.1–3.2)
Mental health services at a civilian facility (excluding clergy)[z]	4.8% (4.2–5.4)	4.1% (3.1–5.1)	4.3% (3.2–5.3)	3.0% (1.9–4.1)	4.9% (2.9–6.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.56
Past-Year Mental Health Service Utilization, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any mental health service use	24.7%[c] (22.5–27.0)	24.3%[c] (22.8–25.8)	29.3%[a,b] (27.8–30.7)	27.0% (24.3–29.6)
Saw mental health provider	16.9%[c] (15.0–18.8)	17.9%[c] (16.5–19.2)	21.3%[a,b] (20.0–22.7)	19.3% (16.9–21.8)
Saw general medical provider	12.1%[c,d] (10.4–13.9)	12.5%[c,d] (11.3–13.7)	17.3%[a,b] (16.1–18.6)	17.2%[a,b] (14.9–19.6)
Any mental health services from specialty mental health or medical provider	20.8%[c] (18.7–22.9)	21.7%[c] (20.3–23.2)	26.7%[a,b] (25.2–28.1)	24.2% (21.6–26.8)
Saw clergy, chaplain, or pastor	10.3%[b,c] (8.6–12.0)	7.5%[a] (6.5–8.4)	7.8%[a] (7.0–8.7)	9.1% (7.2–10.9)
Only saw clergy (no medical)[x]	3.9% (2.8–5.0)	2.5% (2.1–3.0)	2.6% (2.1–3.1)	2.8% (1.8–3.7)
Mental health services at a military facility (excluding clergy)	17.7%[c] (15.8–19.7)	17.1%[c] (15.8–18.4)	21.8%[a,b] (20.4–23.1)	19.6% (17.3–21.8)
Mental health services at a VA facility (excluding clergy)[z]	1.0% (0.4–1.6)	1.4% (0.9–1.9)	1.2% (0.8–1.7)	2.0% (0.6–3.4)
Mental health services at a civilian facility (excluding clergy)	3.4%[c,d] (2.5–4.3)	4.5%[c,d] (3.8–5.1)	6.7%[a,b] (5.9–7.5)	6.7%[a,b] (5.0–8.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Past-Year Mental Health Medication Use

Table D.57
Past-Year Mental Health Medication Use, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Mental health medications, past year	8.6% (7.7–9.5)	10.2%[d] (8.1–12.3)	7.2% (5.8–8.5)	5.7%[b] (3.9–7.6)	9.2% (6.2–12.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[b] Statistically significantly different from non-Hispanic black estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

Table D.58
Past-Year Mental Health Medication Use, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Mental health medications, past year	7.0%[c,d] (5.7–8.3)	8.2%[c,d] (7.2–9.1)	11.6%[a,b] (10.6–12.6)	10.7%[a,b] (8.9–12.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Past-Year Average Number of Mental Health Visits

Table D.59
Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Race/Ethnicity

	Non-Hispanic White n = 2,447	Non-Hispanic Black n = 620	Hispanic n = 561	Non-Hispanic Asian n = 209	Other n = 181
Mean number of mental health visits[z]	12.2% (10.8–13.6)	12.4% (10.5–14.3)	10.5% (8.6–12.4)	9.9% (6.7–13.2)	14.0% (8.5–19.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.60
Average Number of Mental Health Visits in the Past Year for Those Who Used Services, by Age Group

	Ages 17–24 n = 807	Ages 25–34 n = 1,406	Ages 35–44 n = 1,398	Ages 45+ n = 422
Mean number of mental health visits[z]	11.6% (9.6–13.7)	12.4% (11.0–13.8)	11.6% (10.4–12.8)	11.5% (9.6–13.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Perceived Unmet Need for Mental Health Services

Table D.61
Perceived Unmet Need for Mental Health Services, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Perceived unmet need for mental health services, past year[x]	7.1% (6.3–8.0)	7.4% (5.5–9.4)	5.2% (4.0–6.4)	4.2% (2.6–5.7)	9.0% (4.7–13.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons were.

Table D.62
Perceived Unmet Need for Mental Health Services, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Perceived unmet need for mental health services, past year[z]	7.0% (5.6–8.3)	6.6% (5.7–7.6)	7.4% (6.5–8.3)	4.6% (3.5–5.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Concern That Mental Health Treatment Would Damage a Military Career

Table D.63
Belief That Seeking Mental Health Treatment Would Damage Military Career, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Seeking mental health services would damage military career	36.3%[b] (34.8–37.8)	28.4%[a,e] (25.5–31.3)	32.6% (29.7–35.5)	30.5% (26.1–34.9)	39.7%[b] (34.1–45.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[e] Statistically significantly different from Other estimate.

Table D.64
Belief That Seeking Mental Health Treatment Would Damage Military Career, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Seeking mental health services would damage military career	35.0%[d] (32.6–37.4)	34.6%[d] (33.0–36.3)	33.2%[d] (31.7–34.7)	27.8%[a,b,c] (25.1–30.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Chapter Seven: Physical Health and Functioning

