



Strategies to Improve Long-Term Outcomes for Veterans with Traumatic Brain Injury

The U.S. Department of Defense estimates that almost half a million service members sustained a traumatic brain injury (TBI) in the past two decades. Because not all TBIs are reported, this number could be even higher. Most of these service members make a full recovery from their injuries, especially if they had only a single mild TBI, but some require lifelong care and support. Government agencies and organizations that support veterans can benefit from actionable guidance and recommendations to ensure that veterans receive the care they need over the long term.

Until 2007, at the height of the wars in Afghanistan and Iraq, there was no universal screening for TBI in the U.S. military. Service members who experienced blast injuries in combat zones or during training exercises often did not receive timely evaluation and treatment for TBI or psychological problems arising from their exposure to explosive blasts. As understanding of the long-term effects of these experiences continues to evolve, it is becoming clearer that military-related TBIs rarely occur in isolation: Many of these veterans are coping with *polytrauma*—a complex constellation of physical and mental health problems that can persist long after military service ends.

Although there has been significant progress in TBI treatment since the wars in Afghanistan and Iraq began, veterans' needs are not uniform. Today's veteran population is more diverse than ever, and improving outcomes requires a better understanding of how service-connected TBI can affect veterans' lives over the long term, what veterans living with TBI and their caregivers may need as they age, and treatments that are effective or show promise.

TBI During Military Service Can Have a Profound Effect on Veterans Throughout Their Lives

TBI can affect veterans' everyday lives, their career prospects, and the quality of their social interactions for months or years after their injury. Co-occurring conditions, such as posttraumatic stress disorder (PTSD), can compound these challenges and complicate veterans' care. Experiencing one or more TBIs can also place veterans at a higher

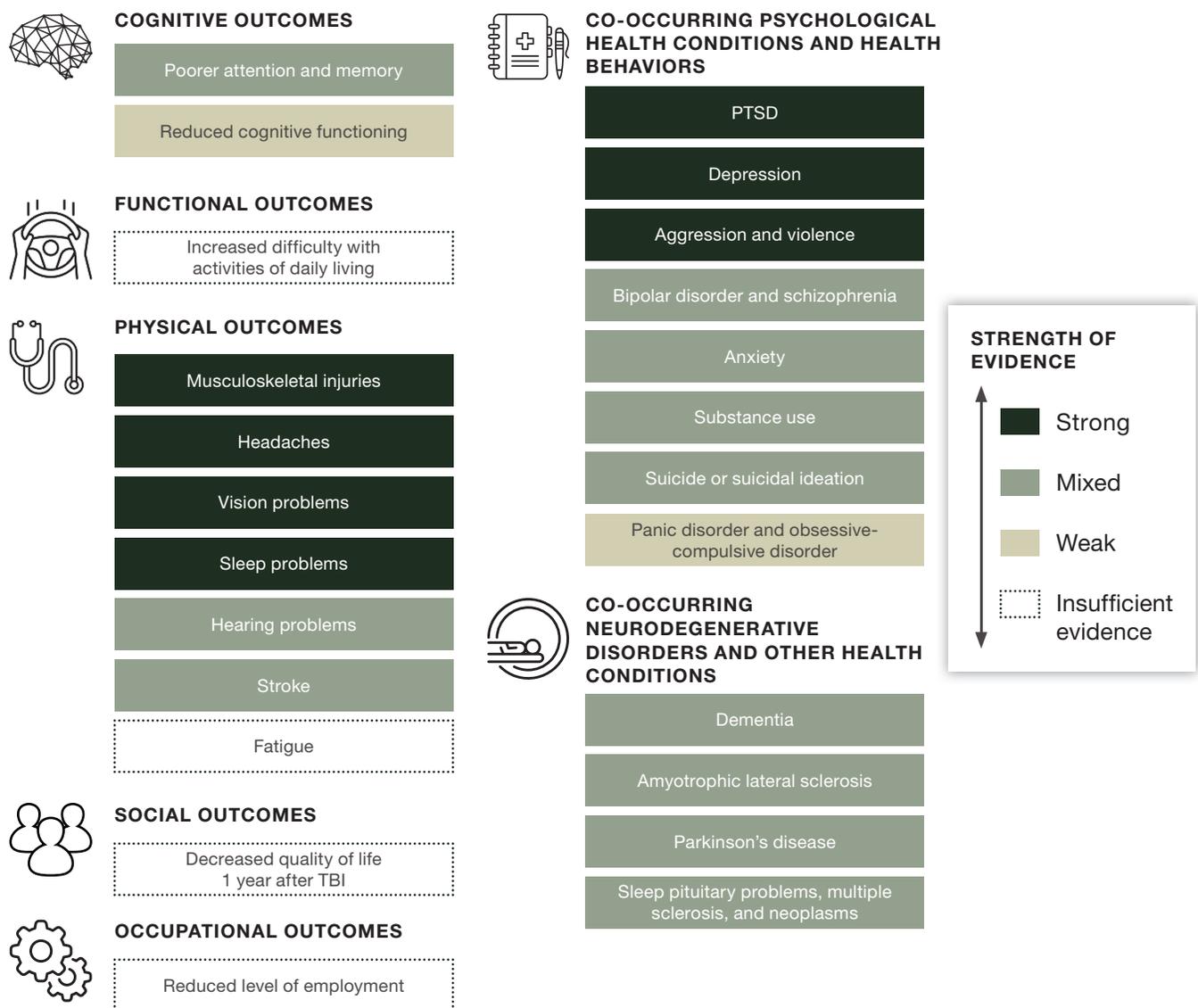
risk of developing other health conditions, such as early-onset dementia, or can contribute to early death.

