
STRESS EXPOSURE IN THE PERSIAN GULF WAR

This chapter reviews available data concerning the degree to which deployment to the Persian Gulf theater was experienced as a stressful event by military personnel. After a brief overview of potential stresses faced by deployed personnel both during and after deployment, the chapter describes groups postulated to be at particularly high risk of negative reactions to stress exposure. Finally, the chapter evaluates key surveys of deployed personnel to determine the types of experiences found to be stressful and the levels of perceived stress precipitated by those circumstances.

OVERVIEW OF STRESSES EXPERIENCED BY VETERANS OF THE GULF WAR

Although comparatively few personnel participated in actual combat—an experience lay people regard as the essence of war-zone stress—deployment was associated with myriad circumstances potentially capable of fostering psychological stress. First, the unexpected and rapid nature of the deployment itself created personal and family hardships, especially for Reservists (Peebles-Kleiger and Kleiger, 1994). Moreover, service in the Persian Gulf, particularly in the build-up phase of the deployment, was associated with multiple stressors including crowded or austere living conditions, long work days, a harsh climate characterized by wide extremes in temperature, pervasive sand, confinement to base camps with little opportunity for customary recreational outlets, separation from loved ones, and nearly total isolation from indigenous populations (Ford et al., 1992; Gifford, Martin, and Marlow, 1991; Gifford et al., 1996; Wright, Marlowe et al., 1995; Wright, Marlowe, and Gifford, 1991). In the early stages of the deployment, the challenge of facing these hardships was amplified due to uncertainty about the length and nature of the mission.

Apprehensions about Iraqi military capabilities—including the possibility of terrorist attack and infiltration by Iraqi special forces—fueled by news coverage, heightened fears concerning the danger of an eventual military engagement.

Casualty forecasts were reported by the media to be as high as 20,000-50,000, with projections frequently interpreted by soldiers to refer to combat mortality rates rather than total combat-related morbidity (Wright, Marlowe, and Gifford, 1991). Casualty estimates for some units were projected to be as high as 50–80 percent for the ground war (Ford et al., 1992).

Iraq was known to have used chemical weapons against Iran and in suppressing its own people, prompting widespread concern about the potential use of deadly chemical or biological warfare agents and the ever-present need for vigilance against such attacks. Apprehension and uncertainty about possible attacks, the effectiveness of defensive suits, and the possible side effects of prophylactic agents aimed at mitigating consequences of exposure to chemical weapons served as a constant backdrop to the day-to-day hardships of preparation for possible war. Constant training for a chemical and biological attack and numerous alarms indicating possible chemical detections increased the salience of this potential threat. In addition, the threat of random SCUD missile attacks—borne out by the destruction of a reserve unit barracks facility and the resulting death of 29 persons (Perconte et al., 1993b)—was theater-wide.

As noted earlier, some experienced traditional combat activities, although relatively few. Moreover, in the aftermath of the highly successful air and ground offensives, many personnel—including noncombatants—were exposed to evidence of widespread devastation, including the deaths of tens of thousands of Iraqis, causing some personnel to experience guilt. “It was difficult not to feel like a bully after having seen the rag-tag bunches of ill-clothed young men who constituted the fifth largest fighting force in the world” (Holsenbeck, 1996).

Finally, veterans—many of whom had little time between leaving the theater and returning to community life (Rodell, Cooley et al., 1992)—reentered a society soon to be confronted by widespread and unrelenting concerns about the possible negative health effects of Gulf War service. Even before the war had ended, efforts were underway to examine potential health problems associated with Gulf War service (e.g., U.S. Army Environmental Hygiene Agency, 1994). Moreover, in 1992, not long after the end of hostilities, two separate incidents of possible outbreaks of symptoms involving units deployed to the Persian Gulf received widespread media attention (Berg, 1994; DeFraités et al., 1992). Although no definitive conclusions have yet been drawn concerning the origins of these symptoms, these reports served to further sensitize veterans to possible health issues associated with Gulf War service. Ambiguity concerning the origins of health problems reported by some Gulf War veterans continues to this day, with media accounts (e.g., see Fumento, 1995) and conflicting reports (Presidential Advisory Committee, 1996; General Accounting Office, 1997; House Committee, 1997) contributing to an ongoing, stress-provoking climate

of distrust, recrimination, and suspicion of government cover-ups and obstruction (cf. Presidential Advisory Committee, 1997).

CERTAIN INDIVIDUALS WERE POSTULATED TO BE AT HIGH RISK FOR STRESS REACTIONS

The impact of the stressors associated with the Gulf War were hypothesized to vary by different subpopulations of veterans. The following characteristics were expected to be associated with greater-than-average risk for stress-related problems. As discussed below, these risk factors were not mutually exclusive, and in some instances cut across multiple groups.

Combat Support and Combat Service Support Units

Combat support and combat service support (CS/CSS) units (e.g., medical units, grave registration, chaplains, combat engineers, chemical weapons, maintenance and transportation units) and brigade-size or larger units without their own mental health service providers (e.g., the 3rd Armored Cavalry Regiment) were hypothesized to be at risk for developing high levels of combat stress (Ruck, 1996; Wright et al., 1991). In general, CS/CSS units—many of which were reserve units—were considered to be at risk due to the long duty hours they worked to build a mature theater base, the lack of integration of some personnel and units into their assigned parent organization, and the ill-preparedness of some units for combat or war-zone deployment (Ford et al., 1992). Once the war was over, many of these units continued to work long hours in-theater, moving personnel and equipment out of the theater, helping with reconstruction, and treating large numbers of Iraqi POWs (Garland, 1993).

Reservists and Reserve Units

Reservists were hypothesized to be particularly vulnerable to the various stressors associated with the different phases of the deployment for several reasons:

- The abrupt call-up and rapid mobilization of Reserve and National Guard personnel left soldiers, as well as their spouses and families, with little time to adjust to departure. Many were unprepared for the possibility of an extended deployment, with most assuming that 180 days would be their maximum length of deployment (Ford et al., 1992).
- The predeployment strengths of many reserve units were often much lower than anticipated, resulting in widespread cross-leveling. Due to problems with readiness, reserve units were frequently broken apart, with individuals or small teams of reservists used to augment other active-duty and reserve

units. In general, the use of reservists in this manner increased the likelihood of social integration problems in-theater.