Chronic Conditions

Table D.65
Past-Year Physician-Diagnosed Chronic Conditions, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
High blood pressure	8.9% (7.9–9.8)	11.3%[c] (9.6–13.1)	8.0%[b] (6.5–9.6)	9.1% (7.0–11.3)	9.2% (6.2–12.1)
Diabetes[z]	0.8% (0.5–1.0)	1.4% (0.8–2.0)	0.9% (0.5–1.3)	1.2% (0.6–1.7)	1.2% (0.0–2.7)
High cholesterol	4.0%[d] (3.6–4.5)	4.2%[d] (3.2–5.2)	3.5%[d] (2.8–4.3)	7.9%[a,b,c] (5.6–10.3)	4.2% (2.7–5.8)
Asthma[x]	1.5% (1.1–1.8)	2.8% (1.7–3.8)	1.9% (1.2–2.5)	1.3% (0.7–2.0)	1.3% (0.4–2.1)
Angina or coronary heart disease[z]	0.2% (0.1–0.4)	0.3% (0.0–0.6)	0.3% (0.0–0.6)	0.2% (0.0–0.4)	0.1% (0.0–0.2)
Heart attack[z]	0.1% (0.0–0.1)	0.2% (0.0–0.4)	0.2% (0.0–0.5)	0.2% (0.0–0.6)	0.04% (0.0–0.1)
Back pain[z]	24.5% (23.2–25.8)	25.4% (22.7–28.2)	25.6% (22.9–28.2)	23.0% (19.2–26.8)	25.0% (19.9–30.0)
Bone, joint, or muscle injury (including arthritis)[z]	26.5% (25.2–27.8)	28.7% (25.9–31.6)	25.2% (22.6–27.8)	23.1% (19.4–26.8)	26.9% (21.9–31.9)
Number of medical diagnoses in past year					
No conditions[z]	59.4% (57.9–60.9)	57.3% (54.1–60.5)	61.4% (58.4–64.4)	61.8% (57.3–66.3)	59.2% (53.8–64.6)
1–2 conditions[z]	36.1% (34.6–37.6)	36.6% (33.5–39.7)	33.3% (30.4–36.2)	31.9% (27.6–36.3)	36.2% (30.8–41.6)
3+ conditions[z]	4.5% (4.0–5.1)	6.1% (4.9–7.3)	5.3% (4.1–6.4)	6.3% (4.5–8.0)	4.6% (2.6–6.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.66
Past-Year Physician-Diagnosed Chronic Conditions, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
High blood pressure	5.2%[b,c,d] (4.0–6.5)	8.4%[a,c,d] (7.4–9.4)	15.4%[a,b,d] (14.2–16.6)	24.6%[a,b,c] (21.7–27.5)
Diabetes	0.4%[c,d] (0.0–0.8)	0.6%[c,d] (0.3–0.9)	1.9%[a,b,d] (1.5–2.3)	4.2%[a,b,c] (3.2–5.3)
High cholesterol	0.9%[b,c,d] (0.4–1.4)	2.7%[a,c,d] (2.2–3.3)	9.7%[a,b,d] (8.8–10.6)	24.3%[a,b,c] (21.1–27.6)
Asthma	1.2%[c,d] (0.7–1.7)	1.5%[c,d] (1.0–1.9)	3.0%[a,b] (2.4–3.6)	3.4%[a,b] (2.4–4.5)
Angina or coronary heart disease	0.2%[d] (0.0–0.3)	0.1%[d] (0.0–0.2)	0.3%[d] (0.2–0.5)	2.4%[a,b,c] (0.9–3.8)
Heart attack[z]	0.1% (0.0–0.2)	0.1% (0.0–0.1)	0.3% (0.1–0.5)	0.2% (0.0–0.3)
Back pain	16.8%[b,c,d] (14.9–18.8)	23.9%[a,c,d] (22.4–25.4)	38.1%[a,b,d] (36.5–39.7)	43.9%[a,b,c] (40.8–46.9)
Bone, joint, or muscle injury (including arthritis)	17.3%[b,c,d] (15.4–19.3)	24.9%[a,c,d] (23.3–26.4)	42.0%[a,b,d] (40.5–43.6)	55.2%[a,b,c] (52.1–58.2)
Number of medical diagnoses in past year				
No conditions	71.7%[b,c,d] (69.4–74.0)	61.0%[a,c,d] (59.3–62.7)	38.9%[a,b,d] (37.4–40.5)	27.6%[a,b,c] (25.1–30.1)
1–2 conditions	26.6%[b,c,d] (24.3–28.9)	35.2%[a,c,d] (33.5–36.9)	50.7%[a,b] (49.1–52.3)	48.8%[a,b] (45.7–51.9)
3+ conditions	1.7%[b,c,d] (1.0–2.3)	3.8%[a,c,d] (3.1–4.5)	10.4%[a,b,d] (9.4–11.3)	23.6%[a,b,c] (20.8–26.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Physical Symptoms

Table D.67
Bothered a Lot by Physical Symptoms in the Past 30 Days, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Stomach or bowel problems[z]	5.4% (4.7–6.0)	6.6% (5.1–8.2)	6.5% (5.0–7.9)	5.0% (3.6–6.5)	6.6% (4.3–9.0)
Back pain[z]	18.3% (17.0–19.5)	20.0% (17.5–22.5)	19.1% (16.7–21.6)	16.5% (13.4–19.6)	17.7% (13.9–21.5)
Pain in the arms, legs, or joints	15.9%[b] (14.7–17.0)	20.5%[a] (17.9–23.0)	16.0% (13.8–18.3)	15.6% (12.5–18.7)	15.4% (10.8–20.0)
Headaches	7.9%[b] (7.1–8.7)	12.2%[a] (10.0–14.3)	9.6% (7.9–11.3)	9.9% (7.4–12.3)	10.1% (7.2–13.0)
Chest pain or shortness of breath	2.2%[b] (1.8–2.7)	3.9%[a] (2.6–5.2)	2.7% (1.9–3.4)	3.1% (1.5–4.7)	2.0% (0.9–3.1)
Dizziness[z]	1.7% (1.3–2.0)	2.5% (1.7–3.3)	2.2% (1.5–3.0)	3.1% (1.5–4.7)	2.8% (0.9–4.7)
Feeling tired or having low energy[z]	18.6% (17.4–19.9)	19.3% (16.8–21.8)	17.7% (15.4–20.0)	14.1% (11.2–16.9)	20.8% (16.7–24.9)
Trouble sleeping	19.2%[b] (17.9–20.6)	23.8%[a] (20.9–26.6)	19.5% (17.1–21.9)	18.6% (15.0–22.2)	22.3% (17.9–26.6)
Any bodily pain (back, arms, legs, or joints)[z]	25.7% (24.3–27.0)	29.1% (26.2–32.0)	25.9% (23.2–28.6)	23.3% (19.7–27.0)	25.7% (20.7–30.7)
Any bodily pain including headache	28.8% (27.4–30.2)	33.3%[d] (30.2–36.4)	29.5% (26.7–32.3)	26.1%[b] (22.3–29.9)	29.6% (24.5–34.8)
High physical symptom severity[z]	16.3% (15.0–17.5)	19.4% (16.9–22.0)	16.1% (13.9–18.2)	17.6% (14.4–20.9)	15.3% (11.8–18.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.68
Bothered a Lot by Physical Symptoms in the Past 30 Days, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Stomach or bowel problems	4.6%[c,d] (3.6–5.5)	5.6%[c,d] (4.8–6.5)	8.1%[a,b] (7.2–9.0)	8.3%[a,b] (6.6–10.0)
Back pain	14.8%[c,d] (13.0–16.7)	17.9%[c,d] (16.5–19.3)	25.2%[a,b] (23.8–26.6)	27.4%[a,b] (24.8–30.0)
Pain in the arms, legs, or joints	13.1%[c,d] (11.3–14.8)	14.8%[c,d] (13.5–16.2)	24.6%[a,b,d] (23.1–26.0)	29.5%[a,b,c] (26.8–32.2)
Headaches	8.9% (7.6–10.2)	8.2%[c,d] (7.2–9.2)	10.7%[b] (9.7–11.6)	11.1%[b] (9.3–12.8)
Chest pain or shortness of breath[z]	2.9% (2.1–3.6)	2.3% (1.8–2.9)	2.6% (2.1–3.1)	3.3% (2.3–4.3)
Dizziness	1.9%[d] (1.3–2.5)	1.8%[d] (1.4–2.2)	2.6% (2.0–3.1)	3.5%[a,b] (2.5–4.5)
Feeling tired or having low energy[z]	18.9% (17.0–20.9)	17.5% (16.2–18.9)	19.3% (18.0–20.6)	18.2% (15.7–20.6)
Trouble sleeping	20.9% (18.8–23.1)	18.0%[c,d] (16.5–19.4)	22.7%[b] (21.3–24.1)	24.4%[b] (21.7–27.1)
Any bodily pain (back, arms, legs, or joints)	20.8%[b,c,d] (18.8–22.9)	24.7%[a,c,d] (23.1–26.3)	36.4%[a,b] (34.8–38.0)	39.3%[a,b] (36.4–42.2)
Any bodily pain including headache	24.6%[c,d] (22.5–26.8)	27.9%[c,d] (26.3–29.5)	39.7%[a,b] (38.1–41.3)	42.3%[a,b] (39.4–45.3)
High physical symptom severity	14.9%[c,d] (13.1–16.7)	15.5%[c,d] (14.1–16.9)	21.5%[a,b] (20.1–22.8)	23.9%[a,b] (21.2–26.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Traumatic Brain Injury and Postconcussive Symptoms