Figure 1 summarizes research findings on long-term outcomes that have been found to be associated with TBI. Individual veterans' outcomes can vary significantly, depending on the severity of the TBI, the time since the injury, and the circumstances of the injury. The strength of the evidence also varies; some

topics have generated a great deal of research, and others have generated much less.

However, the figure illustrates the potential implications of TBI when it comes to veterans' lifelong cognitive, functional, physical, social, and occupational outcomes, as well as the possible increased risk of certain psychological, behavioral, and neurodegenerative conditions.

FIGURE 1
A Variety of Long-Term Health Outcomes Are Associated with TBI, but More Research Is Needed on Functional, Social, and Occupational Outcomes



NOTES: The figure synthesizes findings from 72 systematic reviews of long-term outcomes following TBI; about one-third of those reviews focused specifically on military and veteran populations. See the accompanying report for a description of the process for identifying and analyzing these studies, as well as a detailed discussion of the studies' findings.

Veterans Living with a TBI Often Have a Greater Need for Care and Support, and They Are Likely to Face Increasing Challenges as They Age

An analysis of data from Wounded Warrior Project’s (WWP’s) annual member survey from 2017, 2018, and 2020 revealed that veterans who reported a head injury were much more likely than those who did not to experience many of the co-occurring conditions and challenges that have been identified in the research on the long-term effects of TBI, such as severe headaches, musculoskeletal problems, and mental health conditions, as well as a reduced ability to work.