- Uncertainty existed as to where reservists might be sent. In one instance, for example, reservists were required to participate in a lottery to determine whether they would be deployed to Saudi Arabia or to backfill European bases or bases within the continental United States (Ford et al., 1992).
- Many reservists worried that their civilian businesses or practices would suffer or that their civilian jobs would not be awaiting them due to their lengthy absence. Members of reserve CS/CSS units who were kept in-theater after the war to help with the reconstruction phase resented seeing combat units being redeployed first (Garland, 1993).
- Some reservists returned home to face the loss of job security or financial hardships resulting from the loss of income during the deployment (Ford et al., 1992).
- Upon return to civilian life, many reservists lacked the social support systems available to active-duty troops returning to their home bases (Ford et al., 1992).

Persons or Units Not Assigned to a Parent Unit

Individuals or units not assigned to a parent unit or who were new to a unit also were considered to be at risk due to a lack of well-established support systems in-theater. For example, numerous Army units deployed to the Gulf had as many as 25 percent of their soldiers who were new to the unit at the time of deployment (Armfield, 1994). Units with low cohesion or poor leadership during the Gulf War also were hypothesized to be particularly at risk (Gifford et al., 1996).

Persons Who Experienced High-Magnitude Stressors

Persons exposed to high-magnitude stressors, resulting from either direct or vicarious exposure to combat or its aftermath, also were considered to be at risk for developing stress reactions (Belenky et al., 1996; Wolfe et al., 1992). Some of these included:

- combat and transport units who had witnessed the combat or its aftermath on the Highway of Death or other areas in which there had been massive human and physical destruction
- survivors of the SCUD missile attack on the reserve unit (Perconte et al., 1993)

- troops exposed to Iraqi dead, including badly burned and mutilated bodies
- persons who observed injured civilians, including Iraqis and Kurds
- personnel whose duties brought them in direct contact with Coalition, enemy, or civilian dead
- soldiers who had participated in direct combat or friendly fire incidents.

Others At Risk

Other persons were also believed to be at high risk. Young personnel, particularly those who were recently married or in troubled relationships, were considered to be at heightened risk for adverse reactions (Wright, Marlowe, and Gifford, 1991). In addition, female soldiers were postulated to be at higher risk, particularly those who were not well integrated into their unit, those with small children, or those who had experienced sexual or other types of harassment in-theater (Ford et al., 1992; Wolfe, Mori, and Krygeris, 1994).

STRESS EXPOSURE AND PERCEIVED STRESS

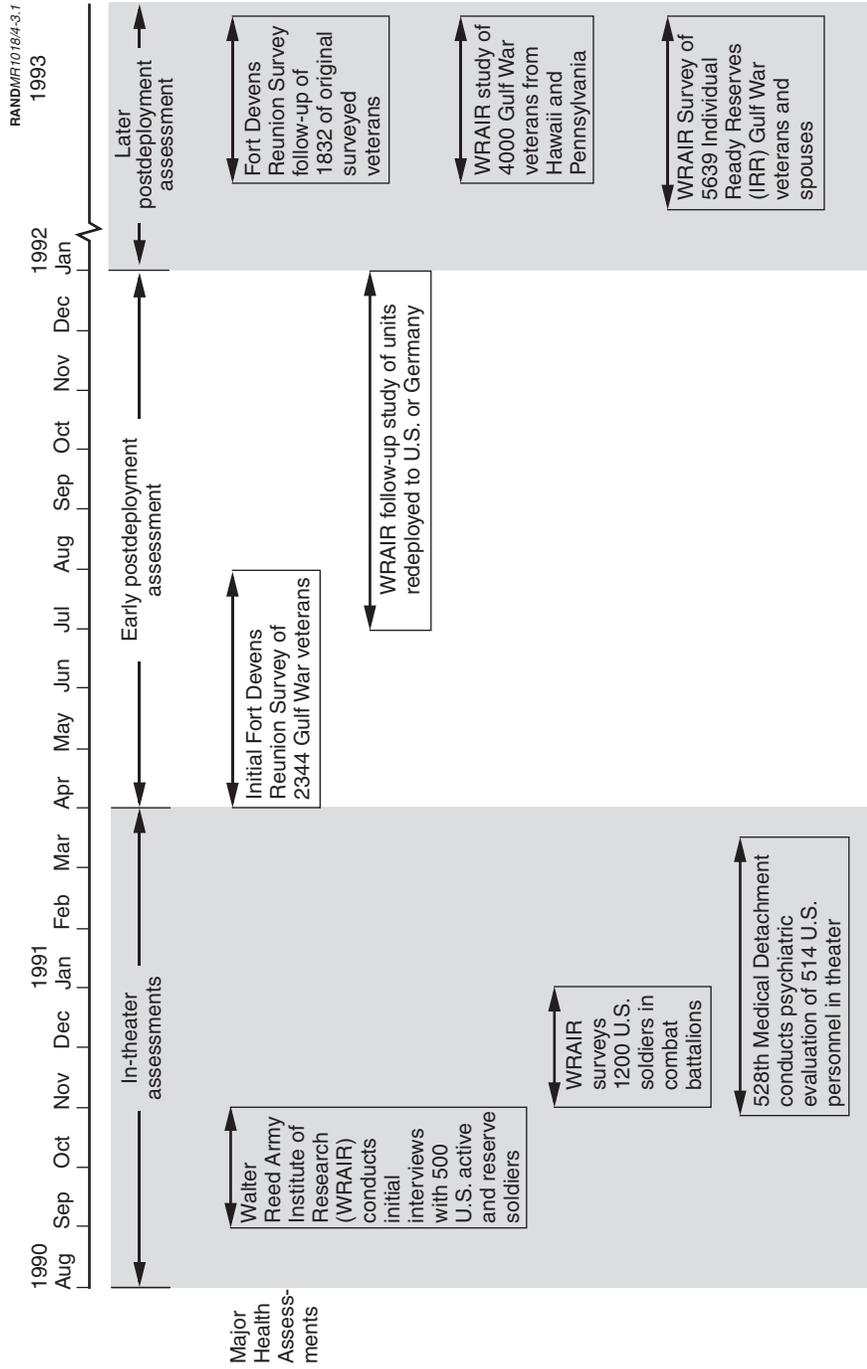
This section reviews available evidence pertaining to stressful life circumstances experienced by veterans of the Gulf War. Data are derived from four different sources: (1) psychiatric evaluations conducted in-theater by mental health teams deployed to the Persian Gulf; (2) in-theater surveys and interview data; (3) postdeployment surveys conducted within days of veterans' departure from the theater; and (4) postdeployment assessments conducted two to three years following the end of the Gulf War.¹ Figure 3.1 shows a timeline of the major health assessments of Gulf War veterans that included measures of stress exposure. Several prospective studies enable a comparison of self-reported stress exposure and perceived stress over time (Martin et al., 1992; Wolfe et al., 1993, 1996).