Table D.69
Past-Year Injury, TBI, and Postconcussive Symptoms, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any injury[z]	27.0% (25.5–28.4)	26.7% (23.8–29.6)	26.8% (24.0–29.6)	29.4% (24.8–33.9)	27.5% (22.4–32.7)
Positive screen for mild TBI[z]	6.3% (5.3–7.2)	7.1% (5.4–8.8)	5.0% (3.9–6.2)	4.1% (2.8–5.5)	6.0% (3.9–8.1)
Positive screen for moderate to severe TBI	0.3% (0.1–0.5)	0.1%[d] (0.0–0.1)	0.05%[d] (0.0–0.1)	1.0%[b,c] (0.1–2.0)	0.3% (0.0–0.9)
Postconcussive symptoms[z]	4.2% (3.4–5.0)	5.2% (3.7–6.8)	3.3% (2.4–4.2)	3.5% (2.1–4.9)	4.6% (2.6–6.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.70
Past-Year Injury, TBI, and Postconcussive Symptoms, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any injury	27.6% (25.3–30.0)	25.4%[d] (23.9–26.9)	27.8% (26.4–29.3)	31.3%[b] (28.1–34.4)
Positive screen for mild TBI[z]	6.2% (4.9–7.5)	5.8% (4.9–6.8)	5.9% (5.1–6.7)	7.9% (5.9–9.9)
Positive screen for moderate to severe TBI[z]	0.2% (0.0–0.4)	0.3% (0.1–0.5)	0.2% (0.1–0.3)	0.1% (0.0–0.3)
Postconcussive symptoms[z]	4.0% (2.9–5.1)	4.2% (3.4–5.1)	4.1% (3.5–4.8)	5.8% (3.9–7.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[b] Statistically significantly different from ages 25–34 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Self-Rated Health

Table D.71
Self-Rated Overall Physical Health, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Excellent[z]	15.4% (14.2–16.5)	12.2% (9.9–14.4)	14.6% (12.1–17.1)	12.2% (9.3–15.1)	16.3% (10.8–21.8)
Very good	39.4%[b,e] (37.9–40.9)	32.6%[a] (29.6–35.7)	37.8% (34.7–40.9)	39.4% (34.6–44.3)	31.9%[a] (27.2–36.6)
Good[x]	35.3% (33.8–36.8)	39.9% (36.7–43.2)	35.2% (32.2–38.2)	33.7% (29.4–38.1)	40.7% (35.5–45.9)
Fair	8.5%[b] (7.5–9.4)	13.2%[a] (10.9–15.6)	10.8% (8.8–12.8)	11.1% (8.5–13.7)	9.2% (6.3–12.2)
Poor[z]	1.5% (1.0–2.0)	2.1% (1.1–3.0)	1.6% (0.6–2.5)	3.6% (1.6–5.6)	1.8% (0.3–3.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[e] Statistically significantly different from Other estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.72
Self-Rated Overall Physical Health, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Excellent	16.7%[c] (14.7–18.7)	14.2%[c] (13.1–15.4)	11.1%[a,b,d] (10.2–12.1)	15.0%[c] (12.8–17.1)
Very good	36.5% (34.1–38.9)	39.9%[c] (38.2–41.5)	35.5%[b] (33.9–37.0)	37.7% (34.8–40.5)
Good	35.7%[c] (33.2–38.1)	34.7%[c] (33.0–36.3)	41.0%[a,b,d] (39.4–42.6)	34.4%[c] (31.2–37.6)
Fair[z]	9.2% (7.7–10.7)	9.7% (8.5–10.8)	10.7% (9.6–11.7)	11.4% (9.6–13.2)
Poor[z]	1.9% (1.2–2.7)	1.6% (1.0–2.1)	1.8% (1.2–2.4)	1.6% (0.9–2.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Health-Related Physical Limitations

Table D.73
Health-Related Functional Limitations: Absenteeism and Presenteeism, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Absenteeism (average number of days lost due to mental or physical symptoms, past 30 days)	0.53[b] (0.43–0.63)	1.10[a,c,e] (0.81–1.40)	0.39[b] (0.28–0.50)	0.80 (0.41–1.18)	0.57[b] (0.35–0.80)
Presenteeism (average number of days that productivity was impaired by mental or physical symptoms, past 30 days)	2.28[c] (2.06–2.50)	2.25 (1.85–2.65)	1.65[a] (1.36–1.93)	1.84 (1.33–2.36)	2.81 (2.00–3.61)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[e] Statistically significantly different from Other estimate.

Table D.74
Health-Related Functional Limitations: Absenteeism and Presenteeism, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Absenteeism (average number of days lost due to mental or physical symptoms, past 30 days)[z]	0.54 (0.40–0.67)	0.70 (0.56–0.84)	0.61 (0.51–0.71)	0.65 (0.49–0.81)
Presenteeism (average number of days that productivity was impaired by mental or physical symptoms, past 30 days)[z]	2.35 (2.02–2.67)	2.14 (1.89–2.38)	2.01 (1.83–2.19)	2.03 (1.60–2.45)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Chapter Eight: Sexual Behavior and Health

Sexual Risk Behaviors and Outcomes

Table D.75
Sexual Risk Behaviors and Outcomes, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
2+ sex partners in past year	16.7%[b,c,d,e] (15.5–17.9)	26.2%[a,d] (23.0–29.4)	22.3%[a,d] (19.5–25.1)	11.5%[a,b,c,e] (8.7–14.4)	25.3%[a,d] (19.5–31.1)
Sex with a new partner without a condom in past year	33.1%[c] (31.6–34.5)	37.5% (34.3–40.7)	38.5%[a] (35.4–41.6)	31.7% (27.4–35.9)	39.0% (33.6–44.5)
Condom use during most-recent vaginal sex[z]	22.9% (21.5–24.3)	25.6% (22.5–28.8)	24.9% (22.1–27.6)	22.7% (18.8–26.7)	23.2% (18.1–28.2)
STI in past year	2.6%[b] (2.1–3.1)	6.1%[a,d] (4.5–7.7)	3.5% (2.3–4.6)	2.2%[b] (1.2–3.1)	5.9% (2.1–9.6)
High risk[1] for HIV	18.9%[b,c,e] (17.6–20.2)	29.7%[a,d] (26.4–32.9)	25.0%[a,d] (22.1–27.8)	14.3%[b,c,e] (11.1–17.5)	27.5%[a,d] (21.7–33.3)
Unintended pregnancy in past year	2.4%[b] (1.9–2.9)	5.6%[a,c,d] (3.9–7.4)	2.7%[b] (1.9–3.5)	1.2%[b] (0.4–1.9)	3.0% (1.3–4.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