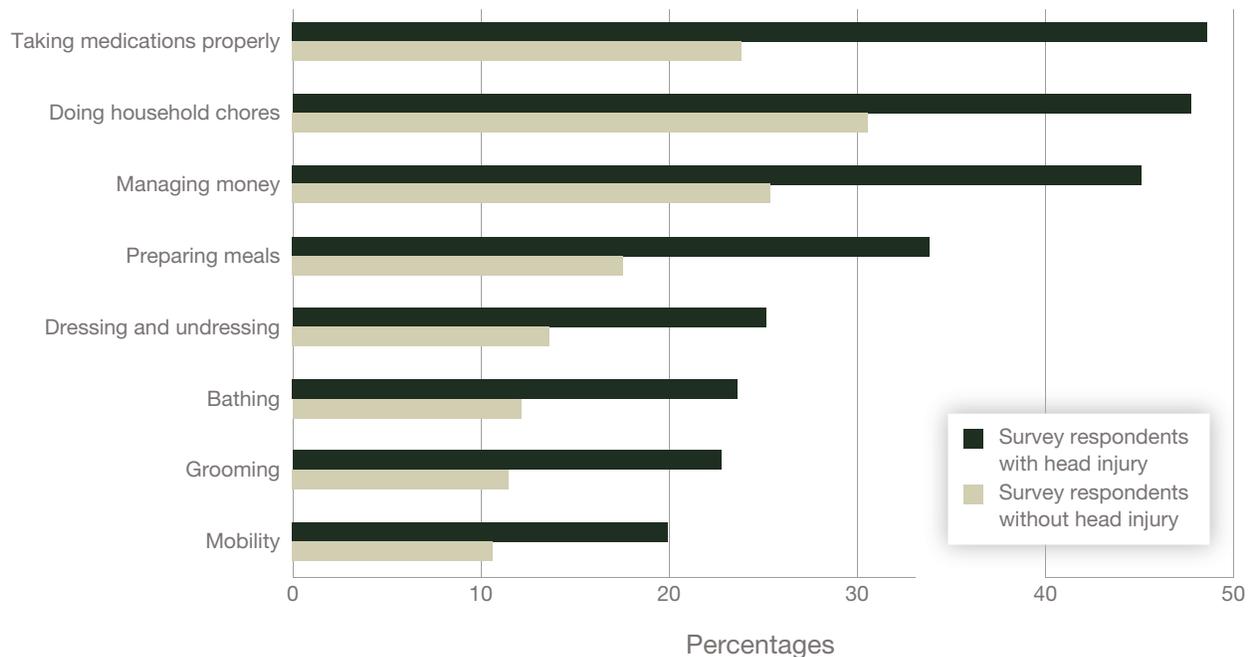
The survey also asks respondents about their caregiving needs. WWP veterans who reported a head injury were almost twice as likely to indicate that they required caregiver support (29 percent versus 16 percent for those without a head injury). Respondents with a head injury reported needing more caregiving time, and they were about twice as likely to be housebound (11 percent versus 6 percent for those without a head

injury). Figure 2 compares the caregiving needs of these two groups. Among those with a head injury, 26 percent reported that they needed more than 40 hours of caregiving per week, and 54 percent needed more than 21 hours. Eighty-five percent of the time, the person providing care was a spouse. The amount and types of assistance that these veterans require—along with the reliance on informal caregiving—point to a potentially significant need for more support programs that target caregivers.

Interviews with 32 veterans who had been living with the effects of a TBI for more than a decade and eight of their caregivers provided insights into how those injuries affected the veterans’ health and well-being, relationships, employment, and educational experiences. The veterans’ search for care and perceived success with treatment were complicated by such conditions as PTSD, migraines, and cognitive challenges.

Many of these veterans described cognitive challenges, including difficulty following a conversation or remembering what to get from the grocery store. Such challenges had taken a major toll on the veterans’ identities, their ability to seek employment and educational opportunities, their romantic relationships, and

FIGURE 2
Veterans with a Head Injury Were More Likely to Require Assistance with Daily Tasks



SOURCE: Aggregated data from the 2017, 2018, and 2020 WWP Annual Warrior Survey.

NOTES: The figure shows only respondents who indicated that they required caregiving support. All differences are significant at the $p < 0.0001$ level.

Veterans shared what it was like to live with the long-term effects of TBI, recurring conditions, and uncertainty about the future.

I still have problems with losing track of a conversation. . . . I've actually lost my balance, hit my head, had another concussion. When the [treatment] cycle is coming to an end, it gets harder to control the headaches.