We identified approximately 20 studies that attempted to measure Gulf War veterans' exposure to stress based either on mental health evaluations or self-reports of Gulf War veterans:²

- in-theater psychiatric evaluations or surveys (Holsenbeck, 1996; Ruck, 1996; Gifford, 1996; Wright et al., 1995; Laedtke, 1996; McDuff and Johnson, 1992; Marlowe et al., 1990; Martin et al., 1992)

¹With the exception of the psychiatric evaluations, data on stress exposure and perceived stress are derived from veterans' self-reports.

²Several studies included assessments conducted at different time periods and so are noted more than once.



NOTE: With respect to the later postdeployment surveys, the veterans included in the studies were surveyed over a period of time. The Fort Devens Reunion Survey was conducted 18–20 months following the return of these veterans to the U.S. WRAIR's study of 4000 Hawaii and Pennsylvania veterans was conducted 2–3 years following their service in the Gulf. WRAIR's study of 5639 individual ready reservists was conducted between May and August 1993.

Figure 3.1—Gulf War Health Assessments Timeline

- early postdeployment surveys (Wolfe et al., 1993; Hammelman, 1995; Southwick and Morgan, 1992; Ford et al., 1992; Sutker et al., 1993; Peebles-Kleiger and Kleiger, 1994; Walter Reed Army Institute of Research (WRAIR), 1994; Martin et al., 1992)
- later post-deployment surveys (Iowa Persian Gulf Study Group; 1997, Wolfe et al., 1996; WRAIR, 1994; Stretch et al., 1995; Stuart and Halverson, 1996).

Overall, findings related to stress exposure were consistent across the various empirical studies and technical reports. In addition, a number of the studies used either the same instruments or modified versions of an instrument to measure self-reported exposure. Given this similarity, we elected to highlight the findings from several key surveys. These studies were selected because they were large and tended to be more representative of Gulf War veterans than other studies—that is, they included either a mix of both active-duty and reserve personnel, CS/CSS and combat units, enlisted personnel and officers, or a range of military occupational specialties. However, we also indicate in the text instances in which smaller studies either support or do not support the findings from the surveys discussed in detail.

MENTAL HEALTH EVALUATIONS IN-THEATER

The vast majority of soldiers assessed in-theater were seen for preexisting problems that may have been exacerbated by the deployment (Ruck, 1996; Holsenbeck, 1996).³ In-theater assessments almost exclusively pertain to the build-up phase. At the time of the Gulf War, the 528th Medical Detachment was the only corps-level active-duty mental health team that was deployed to Saudi Arabia. Of the soldiers who received psychiatric evaluations in-theater, most presented within one month of arrival in-theater, having been referred to the 528th by their chain of command or having independently sought help (Holsenbeck, 1996).⁴ The most common risk factor for psychiatric evaluation was having been deployed to the Persian Gulf within 90 days of assignment to a new unit (Holsenbeck, 1996). Only a few soldiers were seen specifically for combat-related stress reactions.

The corps-level mental health team of the 18th Airborne Corps similarly noted a relationship between being newly assigned to a unit and the type of problems experienced in-theater (Ruck, 1996). Of the 108 soldiers this team treated be-

³Examples of preexisting problems included marital difficulties, poor work performance, poor anger control, somatization disorders, preexisting depression, and eating disorders.

⁴From late October 28, 1990, to March 10, 1991, the 528th Medical Detachment conducted a total of 514 psychiatric evaluations in-theater.

tween mid-November 1990 and March 1991, nearly 20 percent had been with their unit less than three months before they were deployed. A majority of these soldiers had preexisting problems. In general, they were regarded as having poor coping skills that were exacerbated by the deployment (Ruck, 1996).

Mental health services provided to the U.S. Army 7th Corps by the 531st Psychiatric Detachment between late December 1990 and early February 1991 also covered the period encompassed by the air war. Of a total 158 patients treated, 76 percent were soldiers with stress reactions (McDuff and Johnson, 1992). The most common stressors identified were fatigue, cold, sleep deprivation, poor unit leadership and poor morale, and perceived threats to personal safety, which increased dramatically after the start of the air war.

SURVEYS CONDUCTED IN-THEATER

A key set of studies concerning reported stress exposure in-theater was conducted by the WRAIR as part of its effort to evaluate coping and adaptation of U.S. forces in the Persian Gulf. It conducted two in-theater assessments: (a) open-ended interviews with 500 deployed troops during the early phase of the buildup (between September and October 1990; Wright et al., 1995; Gifford et al., 1996);⁵ and (b) a self-administered survey of almost 1200 soldiers from eight combat battalions during November–December 1990 (Gifford et al., 1996).⁶ The survey presented respondents with a list of approximately 60 potential stressors and asked them to indicate the extent to which they were bothered by each using a scale ranging from 1 (none) to 5 (extreme stress).⁷

Observations from the initial set of interviews suggested that problems seemed related to factors that existed before the deployment. During the first few months in the Gulf, the stresses and intense interpersonal contact associated with deployment often exacerbated problems that existed at the unit's home station. Similarly, soldiers' individual problems that existed before the alert ap-

⁵The units visited by the WRAIR team included maneuver battalions from each of the three divisions established in the Persian Gulf, as well as support and headquarters units. Selection of units was done to ensure that the units interviewed were those that had been in the Persian Gulf the longest, were the most forward deployed, had lived under the most austere conditions, or had missions judged particularly stressful by their higher headquarters. When possible, interviewees represented the different organizational levels within a given unit (Wright et al., 1995).