Table D.76
Sexual Risk Behaviors and Outcomes, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
2+ sex partners in past year	30.6%[b,c,d] (28.3–33.0)	15.4%[a,c,d] (14.1–16.7)	7.8%[a,b] (7.0–8.7)	5.1%[a,b] (3.5–6.7)
Sex with a new partner without a condom in past year	37.9%[b,c,d] (35.5–40.3)	33.9%[a,d] (32.2–35.5)	32.1%[a] (30.6–33.6)	28.8%[a,b] (25.7–31.9)
Condom use during most-recent vaginal sex	31.8%[b,c,d] (29.4–34.2)	22.6%[a,c,d] (21.2–24.1)	12.9%[a,b,d] (11.8–14.0)	8.7%[a,b,c] (7.2–10.3)
STI in past year	4.7%[b,c,d] (3.7–5.7)	3.2%[a,c,d] (2.5–3.8)	1.7%[a,b] (1.3–2.1)	0.9%[a,b] (0.4–1.4)
High risk[1] for HIV	33.3%[b,c,d] (31.0–35.7)	18.0%[a,c,d] (16.6–19.4)	9.8%[a,b,d] (8.8–10.8)	6.5%[a,b,c] (4.8–8.2)
Unintended pregnancy in past year	3.7%[c,d] (2.8–4.6)	3.0%[c,d] (2.4–3.6)	1.6%[a,b] (1.1–2.0)	0.6%[a,b] (0.0–1.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

Contraceptive Use and Methods

Table D.77
Method of Contraception, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Birth control method					
No contraception	14.6%[b,c] (13.5–15.6)	22.9%[a,e] (20.2–25.7)	19.0%[a,e] (16.4–21.6)	18.9% (15.4–22.3)	12.7%[b,c] (9.8–15.6)
Highly effective contraception	28.0%[b,c,d] (26.7–29.4)	21.2%[a,d,e] (18.7–23.6)	21.5%[a,d,e] (19.2–23.7)	15.1%[a,b,c,e] (12.1–18.1)	30.2%[b,c,d] (25.5–34.9)
Other contraception[z]	33.5% (32.0–35.0)	33.8% (30.5–37.0)	36.4% (33.4–39.5)	33.0% (28.7–37.4)	36.1% (30.4–41.8)
Not applicable	23.9%[d] (22.4–25.3)	22.1%[d] (19.3–25.0)	23.1%[d] (20.2–25.9)	33.0%[a,b,c,e] (28.2–37.9)	21.0%[d] (16.8–25.2)
Birth control method at time of past-year unintended pregnancy					
No contraception[z]	60.2% (49.8–70.6)	74.7% (61.9–87.5)	57.1% (42.6–71.5)	NR (45.2–93.6)	NR (61.0–99.3)
Highly effective contraception[z]	9.5% (0.1–18.8)	2.4% (0.0–7.2)	9.4% (0.0–19.1)	8.8% (0.0–22.4)	0.0% (0.0–25.5)
Other contraception[z]	30.3% (21.6–39.0)	22.8% (10.6–35.0)	33.6% (20.4–46.7)	NR (1.6–42.0)	NR (0.7–39.0)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.78
Method of Contraception, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Birth control method				
No contraception	13.2%[b,c,d] (11.5–15.0)	16.3%[a,c,d] (15.0–17.6)	22.1%[a,b,d] (20.7–23.4)	31.0%[a,b,c] (28.1–33.8)
Highly effective contraception	17.8%[b,c,d] (15.9–19.7)	23.6%[a,c,d] (22.2–25.0)	41.6%[a,b] (40.0–43.2)	40.2%[a,b] (37.2–43.2)
Other contraception	41.0%[b,c,d] (38.5–43.5)	35.5%[a,c,d] (33.9–37.2)	20.6%[a,b,d] (19.3–21.9)	15.1%[a,b,c] (12.6–17.7)
Not applicable	27.9%[c,d] (25.5–30.3)	24.5%[c,d] (23.0–26.0)	15.8%[a,b] (14.6–16.9)	13.7%[a,b] (11.6–15.8)
Birth control method at time of past-year unintended pregnancy				
No contraception[z]	63.5% (51.6–75.3)	71.3% (62.8–79.8)	51.6% (37.0–66.2)	NR (NR)
Highly effective contraception[z]	9.2% (0.0–18.8)	4.2% (0.2–8.1)	5.5% (0.0–10.9)	NR (NR)
Other contraception[z]	27.3% (17.3–37.3)	24.5% (16.8–32.3)	42.9% (28.2–57.6)	NR (NR)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Deployment-Related Unintended Pregnancy, Contraceptive Access and Counseling

Table D.79
Deployment-Related Contraceptive Counseling and Access (Women Only), by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Contraceptive counseling prior to deployment[z]	37.0% (31.3–42.7)	37.8% (27.4–48.1)	49.1% (38.7–59.6)	37.2% (22.8–51.6)	25.4% (12.3–38.6)
Able to get or refill preferred birth control before deployed[z]	89.8% (85.3–94.3)	83.2% (72.9–93.4)	87.2% (76.7–97.6)	NR (49.7–100.0)	NR (57.1–99.2)
Able to get or refill preferred birth control while deployed[z]	77.1% (69.0–85.2)	80.0% (66.2–93.8)	81.4% (68.4–94.5)	NR (38.0–99.4)	NR (34.5–97.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.80
Deployment-Related Contraceptive Counseling and Access (Women Only), by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Contraceptive counseling prior to deployment	51.4%[b,c,d] (42.4–60.3)	33.2%[a] (27.7–38.7)	32.0%[a] (25.3–38.7)	20.1%[a] (9.1–31.2)
Able to get or refill preferred birth control before deployed[z]	88.0% (81.4–94.7)	83.8% (76.6–91.0)	88.3% (82.0–94.5)	NR (NR)
Able to get or refill preferred birth control while deployed[z]	83.5% (74.2–92.7)	70.5% (59.8–81.1)	74.9% (63.1–86.6)	NR (NR)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.81
Deployment-Related Contraceptive Counseling and Access (Men Only), by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Contraceptive counseling prior to deployment	14.8% (12.5–17.2)	9.3%[c] (6.3–12.3)	19.6%[b] (14.1–25.2)	11.0% (6.2–15.8)	14.7% (6.7–22.6)
Able to get or refill preferred birth control before deployed[z]	20.9% (10.4–31.4)	7.7% (0.9–14.5)	12.7% (3.6–21.9)	8.0% (1.2–14.8)	11.3% (0.0–24.8)
Able to get or refill preferred birth control while deployed	31.1%[b] (16.9–45.3)	6.1%[a] (1.0–11.1)	18.9% (8.3–29.6)	7.9% (0.2–15.5)	7.2% (0.0–17.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.82
Deployment-Related Contraceptive Counseling and Access (Men Only), by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Contraceptive counseling prior to deployment[z]	15.4% (11.5–19.3)	15.0% (12.5–17.5)	12.1% (10.0–14.2)	12.1% (7.8–16.4)
Able to get or refill preferred birth control before deployed[z]	15.4% (5.1–25.8)	12.4% (5.5–19.3)	12.9% (7.4–18.4)	9.5% (2.4–16.6)
Able to get or refill preferred birth control while deployed[z]	22.7% (9.9–35.5)	16.2% (7.8–24.6)	16.0% (9.1–22.9)	7.9% (0.0–15.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