Sometimes I feel like I should be doing more, and then my therapist has to remind me that I'm having a good run, but that I've got a chronic condition. . . . I certainly won't be getting back into a career field.

the well-being of their families, which was confirmed by their caregivers. Several veterans coped with these challenges through service to others, particularly volunteering their time to help other veterans. Looking to the future, veterans were concerned about accelerated aging and early-onset dementia. They were looking for answers and ways to prepare, and caregivers similarly wanted more information and direction about what to expect in the future.

Despite Investments in Research, There Is Limited Evidence on Effective Interventions to Address the Long-Term Effects of TBI

Figure 3 summarizes the research findings from 165 systematic reviews of interventions to treat symptoms and improve long-term outcomes following TBI.

Overall, cognitive rehabilitation had the strongest evidence of effectiveness for cognitive outcomes, while psychotherapy was effective for psychological outcomes, behavioral interventions were effective for social outcomes, occupational rehabilitation was effective for occupational outcomes, and psychotherapy and behavioral interventions were effective for post-concussion syndrome (PCS). By comparison, the evidence for interventions targeting functional and physical outcomes was mixed. The authors of the systematic reviews routinely emphasized the lack of high-quality

evidence, and most studies focused on general adult populations rather than veterans. Veterans' TBI experiences and etiologies differ significantly enough from those of the general adult population that interventions could be disproportionately more or less effective for veterans. There is a need for more research and higher-quality study designs to draw stronger conclusions about effective interventions for veterans living with the long-term effects of TBI.

Brain Science Is Still Developing, and There Is Uncertainty About How TBI Affects Aging

In interviews with 16 experts in neuroscience, neurology, rehabilitation medicine, and other related specialties, clinicians and researchers noted that TBI presents an increased risk—albeit modest—for several disorders. Although there were disagreements about the precise magnitude of this risk, all experts agreed that confounding comorbid conditions (e.g., PTSD) and ambiguity over the number and severity of TBIs make it nearly impossible to make definitive statements about risk for downstream health issues or the best ways to address or mitigate this risk. All experts emphasized the importance of promoting general wellness and active engagement with care.

Clinicians and researchers had mixed views on the extent to which TBI affected veterans' long-term outcomes.

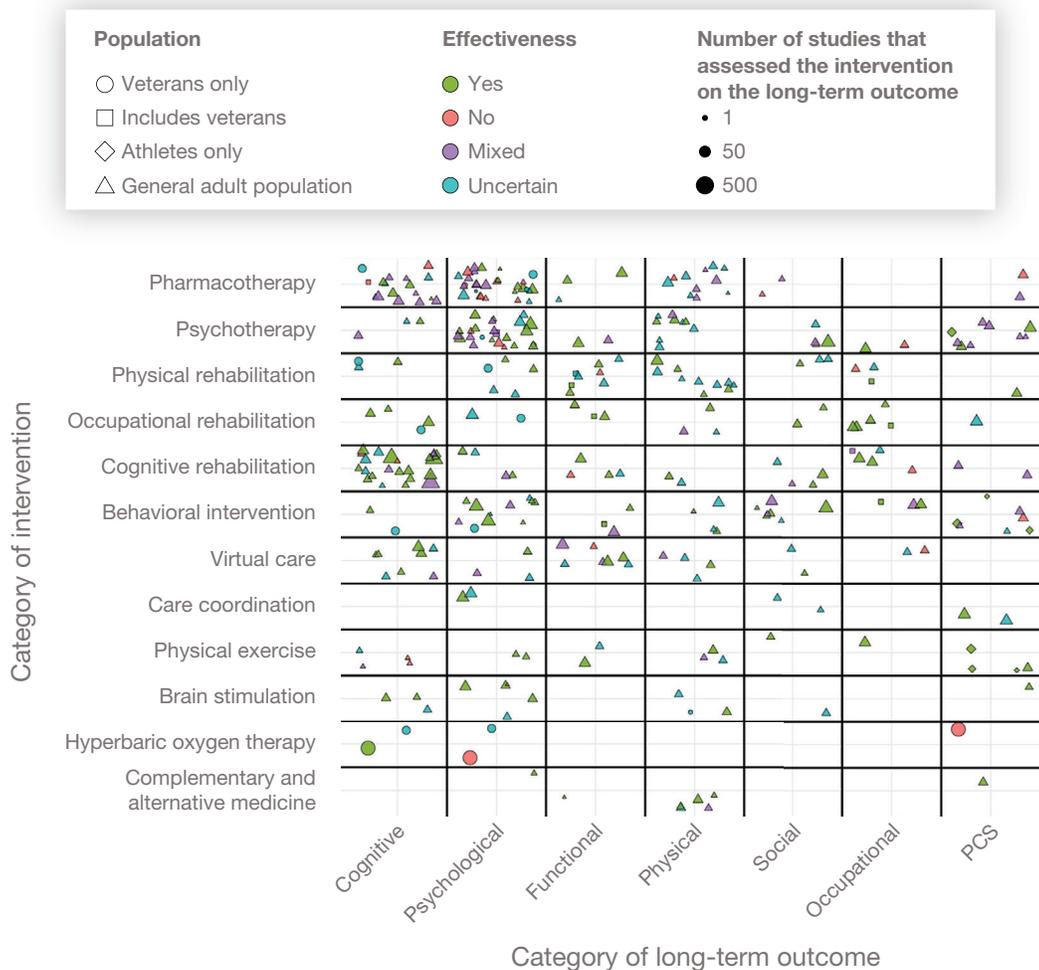
Without being overdramatic, I'm suggesting that we may be facing a tsunami [of early-onset cognitive decline].