⁶These data collection efforts obtained information on a range of topics. The focus of this chapter is limited to self-reported exposure and perceived stress. It is not possible to determine the survey response rate because the sampling was opportunistic and there was a need to be flexible in the method of distribution. So, surveys were either given directly to the soldiers by the research team or were distributed and collected by the chain of command (Gifford et al., 1996).

⁷Survey instruments differed for enlisted personnel and officers.

peared to have continued or worsened after deployment (Wright et al., 1995; Gifford, 1996).

Results of the WRAIR survey indicated that a substantial number of personnel reported experiencing significant stress during the build-up phase. Stressors could be broadly divided into two categories: (1) those pertaining to harsh living conditions/family-civilian concerns; and (2) those pertaining to the anticipation of combat. With respect to the first category, the circumstances most commonly reported as provoking high levels of stress included uncertainty of the tour length, ambiguity of the mission, separation from and limited contact with family and home, austere physical environment, and crowded living conditions in-theater.⁸

The WRAIR in-theater survey results of the 1167 soldiers who had completed questionnaires during November–December 1990 helped to quantify some of the interview observations (Wright et al., 1995). Circumstances experienced during the build-up phase rated by U.S. service personnel as causing “quite a bit (4)” to “extreme (5)” stress, are displayed in Figure 3.2.⁹

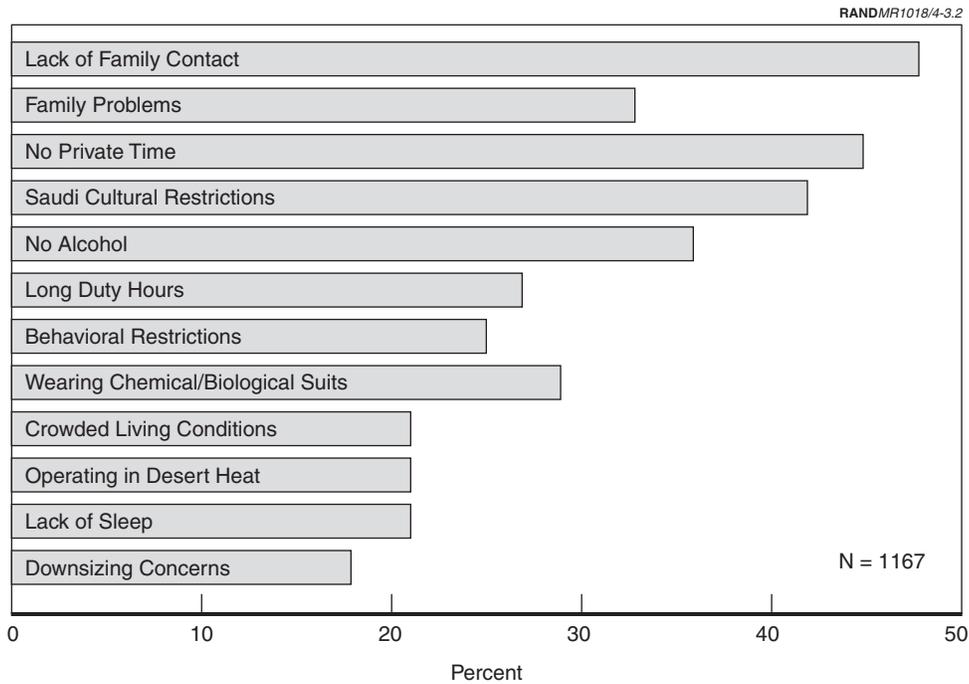
With respect to anticipation of combat, results revealed that a substantial proportion of personnel surveyed indicated experiencing high levels of perceived stress. Regarding potential combat, concerns most frequently reported as being highly stressful (as defined by the Combat Anticipation Stress Rating Scale)¹⁰ included anticipation of attack by chemical/biological warfare agents, artillery, air, or armor (Figure 3.3).

Perceived stress concerning combat casualties was also substantial, with significant percentages of personnel rating anticipatory concerns connected with receiving adequate medical care, being killed or wounded, having buddies or leaders killed or wounded, or having to kill or wound enemy troops as causing “quite a bit (4)” or “extreme (5)” stress (Figure 3.4).

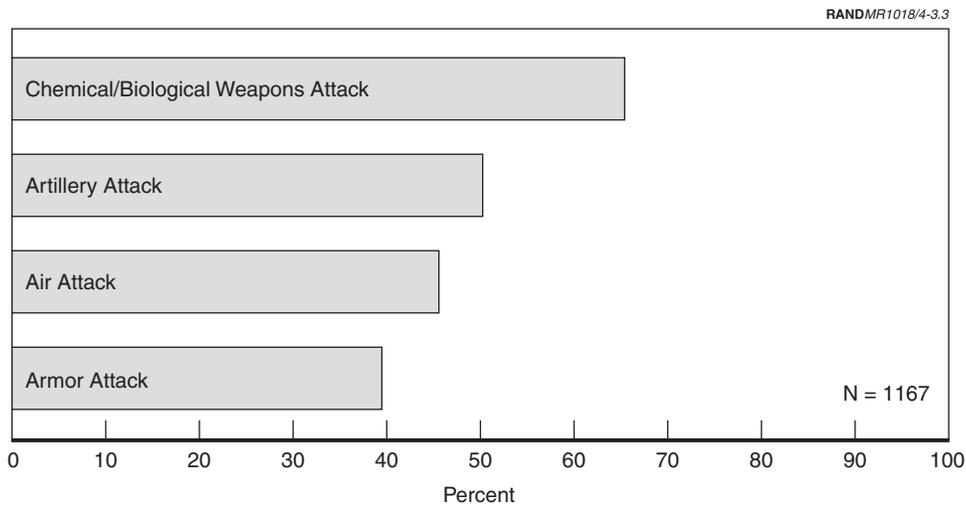
⁸A second round of open-ended individual and group interviews were conducted by WRAIR Human Issues Assessment Teams with select combat arms units and with Division Support Command and care personnel in the 82nd Airborne Division, the 101st Airborne division, the 1st Cavalry Division, and the 24th Infantry Division between November 12 and December 6, 1990. This qualitative assessment reports on a similar set of stressors related to the build-up phase (Marlowe et al., 1990).