HIV Testing

Table D.83
HIV Testing, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
HIV test in past 12 months	75.4% (74.0–76.8)	79.3%[d] (76.5–82.1)	76.0% (73.2–78.8)	69.5%[b] (64.7–74.3)	76.7% (72.4–81.1)
High risk[1] for HIV tested in past 12 months[z]	80.7% (77.4–84.0)	83.3% (78.2–88.4)	81.8% (76.5–87.0)	73.5% (60.9–86.2)	80.5% (71.1–89.8)
Men who had sex with men in the past 12 months tested in past 12 months[z]	76.8% (65.6–88.0)	NR (63.8–98.5)	84.3% (75.6–93.0)	NR (24.8–93.6)	NR (NR)
HIV test in past 6 months	37.6% (36.0–39.1)	41.8%[d] (38.5–45.1)	38.5% (35.4–41.6)	33.6%[b] (29.3–37.9)	41.8% (36.2–47.4)
Men who had sex with men in the past 12 months tested in past 6 months[z]	47.8% (35.9–59.7)	NR (38.2–82.0)	51.6% (38.1–65.2)	NR (8.6–61.5)	NR (NR)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[b] Statistically significantly different from non-Hispanic black estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

Table D.84
HIV Testing, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
HIV test in past 12 months	70.0%[b,c,d] (67.7–72.4)	78.4%[a,c] (77.0–79.9)	81.4%[a,b] (80.1–82.7)	78.5%[a] (75.3–81.6)
High risk[1] for HIV tested in past 12 months[x]	79.1% (75.6–82.6)	84.0% (80.7–87.4)	85.6% (82.1–89.2)	NR (58.3–90.5)
Men who had sex with men in the past 12 months tested in past 12 months[x]	71.8% (58.5–85.1)	88.6% (82.6–94.6)	75.7% (64.1–87.3)	87.5% (73.5–100.0)
HIV Test in past 6 months[z]	38.8% (36.4–41.3)	38.9% (37.2–40.6)	36.7% (35.1–38.2)	33.8% (31.0–36.6)
Men who had sex with men in the past 12 months tested in past 6 months[x]	44.4% (29.9–58.8)	61.9% (52.0–71.9)	39.8% (26.4–53.3)	NR (38.5–91.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[1] *High risk* was defined as male service members who had sex with one or more men in the past year, service members who had vaginal or anal sex with more than one partner in the past year, and service members who had a past-year STI (CDC, 2019c).

Chapter Nine: Sexual Orientation and Health

Table D.85
LGB Identity, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
LGB[x]	6.0% (5.3–6.7)	5.7% (4.5–6.9)	7.5% (6.2–8.9)	5.5% (3.9–7.2)	9.4% (5.5–13.3)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

Table D.86
LGB Identity, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
LGB	8.5%[b,c,d] (7.3–9.6)	6.1%[a,c,d] (5.4–6.9)	3.3%[a,b] (2.8–3.8)	2.3%[a,b] (1.6–2.9)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Chapter Ten: Deployment Experience and Health

Lifetime Number of Deployments

Table D.87
Lifetime Number of Deployments, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
1 time[z]	19.1% (17.8–20.4)	20.7% (17.9–23.5)	20.4% (17.8–23.0)	16.8% (13.5–20.2)	15.4% (11.8–19.0)
2 times[z]	12.6% (11.7–13.6)	12.5% (10.4–14.7)	12.1% (10.1–14.2)	14.5% (11.3–17.7)	16.1% (12.0–20.3)
3 or more times	30.6%[b,c] (29.4–31.9)	26.4%[a,e] (24.0–28.9)	22.3%[a,e] (20.3–24.4)	27.2% (23.4–30.9)	34.7%[b,c] (30.0–39.5)
I have never been deployed	37.7%[c] (36.0–39.3)	40.3% (36.9–43.7)	45.1%[a,e] (41.9–48.4)	41.5% (36.6–46.4)	33.7%[c] (28.0–39.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[e] Statistically significantly different from Other estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.88
Lifetime Number Deployments, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
1 time	21.2%[c,d] (19.1–23.3)	23.0%[c,d] (21.5–24.5)	9.6%[a,b] (8.7–10.6)	9.3%[a,b] (7.4–11.2)
2 times	7.1%[b,c,d] (5.8–8.4)	17.7%[a,c,d] (16.3–19.0)	13.7%[a,b] (12.6–14.8)	12.0%[a,b] (9.7–14.2)
3 or more times	5.5%[b,c,d] (4.4–6.7)	27.4%[a,c,d] (26.0–28.9)	68.1%[a,b] (66.6–69.7)	72.3%[a,b] (69.4–75.3)
I have never been deployed	66.2%[b,c,d] (63.8–68.6)	31.9%[a,c,d] (30.3–33.5)	8.5%[a,b] (7.6–9.5)	6.4%[a,b] (4.8–8.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Lifetime Number of Combat Deployments

Table D.89
Lifetime Number of Combat Zone Deployments, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
I have not had any combat zone deployments[x]	26.1% (24.4–27.7)	25.6% (21.8–29.4)	30.7% (27.1–34.4)	29.3% (23.7–34.9)	32.8% (27.1–38.6)
1 deployment[z]	31.4% (29.6–33.1)	33.4% (29.6–37.2)	34.1% (30.3–38.0)	30.1% (25.1–35.1)	29.0% (23.6–34.3)
2 deployments[z]	17.5% (16.3–18.7)	19.1% (16.4–21.9)	17.4% (14.7–20.0)	19.9% (15.9–23.8)	18.1% (13.4–22.9)
3 or more deployments	25.1%[c] (23.8–26.3)	21.9% (19.3–24.5)	17.8%[a] (15.6–20.0)	20.8% (17.1–24.4)	20.1% (15.9–24.2)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[c] Statistically significantly different from Hispanic estimate.