⁹The survey’s findings also supported some of the clinical observations made by the 528th Medical Detachment regarding family-related stresses. Of 530 soldiers interviewed, 25 percent indicated having moderate to major family problems prior to deployment, 21 percent reported having family problems that required them to be at home, and 7 percent indicated that they had actually requested being sent home to deal with family problems (Wright et al., 1995).

¹⁰WRAIR asked the 1167 soldiers about their pre-combat perceptions regarding combat losses and enemy capabilities. WRAIR developed a Combat Anticipation Stress Rating Scale that was divided into two categories: (a) items concerning enemy assets (e.g., weapons, equipment, systems), and (b) items regarding soldiers’ perceptions relating to casualties and combat losses (e.g., buddy or leader wounded or killed in action; Wright et al., 1995).



**Figure 3.2—Non-Combat Stressors: Build-Up Phase
(Percent of Gulf War Veterans Citing Factor
as Causing “Quite a Bit” or “Extreme” Stress)**



**Figure 3.3—Combat Anticipation Stressors: Build-Up Phase
(Percent of Gulf War Veterans Citing Anticipatory Concerns
as Causing “Quite a Bit” or “Extreme” Stress)**

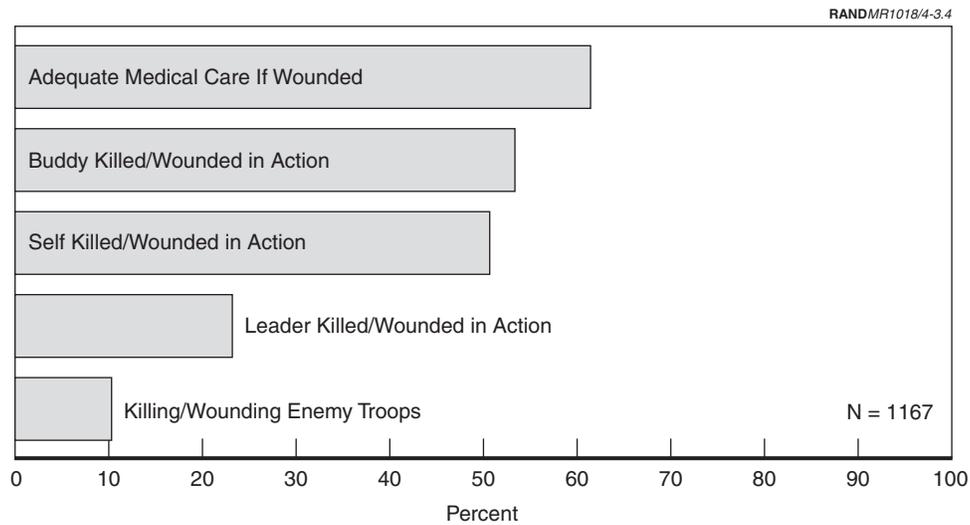


Figure 3.4—Combat Casualty Anticipation Stressors: Build-Up Phase
 (Percent of Gulf War Veterans Citing Anticipatory Concerns
 as Causing “Quite a Bit” or “Extreme” Stress)

In addition, another WRAIR survey of 748 combat arms soldiers deployed from Germany to Operations Desert Shield and Desert Storm found a similar set of pre-combat concerns regarding a variety of enemy threats. The percentages of soldiers reporting “quite a bit” to “extreme” stress were similar to those reported in Figures 3.3 and 3.4, including the potential use of chemical or biological agents, the possibility that they or a buddy might be wounded or killed in combat, and the possibility of artillery, aircraft, or tank attack (Martin et al., 1992). Importantly, this survey was conducted just several weeks before the ground war and administered to junior and mid-level enlisted soldiers in remote desert staging areas near the Iraqi border; it therefore measures forward deployed combat units’ experiences.

SURVEYS CONDUCTED IN THE IMMEDIATE POST-GULF WAR PERIOD

The Fort Devens Reunion Survey, a prospective study of Gulf War veterans, provided the best source of information concerning stress exposure and perceived stress during the initial days following the return from the Gulf theater (Wolfe et al., 1993). The survey was administered to 2344 veterans who had deployed to the Persian Gulf theater from Fort Devens, MA, within five days of their return to the United States. The sample included service personnel with a wide range of military occupational specialties from more than 45 different

units. It was administered as the units returned to undergo administrative processing. As a result, the survey captured 60–70 percent of those soldiers who had deployed through Fort Devens (Wolfe et al., 1996); however, only 11 percent of respondents were active-duty. Moreover, two-thirds of the active-duty troops surveyed were from Special Forces; thus, the bulk of the survey covered reserve and National Guard personnel.

The Fort Devens survey used both structured and open-ended questions to elicit information about veterans' self-reported exposure to a number of potential stressors. Three assessment instruments were used. The first instrument consisted of a set of combat exposure items involving minor modifications of previously validated combat exposure questions (Gallop et al., 1981). Known as the Laufer combat scale and developed to assess Vietnam combat experiences, this instrument contained items describing exposure to actual combat, such as whether an individual had received friendly or incoming fire; whether his or her unit had been ambushed, attacked, or received sniper fire; and whether he or she had seen either Americans or other troops killed or wounded (Gallop et al., 1981; Wolfe et al., 1993). A second instrument, known as the ODS expanded checklist, consisted of the original Laufer items and 23 additional items pertinent to the Persian Gulf War (e.g., exposure to chemical alert). The ODS expanded checklist was used to create the ODS Combat Exposure Scale. An index of overall war-zone stress exposure was created by adding positively-endorsed items from the Laufer combat and ODS exposure scales. A third instrument asked respondents to describe, in open-ended fashion, the single most distressing incident during deployment.

The survey focused on several stressor categories: (a) wartime activities (e.g., troop engagements); (b) nontraditional wartime events (e.g., combat war-zone events specific to the Gulf War and significant noncombat war-zone occurrences); and (c) non-war-zone, deployment-related experiences (e.g., vocational, domestic, and psychological stressors).

The survey found that approximately two-thirds of the Fort Devens veterans reported very little exposure to combat events as measured by the traditional Laufer combat scale.¹¹ Fifty-six percent of male veterans and 58 percent of female veterans scored in the low range for traditional combat events. Only 3 percent of male veterans and 3 percent of female veterans reported high levels

¹¹Southwick and Morgan (1992) similarly found in their study of 700 Connecticut National Guard personnel and reservists that although combat exposure was relatively limited, anticipation of missile attacks and the possibility of a massive ground war were stressors cited by many of the soldiers. Using the Combat Exposure Scale (CES), they also found that the majority of soldiers reported limited exposure to actual combat-related events.

of exposure to traditional combat activities. No significant differences were found between male and female veterans on mean Laufer combat scores.

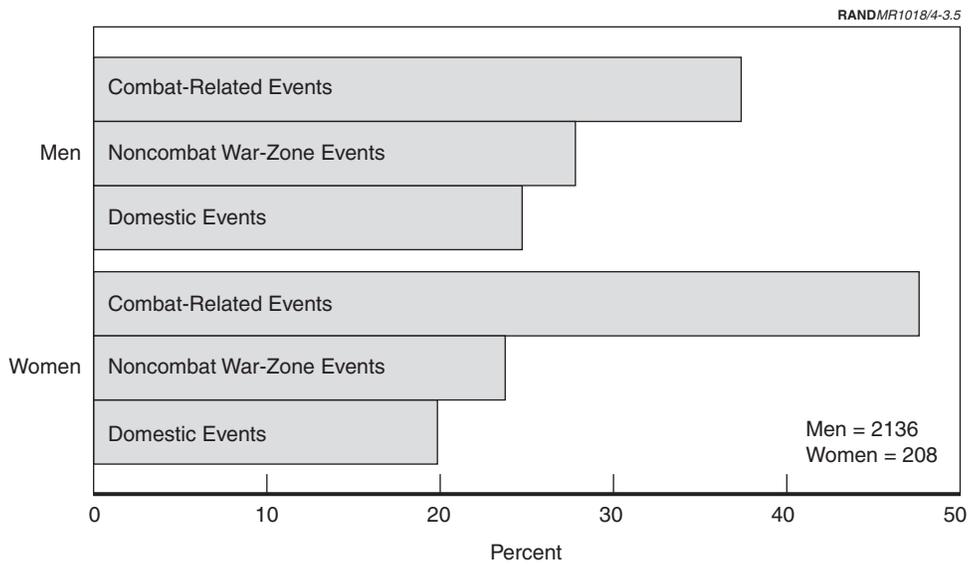
Because of the inclusion of ODS-relevant items, the expanded ODS exposure scale yielded higher mean scores than the Laufer combat scale. The ODS exposure scale indicated that the three most commonly endorsed war-zone experiences reported by Fort Devens male and female veterans were:

- alerts of biological or chemical attack (74 percent men; 78 percent women)
- receipt of incoming fire from large arms (74 percent men; 70 percent women)
- witnessing deaths or the disfigurement of enemy troops (50 percent men; 45 percent women).

When asked in open-ended fashion to describe the single most distressing event, men and women veterans reported similar types of events, with the exception that more women reported combat-related concerns as the most stressful experience (Wolfe et al., 1993).¹² For example, approximately 38 percent of men and 48 percent of women reported a combat-related experience as most stressful (e.g., threat of SCUD missile attack); 28 percent of men and 24 percent of women reported noncombat war-zone events as most stressful (e.g., unit member seriously injured or killed in nonmission activity), and 25 percent of men and 20 percent of women reported domestic events as most stressful (e.g., separation from family, family member ill). See Figure 3.5.

Consistent with the above findings are those of Sutker et al. (1993), who surveyed 215 Louisiana Army National Guard and Army Reserve troops activated to service in the Persian Gulf. Four to six months following ODS, these soldiers also were asked in open-ended fashion to list up to three of the most stressful conditions or events experienced during Persian Gulf duty. Content analysis of the written replies identified three major categories of stress: hardships associated with separation from family and home, fear of SCUD-missile and other military attacks, and discomfort related to the austere desert physical environment.

¹²The self-generated stressor categories were based on 300 unique events described by the veterans, including: (a) combat/mission stressors—actual threat to life (e.g., SCUD missile attack, direct exposure to unit member, friend, or civilian being killed or wounded) during mission activity; (2) noncombat, war-zone stressors (e.g., unit member seriously injured or killed in nonmission activity); (3) domestic stressors (e.g., separation from family, family member ill, divorce or legal separation); (4) anticipation of war and combat activities (e.g., SCUD missile alert, fear of biological or chemical attack); (5) physical and situational attributes of the war zone (e.g., communication blockade, severe environmental conditions, continual tour of duty); (6) intra-unit “hassles” (e.g., personal conflict in unit, harassment, leadership failures); and (7) absence of a specific stressor.



**Figure 3.5—Single Most Stressful Gulf War Experience: Ft. Devens Survey
(Percent of Gulf War Veterans Citing Factor as Most Stressful)**

Debriefings conducted by the Portland VA Medical Center with a small group of ODS veterans and their spouses (N=80) up to six months following their return from the Persian Gulf also found that important stressors identified included family separation, rapidity of the call-up, hardships associated with the austere desert physical environment, fear of SCUD-missile and other military attacks, and indirect exposure to combat such as being sent into minefields (Ford et al., 1992). In addition, some female veterans reported instances of sexual harassment by allied troops (Ford et al., 1992).

SURVEYS CONDUCTED SEVERAL YEARS FOLLOWING THE GULF WAR

Three key studies evaluated the extent of stress exposure a number of months following the end of the Gulf War.