[x] At the aggregate, the chi-square test was statistically significant; however, none of the individual pairwise comparisons was.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.90
Lifetime Number of Combat Zone Deployments, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
I have not had any combat zone deployments	54.4%[b,c,d] (50.0–58.8)	27.3%[a,c,d] (25.5–29.1)	11.0%[a,b] (10.0–12.0)	8.3%[a,b] (6.4–10.1)
1 deployment	38.5%[c,d] (34.1–42.8)	38.0%[c,d] (36.0–40.0)	19.2%[a,b] (17.9–20.5)	21.0%[a,b] (17.8–24.2)
2 deployments	6.1%[b,c,d] (4.0–8.2)	19.7%[a,c] (18.1–21.3)	23.3%[a,b] (21.8–24.7)	20.3%[a] (18.0–22.6)
3 or more deployments	1.0%[b,c,d] (0.0–2.1)	15.0%[a,c,d] (13.7–16.4)	46.5%[a,b] (44.9–48.2)	50.4%[a,b] (47.2–53.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Lifetime Duration of Deployments

Table D.91
Lifetime Duration of Deployments, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
1 to 6 months	17.6%[e] (16.1–19.2)	18.5%[e] (15.2–21.8)	19.8%[e] (16.8–22.9)	20.6%[e] (15.5–25.7)	10.5%[a,b,c,d] (7.3–13.8)
7 to 12 months[z]	24.8% (23.1–26.4)	27.2% (23.3–31.1)	29.6% (25.8–33.5)	28.4% (23.3–33.5)	28.7% (23.0–34.4)
13 to 24 months[z]	24.6% (23.2–26.1)	21.2% (18.2–24.3)	24.3% (21.1–27.4)	20.7% (16.5–24.9)	28.8% (23.3–34.3)
25 to 48 months[z]	21.1% (19.9–22.3)	21.8% (19.1–24.5)	17.7% (15.2–20.1)	19.2% (15.5–23.0)	19.8% (15.4–24.2)
49 months or more	11.8%[c] (11.0–12.7)	11.3% (9.5–13.0)	8.6%[a] (7.1–10.2)	11.1% (8.6–13.5)	12.2% (8.9–15.6)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.92
Lifetime Duration of Deployments, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
1 to 6 months	41.5%[b,c,d] (37.2–45.8)	16.4%[a,c,d] (15.0–17.8)	6.0%[a,b] (5.2–6.7)	5.1%[a,b] (3.4–6.8)
7 to 12 months	38.9%[b,c,d] (34.6–43.3)	30.8%[a,c,d] (28.8–32.7)	12.2%[a,b] (11.2–13.3)	11.7%[a,b] (9.4–14.1)
13 to 24 months	15.7%[b,c] (12.6–18.8)	29.4%[a,c,d] (27.6–31.3)	22.6%[a,b,d] (21.2–24.0)	18.3%[b,c] (15.6–21.0)
25 to 48 months	3.5%[b,c,d] (2.2–4.8)	17.6%[a,c,d] (16.1–19.1)	35.2%[a,b] (33.6–36.8)	34.3%[a,b] (31.4–37.2)
49 months or more	0.3%[b,c,d] (0.0–0.8)	5.8%[a,c,d] (4.9–6.7)	24.0%[a,b,d] (22.6–25.5)	30.6%[a,b,c] (27.8–33.4)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

Duration of Recent Deployments

Table D.93
Duration of Deployments in the Past 12 Months, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
I did not deploy in the past 12 months	56.3%[c] (54.5–58.1)	53.4% (49.5–57.4)	47.4%[a] (43.6–51.1)	54.5% (49.0–60.0)	56.0% (50.1–62.0)
Less than 1 month[z]	2.9% (2.4–3.4)	2.1% (0.8–3.3)	3.1% (1.8–4.5)	4.2% (1.1–7.3)	2.3% (0.9–3.7)
1 to 3 months	9.3% (8.2–10.3)	6.0%[c] (4.1–7.8)	11.3%[b] (8.7–13.9)	8.7% (6.1–11.4)	10.7% (6.8–14.7)
4 to 6 months[z]	17.2% (15.7–18.7)	15.8% (12.7–18.9)	16.5% (13.6–19.4)	16.0% (11.5–20.5)	12.3% (8.2–16.4)
7 to 9 months	10.2%[c] (8.9–11.5)	12.3% (9.4–15.2)	15.3%[a] (11.8–18.8)	11.0% (7.1–14.9)	12.8% (8.4–17.2)
10 to 12 months	4.1%[b] (3.4–4.8)	10.5%[a,c,d] (8.0–12.9)	6.3%[b] (4.6–8.1)	5.5%[b] (3.6–7.5)	5.9% (3.0–8.7)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from on-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.94
Duration of Deployments in the Past 12 Months, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
I did not deploy in the past 12 months	25.5%[b,c,d] (21.9–29.1)	56.4%[a,c,d] (54.4–58.4)	68.2%[a,b,d] (66.6–69.8)	75.3%[a,b,c] (72.6–77.9)
Less than 1 month	4.4%[b,d] (2.7–6.0)	2.4%[a] (1.8–2.9)	2.7% (2.2–3.2)	2.1%[a] (1.4–2.9)
1 to 3 months	14.9%[b,c,d] (12.0–17.9)	7.9%[a] (6.9–9.0)	7.1%[a] (6.3–7.9)	5.9%[a] (4.5–7.2)
4 to 6 months	29.2%[b,c,d] (25.1–33.2)	16.5%[a,c,d] (14.9–18.0)	9.6%[a,b,d] (8.6–10.6)	5.9%[a,b,c] (4.6–7.2)
7 to 9 months	21.5%[b,c,d] (17.6–25.4)	10.6%[a,c,d] (9.3–12.0)	7.1%[a,b,d] (6.2–8.1)	4.2%[a,b,c] (3.1–5.4)
10 to 12 months[z]	4.5% (2.8–6.2)	6.2% (5.1–7.3)	5.3% (4.5–6.1)	6.6% (4.8–8.5)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Lifetime Combat Trauma Exposure

Table D.95
Lifetime Combat Trauma Experiences During Deployment, by Race/Ethnicity

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Non-Hispanic Asian	Other
Any traumatic combat experience[z]	37.3% (35.6–39.0)	35.7% (32.1–39.2)	35.1% (31.5–38.6)	35.8% (30.9–40.8)	30.3% (25.0–35.6)
I worked with landmines or other unexploded ordnance	12.5%[b] (11.3–13.7)	5.4%[a,c] (3.7–7.1)	9.6%[b] (7.4–11.9)	8.1% (5.3–10.9)	8.4% (5.0–11.8)
I witnessed members of my unit or an ally unit being seriously wounded or killed[z]	21.9% (20.5–23.2)	20.3% (17.6–23.1)	20.4% (17.6–23.2)	20.3% (16.3–24.3)	15.7% (11.9–19.5)
Someone I knew well was killed in combat	22.9%[e] (21.5–24.3)	23.2%[e] (20.3–26.2)	20.2% (17.5–22.9)	24.8%[e] (20.5–29.2)	15.6%[a,b,d] (11.6–19.5)
I witnessed or engaged in acts of cruelty, excessive force, or acts violating rules of engagement[z]	4.2% (3.5–4.9)	4.5% (2.9–6.0)	4.1% (2.7–5.4)	7.6% (4.8–10.3)	4.2% (1.5–6.8)
I was wounded in combat[z]	3.2% (2.7–3.8)	2.2% (1.4–3.0)	4.0% (2.5–5.5)	1.8% (0.7–2.9)	2.4% (0.7–4.1)
I witnessed civilians being seriously wounded or killed[z]	19.8% (18.5–21.1)	17.8% (14.9–20.7)	17.9% (15.3–20.5)	19.1% (15.2–23.0)	14.4% (10.7–18.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from non-Hispanic white estimate.