The Iowa Persian Gulf Study

One survey of Gulf War veterans was conducted five years following ODS (Iowa Persian Gulf Study Group, 1997). This population-based survey of 4886 veterans was designed to assess the prevalence of self-reported symptoms and illnesses among military personnel deployed to the Persian Gulf. However, although veterans were asked about various exposures in the Persian Gulf, of those reported in the literature, only a few categories are relevant here: expo-

sure to psychological stressors, chemical warfare agents, and physical trauma. In general, the study found that National Guard/reserve personnel tended to report greater exposure to these stressors than did regular military personnel. For example, 96 percent of National Guard/reserve personnel (N=911) reported exposure to psychological stressors as compared to 82.6 percent of regular military (N=985). Similarly, more National Guard/reserve personnel than regular military reported exposure to chemical warfare agents (6.4 percent versus 4.6 percent) and physical trauma (5.6 percent versus 3.7 percent).

The Fort Devens Follow-Up Reunion Survey

The follow-up to the initial Fort Devens Reunion Survey occurred in 1993, between 18 and 20 months following these veterans' return to the United States (Wolfe et al., 1996). Of the original 2344 veterans surveyed, 1832 (92 percent men, 8 percent women) participated in the follow-up survey, which consisted of most of the original questions and measures. No significant differences were found in demographic characteristics between the initial and follow-up respondents. The second survey replicated the initial findings. Specifically, a similar set of Gulf War circumstances were widely endorsed as significant sources of perceived stress. The two Fort Devens studies differed, however, in that respondents retrospectively reported higher levels of stress at follow-up than at the initial assessment, a finding consistent with Southwick et al. (1995). Similar increases were found for both men and women.

The WRAIR Study

A second key survey of veterans, conducted two to three years following service in the Gulf War, assessed over 4000 active-duty and reserve personnel from Pennsylvania and Hawaii who had served during Operation Desert Shield/Desert Storm (ODS/S) (Stretch et al., 1995; Stretch et al., 1996a, 1996b; and WRAIR, 1994). Of that sample, 710 active-duty and 764 reserve personnel had deployed in support of Operation Desert Shield/Storm.

The survey compared active-duty and reserve veterans, as well as deployed and nondeployed personnel, with respect to perceived sources of Gulf War theater stress, perceived levels of current stress, causal attributions concerning present problems, and the importance of deployment stressors compared to other recent life events.

Our review of this study focused on deployed personnel and comparisons of active-duty to reserve personnel. As part of the self-administered survey, both deployed active-duty and reservist personnel were asked whether they had experienced various events during their deployment. If they experienced the

event(s), then they were asked the extent to which they found the event or events stressful. An overall finding from this study was that, two to three years following the Gulf War, many veterans rated a number of experiences as being moderately to extremely stressful. The general pattern and magnitude of reported stressors were similar for both active-duty and reserve deployed samples, as summarized below. Moreover, this pattern is similar to the results from the two Ft. Devens surveys that showed a range of stressors, including those associated with combat, exposure to other traumatic wartime events, living and working conditions in-theater, and domestic stressors.

A substantial number of respondents in this study reported combat-related experiences as being moderately to extremely stressful (WRAIR 1994, pp. A-19, A-22):

Reserve Deployed (N=764)

- threat of being killed or wounded (60 percent experienced; of those, 54 percent rated experience as being moderately to extremely stressful)
- exposure to American soldiers killed or wounded (29 percent experienced; of those, 44 percent rated experience as being moderately to extremely stressful)
- exposure to dead or dying (24 percent experienced; of those, 26 percent rated experience as being moderately to extremely stressful).

Active-Duty Deployed (N=710)

- being fired on by the enemy (36 percent experienced; of those, 58 percent rated experience as being moderately to extremely stressful)
- having a buddy wounded or killed in action (15 percent experienced; of those, 34 percent rated experience as being moderately to extremely stressful)
- being wounded or injured (11 percent experienced; of those, 34 percent rated experience as being moderately to extremely stressful)
- having a confirmed kill (10 percent experienced; of those, 23 percent rated experience as being moderately to extremely stressful)
- exposure to American soldiers killed or wounded by friendly fire (20 percent experienced; of those, 43 percent rated experience as being moderately to extremely stressful)
- engaging enemy in a fire fight (18 percent experienced; of those, 43 percent rated experience as being moderately to extremely stressful).

These findings were consistent with those from a separate survey conducted by WRAIR in May 1993 of 5639 Individual Ready Reserve (IRR) soldiers (Stuart and Halverson, 1996).¹³

In terms of exposure to traumatic events, in the WRAIR study of Pennsylvania and Hawaii Gulf War veterans, both deployed active-duty and reserve personnel rated their concerns similarly about the threat of SCUD-missile and chemical-weapons attacks. Eighty-three percent of reserve and 77 percent of active-duty deployed troops experienced the threat of SCUD missile attack. Sixty-nine percent of reserve and 65 percent of deployed active-duty troops rated SCUD missile alerts as being moderately to extremely stressful. Twenty-four percent of reserves and 76 percent of active-duty deployed troops experienced the threat of enemy chemical weapons or agents; approximately 68 percent of these rated this threat as being moderately to extremely stressful.

Waiting for deployment to the Gulf was rated by 72 percent of deployed reserve troops (as compared to 61 percent of deployed active-duty personnel) as being moderately to extremely stressful. Stressors that both groups of deployed troops associated with living and working conditions included: boredom, operating in desert climates, long duty days, extended periods in chemical or biological protective gear, not getting enough sleep, crowding in base camps, lack of private time, and physical workload.

In terms of stressors associated with home, approximately 80-85 percent of active-duty and reserve deployed personnel experienced lack of contact with family and roughly 40 percent reported illness or problems back home. Approximately 70 percent of deployed reservists and 66 percent of deployed active-duty personnel rated lack of contact with family as being moderately to extremely stressful. Approximately half of deployed reserve and active-duty personnel also rated illness or problems back home as being moderately to extremely stressful.