[b] Statistically significantly different from non-Hispanic black estimate.

[c] Statistically significantly different from Hispanic estimate.

[d] Statistically significantly different from non-Hispanic Asian estimate.

[e] Statistically significantly different from Other estimate.

[z] The omnibus chi-square test was not statistically significant ($p < 0.05$).

Table D.96
Lifetime Combat Trauma Experiences During Deployment, by Age Group

	Ages 17–24	Ages 25–34	Ages 35–44	Ages 45+
Any traumatic combat experience	15.3%[b,c,d] (12.0–18.6)	34.1%[a,c,d] (32.1–36.0)	51.2%[a,b,d] (49.6–52.9)	55.9%[a,b,c] (52.8–59.1)
I worked with landmines or other unexploded ordnance	4.9%[b,c,d] (2.8–7.0)	10.2%[a,c] (8.8–11.5)	14.9%[a,b] (13.6–16.1)	12.2%[a] (9.5–15.0)
I witnessed members of my unit or an ally unit being seriously wounded or killed	4.4%[b,c,d] (2.7–6.1)	19.5%[a,c,d] (17.8–21.2)	32.6%[a,b] (31.0–34.2)	36.5%[a,b] (33.3–39.7)
Someone I knew well was killed in combat	4.9%[b,c,d] (2.8–7.0)	18.6%[a,c,d] (16.9–20.3)	37.1%[a,b,d] (35.5–38.8)	41.7%[a,b,c] (38.6–44.8)
I witnessed or engaged in acts of cruelty, excessive force, or acts violating rules of engagement	1.4%[b,c,d] (0.3–2.6)	4.4%[a,c] (3.4–5.3)	6.4%[a,b] (5.5–7.3)	6.1%[a] (4.7–7.5)
I was wounded in combat	0.7%[b,c,d] (0.0–1.3)	2.5%[a,c,d] (1.8–3.2)	5.4%[a,b] (4.6–6.3)	4.4%[a,b] (3.1–5.6)
I witnessed civilians being seriously wounded or killed	5.0%[b,c,d] (2.9–7.1)	17.8%[a,c,d] (16.2–19.4)	29.4%[a,b] (27.8–31.0)	27.3%[a,b] (24.5–30.1)

NOTES: All data are weighted. 95-percent CIs are presented in parentheses.

[a] Statistically significantly different from ages 17–24 estimate.

[b] Statistically significantly different from ages 25–34 estimate.

[c] Statistically significantly different from ages 35–44 estimate.

[d] Statistically significantly different from ages 45+ estimate.

APPENDIX E

Missing Data and Imputation Method Detail

Introduction

Steps taken to address missing data in the 2018 HRBS were overviewed in Chapter Two. Recall that the package mice in R (Van Buuren and Groothuis-Oudshoorn, 2011) was used to create imputations. Here, we elaborate on issues encountered and decisions made through the process of developing imputations. In particular, we focus on the process used to account for skip logic, the selection of imputation methods for general classes of variables, and convergence issues encountered with mice.

Skip Logic

The survey instrument contains both parent questions (e.g., "Did you deploy in the past year?") and child questions (e.g., "For how long did you deploy?"). Child questions are asked only of those who provided certain responses to the parent questions. Even though some child questions would not be relevant given a particular value on the associated parent question, all child questions were imputed. A postimputation editing process determined which imputed values should be overwritten as legitimate skips. That is, if a respondent had an imputed value on a parent question that indicated no deployment in the prior year, a nonzero imputed value of the child question of how long the deployment lasted was retained and "cleaned" later so that the parent-child questions were consistent. In contrast, if the imputed value of the parent question indicated that the respondent did not deploy, the child question was marked as a skip. To avoid collinearity issues, the imputation model for a child question was not allowed to include a parent question (and vice versa).

Imputation Method

Binary Data

As is common practice, our plan was to use PMM for imputation of continuous and ordinal variables, logistic regression for imputation of binary variables, and polytomous regression for categorical variables. However, the survey contains a multitude of yes or no questions where the frequency of yes or no responses was small (1 percent or less). Using logistic regression resulted in imputed values that contained much higher proportions of yes responses than the observed data. In many cases, the proportion of yes responses was far outside a feasible range given the context of the respective question. As such, other imputation approaches were con-

sidered. In total, the methods considered for imputation of binary variables included the following (R option/command noted in parenthesis):

1. imputation by logistic regression (logreg)
2. PMM (PMM)
3. two-level imputation with generalized linear mixed effects regression (GLMER; 2l.bin)
4. Gaussian imputation following empirical distribution transformation (EMP; Robbins, 2014).

Note that mice has several other built-in methods for imputation of binary data (e.g., classification and regression trees, linear discriminant analysis, random forest imputations), but none of these other methods were able to produce imputations of HRBS data (which is likely a consequence of the dimensionality and sparsity of the data).

Tables E.1 and E.2 give examples of marginal diagnostics of the imputations found using these methods for two items: Q61_2 and Q95D (the third-to-last item in the survey and, therefore, one with the greatest amount of missingness). The two tables provide the portion of no and yes responses for the observed values of the variables and the imputed values for each of the four methods of binary imputation. In Table E.1, we see that 0.1 percent of (observed) respondents indicated being wounded by a bullet, whereas 14.7 percent of respondents imputed with logistic regression were deemed to have been wounded by a bullet. When concatenating observed data with logistic regression–based imputations, 91.4 percent of data units that indicated a bullet wound would have come from imputed data, whereas only 4.5 percent of data units were imputed for that question. We concluded that the logistic regression imputations were erroneous for this question, and similar patterns were seen across dozens of survey items

Table E.1
Q61_2: In the Past 12 Months, Were You Wounded by a Bullet?

	No (Count)	Yes (count)	No (%)	Yes (%)
Observed	32,112	21	99.9%	0.1%
Imputed: logreg	1,286	222	85.3%	14.7%
Imputed: PMM	1,503	5	99.7%	0.3%
Imputed: 2l.bin	1,507	1	99.9%	0.1%
Imputed: EMP	1,503	5	99.7%	0.3%

Table E.2
Q95: In the Past 12 Months, Have You Ever Had to Lie to People Important to You About How Much You Gambled?

	No (Count)	Yes (Count)	No (%)	Yes (%)
Observed	31,341	141	99.55%	0.45%
Imputed: logreg	2,129	30	98.61%	1.39%
Imputed: PMM	2,107	52	97.59%	2.41%
Imputed: 2l.bin	2,143	16	99.26%	0.74%
Imputed: EMP	2,143	16	99.26%	0.74%

(though only two such items are presented here). The tables also show that the marginal characteristics of imputations found using the other three methods were much more in line with the characteristics of the observed data.

We also evaluated the multivariate properties of the imputations, which was accomplished primarily through a correlation analysis. Specifically, we calculated the pairwise correlations across all variables using only observed data, and for each method of imputation, we calculated the same correlations using only imputed data. Then, for each pair of variables, we took the absolute difference of the correlation based on observed data with respect to the correlation based on imputed data. Finally, we took the average of those absolute differences. This average provides a summary of how well each imputation method does at preserving multivariate characteristics (smaller is better). To account for the possibility that the ability of a method to preserve an association may be dependent on the strength of that association, we segmented these findings based on the strength of the baseline value of the correlation (which is the correlation calculated using observed data). Results are in Table E.3.