The WRAIR study also attempted to determine current levels of life stress in deployed and nondeployed personnel and to assess the degree to which veter-

¹³In May 1993, WRAIR conducted a survey of 5639 IRR soldiers to assess their experiences of stress or trauma exposure. To measure combat exposure, respondents who had deployed to the Persian Gulf (N=576) were asked whether they had experienced any of 26 combat events during ODS/S and to rate each on a 1-5 point scale as to the degree to which it was perceived as stressful. Similar to the WRAIR study of Pennsylvania and Hawaii Gulf War veterans, a high proportion of the IRR soldiers who had deployed rated a similar set of high-magnitude stressors as being "quite a bit" to "extremely" stressful, including observation of an American soldier or fellow soldier killed in action (70 percent); thoughts of being killed (64 percent); death or wounding of civilians (60 percent); and attack by enemy aircraft, rocket, mortar, or artillery fire (60 percent; Stuart and Halverson, 1996). The most frequent combat events experienced by the IRR were receiving incoming artillery, rocket, or mortar fire (48 percent), seeing an enemy soldier killed or wounded (47 percent), and encountering mines or booby traps (36 percent).

ans attributed their present-day problems to experiences during ODS/S. To address this issue, personnel responded to a checklist of potential life stressors, including the degree of stress they experienced in the past two weeks with respect to each circumstance. In general, results revealed that deployed troops tended to report higher levels of current life stress in a number of domains than did nondeployed personnel. This finding was consistent across both active-duty and reserve personnel.

Veterans were also asked about their present levels of life stress and to indicate what caused most of their recent problems. Deployed troops reported more current concerns than did nondeployed personnel. For example, 40 percent of both deployed active-duty and reserve troops reported at least moderate concern in the past two weeks regarding personal health matters, as compared to 21 percent of nondeployed active duty personnel and reservists. Similarly, approximately 20 percent of active-duty and reserve deployers noted moderate or greater concern in the past two weeks regarding their ODS/S experiences (e.g., thoughts of fellow service personnel being killed or wounded in the Gulf War, or their relationship with their spouse or significant other since their return from Gulf War service).

METHODOLOGICAL LIMITATIONS

The available studies have limitations that hamper drawing definitive conclusions concerning exposure to stressful events during the Gulf War. A key shortcoming is uncertainty as to the general applicability of these data to the broad range of personnel deployed to the Persian Gulf.

Reservations about the lack of general applicability of these findings stem from two primary concerns: low survey-completion rates and nonrandom respondent selection procedures. With respect to survey response rates, some key studies reported levels that only slightly exceeded 30 percent (e.g., WRAIR, 1994). One potential bias associated with low participation is that the surveys may have overrepresented individuals who have been concerned about or who have experienced stress or illness. If this assumption is true, then estimates of self-reported stress exposure and perceived stress could be somewhat inflated.

The partial reliance on retrospective studies and the attendant problem of distorted recall also may have compromised some of these studies. Some evidence suggests, for example, that the perception of stress may become amplified over time (Wolfe et al., 1996), and additional data indicate that recall of exposure to stressful circumstances may be biased in the direction of reporting greater exposure with the passage of time (Southwick et al., 1997). The fact that retrospective recall of perceived stress as well as actual exposure to objective events was greater at follow-up than at the initial assessment is consistent

with the argument that memories of war-related stressors are influenced by intervening events, life changes, and experiences.

With respect to nonrandom respondent selection, most of the available information was derived from combat support and combat service support units, with relatively little representation of combat units. In general, sampling issues call into question the representativeness of study findings. For example, the Fort Devens Reunion Survey appeared largely to have missed combat veterans, sampling mostly those who saw little or no combat. Further, reservists in general were more highly represented than active-duty troops. The lack of data from combat units represents a serious limitation, because these were the units most likely to have been exposed to the high-magnitude stressors.

Moreover, insights gained from in-theater psychiatric evaluations pertain mostly to the staging areas and the build-up phase, where the stressors resulted primarily from coping with family separation, austere and crowded living conditions, uncertainty about the mission, and anticipation of combat. Thus, these assessments offer only a limited picture of the experiences of forward-deployed units or soldiers directly involved in the ground assault.

Another methodological limitation of some studies is that data are collapsed into groups in a manner that obscures potential differences (e.g., CS/CSS and actual combat units are combined, or active-duty and reservist troops are combined). These units would be expected to have vastly different wartime experiences and exposures.

SUMMARY AND CONCLUSIONS

Because of methodological limitations of key studies, we do not know how many Gulf War veterans actually experienced potentially stressful situations. Although not definitive, the available data support the following tentative conclusions:

- Although the Gulf War could be characterized as a brief, brisk action with the air and ground assaults lasting only from January 17, 1991, to February 28, 1991, it was preceded by an abrupt, rapid mobilization and a prolonged build-up phase.
- Deployment to the Persian Gulf theater exposed both combatants and non-combatants to a wide range of stressful circumstances as self-reported by veterans, with stress exposure varying across the different phases of deployment.
- Low-level stress exposures included harsh and crowded living conditions in-theater, long work hours, and uncertain tour length.

- Additional, low-level stressors reported by many Gulf War veterans included concerns regarding separation from family and related problems (e.g., illness in the family, dissolution of a marriage).
- Although exposure to potentially more intense stressors—such as actual combat—was limited, during the six-month build-up phase many Gulf War veterans experienced prolonged anticipation of the risk of serious injury or loss of life due to impending air and ground assaults, as well as to possible chemical-biological warfare and SCUD missile attacks. Other potentially intense stressful events included receipt of incoming fire from large weapons, witnessing the death or disfigurement of American, coalition, or enemy forces, and witnessing other consequences of war such as injured Iraqi or Kurdish civilians.
- Although exposures were not perceived as stressful by all exposed personnel, large numbers of veterans reported experiencing high levels of stress resulting from multiple circumstances. These findings were consistent across studies and over time (e.g., two to three years following the Gulf War).
- Study findings were also consistent for male and female veterans, with few differences found in self-reported exposure between the two groups.
- In comparison to active-duty personnel, reservists—as a group—reported somewhat higher levels of perceived stress, perhaps because of different expectations about military obligations, different levels of preparedness or training, the abrupt and rapid mobilization, and problems in the way they were utilized (e.g., units split apart and individual reservists assigned to other than their parent organization), among other factors.