From the table, it appears first that logistic regression performed decently at preserving multivariate characteristics but was disqualified because of its poor performance at preserving univariate characteristics. In addition, GLMER performed the worst of the four methods in terms of preserving multivariate characteristics and, as such, was not considered further. Lastly, EMP performed slightly better than PMM when all correlations were considered (i.e., the top row of the table), whereas PMM performed better than EMP at preserving larger baseline correlations (i.e., the bottom row of the table).

Note that Robbins, 2014, argues that EMP performs comparably to PMM but is significantly more computationally efficient. However, in this case, the computational improvements were mitigated by the fact that the bulk of the computation time was spent on polytomous regression (which must be used for all methods to impute categorical variables). Ultimately, PMM was selected for imputation of binary variables because it is a well-established and widely used procedure (unlike EMP, which is not built into any widely used imputation software package). For final imputations, we applied mice with a burn-in period of 100 iterations to create a single imputed data set (which constitutes the analytic file). However, four other imputed data sets were created independently in the event that a data user wants to apply multiple imputation.

Table E.3
Correlation Summary (in Terms of) Across Imputation Methods

Strength of Baseline Correlation, Observed Data	logreg	PMM	2l.bin	EMP
All	0.110	0.119	0.140	0.111
(0.00, 0.05]	0.094	0.107	0.106	0.088
(0.05, 0.10]	0.107	0.122	0.137	0.107
(0.10, 0.20]	0.128	0.127	0.175	0.131
(0.20, 1.00]	0.180	0.167	0.284	0.221

NOTE: Correlations represent the average absolute difference between pairwise correlations found using observed versus imputed data units.

Convergence

mice, as described above, implements fully conditional specification (FCS; Van Buuren, 2018), in which imputations are generated by allowing each variable to depend on all other variables in the data. FCS is known to sample imputations from incoherent joint distributions (Little and Rubin, 2019) and therefore may fail to converge (or may diverge) across iterations of MCMC. However, most references that discuss convergence in FCS methods (e.g., White, Royston, and Wood, 2011; Van Buuren, 2018) recommend the use of a small number of iterations of MCMC (usually as low as five, which is the default in mice). Although we accept existing arguments that five iterations should be sufficient in such methods, we tested the algorithm with 100 iterations of MCMC to see whether convergence issues would be observed.

When FCS with 100 iterations was used for imputation, we noticed that for binary questions where the vast majority of respondents selected one answer (most commonly "no"), there appeared to be some possible divergence. In particular, we saw evidence that the frequency of the less popular answer (e.g., "yes") was notably higher in imputations generated with 100 iterations of FCS than when considering the observed data or when compared with imputations generated using five iterations of FCS. Tables E.4 and E.5 show marginal distributions (across observed versus imputed data) for three representative questions, which we use to provide evidence that the algorithm may be diverging at higher iterations. In addition, Table E.6 provides an analogue of Table E.3 (wherein correlation diagnostics are provided) that is used to examine the effect of increasing the number of MCMC iterations on bivariate diagnostics. However, it appears that increasing the number of iterations improves, if anything, bivariate performance of the imputations.

Table E.4
Q40A: In the Past 12 Months, Have You Used Marijuana or Hashish?

	Yes (Count)	No (Count)	Yes (%)	No (%)
Observed	253	32,846	0.76%	99.24%
Imputed: fully conditional, 5 iterations	3	539	0.55%	99.45%
Imputed: fully conditional, 100 iterations	21	521	3.87%	96.13%
Imputed: sequentially specified, 5 iterations	5	537	0.92%	99.08%
Imputed: sequentially specified, 100 iterations	8	534	1.48%	98.52%

Table E.5
Q95: In the Past 12 Months, Have You Ever Had to Lie to People Important to You About How Much You Gambled? (Marginal Distributions)

	Yes (Count)	No (Count)	Yes (%)	No (%)
Observed	141	31,341	0.45%	99.55%
Imputed: fully conditional, 5 iterations	30	2,129	1.39%	98.61%
Imputed: fully conditional, 100 iterations	52	2,107	2.41%	97.59%
Imputed: sequentially specified, 5 iterations	16	2,143	0.74%	99.26%
Imputed: sequentially specified, 100 iterations	16	2,143	0.74%	99.26%

Table E.6
Correlation Summary for Convergence Diagnostics

Strength of Baseline Correlation, Observed Data	Fully Conditional (FCS), 5 Iterations	Fully Conditional (FCS), 100 Iterations	Sequentially, 5 Iterations	Sequentially, 100 Iterations
All	0.1040	0.0989	0.0933	0.0949
(0.00, 0.05]	0.0786	0.1088	0.0753	0.0770
(0.05, 0.10]	0.1112	0.1417	0.0989	0.1025
(0.10, 0.20]	0.1344	0.1460	0.1220	0.1216
(0.20, 1.00]	0.2090	0.1955	0.1569	0.1545

NOTE: Correlations represent the average absolute difference between pairwise correlations found using observed versus imputed data units.

We were unable to verify whether this problem would be exacerbated when more than 100 iterations are run due to time constraints. Specifically, the 100-iteration version of FCS in the 2018 HRBS data took four to five days to run. Although the issues with the 100-iteration version of FCS were not as extreme as those with the logistic regression method, our diagnostics led to the conclusion that the imputations produced using 100 iterations of FCS were implausible and likely erroneous. Therefore, we doubt the quality of imputations generated using five iterations of this method as well.

As a remedy, we considered a modified imputation model that built dependence sequentially instead of fully. In this model, Q1 would be allowed to depend only on covariates. Furthermore, Q2 would be allowed to depend upon covariates and Q1, whereas Q3 would be allowed to depend only on covariates, Q1, and Q2. Only the final question (Q97D) would be allowed to depend upon all other variables in the data. Sequential modeling in this fashion is designed to result in a sampling mechanism that mimics one that samples from a true joint distribution. Note that sequential modeling is prudent for missingness that occurs in a monotonic manner (i.e., if one variable is missing for a given case, all subsequent variables are also missing for that case). However, it may lead to bias if missingness is not monotonic. In the 2018 HRBS data, 94 percent of missing values were due to dropout, whereas 6 percent were due to refusal. As such, the missingness is nearly monotonic, which makes HRBS a good candidate for sequential modeling. Sequential modeling was implemented by setting the elements in the upper triangle of the mice parameter "predictionMatrix" to be zero.

Tables E.4 and E.5 also show marginal distributions for imputations created using a sequential model generated using five iterations and other such imputations generated using 100 iterations. We did not see evidence of divergence when a sequential model was used. Table E.6 provides bivariate correlations for imputations generated using a sequential model. The bivariate diagnostics from sequentially modeled imputations are improved over those found from imputations generated via FCS. Thus, our final imputation model utilized a five-iteration, sequential approach.

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