Things are not nearly as bad as the advocates think they are when it comes to TBI and aging. . . . My concern is about dementia in general as our population ages.

Recommendations

The study's findings point to several recommendations for improving care and support for veterans with TBI. These recommendations are intended to guide policymakers, health care systems, veteran-serving organi-

FIGURE 3
Clinical Studies of Various TBI Treatments Found a Range of Results Across Seven Types of Long-Term Outcomes



zations, and researchers in their work to improve the long-term outcomes for veterans with TBI and to provide adequate support to their caregivers and families.

Create Long-Term Systems of Support for Veterans and Caregivers

As veterans with TBI age and cope with chronic health issues, their need for treatment and caregiving support will only increase. It is also important to consider caregivers' needs as they age and become less able to care for veterans.

- **Provide support to veterans and caregivers for long-term planning and clarify expectations.** Veterans and caregivers need to know

what they can expect in the long run and how much agency they have to improve their situations, but getting these answers is complicated by uncertainties about the long-term impacts of TBI. Clear communication and consistent case management are essential to planning for the long term and setting expectations for managing TBI and complex polytraumas.

- **Increase caregiver support.** The U.S. Department of Veterans Affairs (VA) Program of Comprehensive Assistance for Family Caregivers provides support to caregivers of eligible veterans. As caregivers age and have reduced capacity to care for veterans, this program might need additional resources.

- **Expand access to long-term care.** Given the expected long-term care needs of veterans with TBI, expanding access to care by reducing financial barriers will be essential.

Expand Access to Multidisciplinary Treatment

Given veterans' increased need for care as they age, VA should expand its network of polytrauma facilities and providers and explore other options to increase access to this type of treatment, such as through telehealth. This approach can also serve as a model of holistic, multidisciplinary care for TBI and associated conditions. To this end, VA should document and disseminate best practices, research on effective treatments, and data on veterans' long-term outcomes.

Promote Health-Enhancing Behaviors

In interviews, veterans expressed concern about the long-term implications of TBI and uncertainty about their risk of developing early-onset neurological deficiencies. However, regular exercise, a healthy diet, abstinence from alcohol and other substances, and other wellness practices can go a long way toward improving veterans' overall health and well-being and supporting their treatment. Veteran-serving organizations should expand their health and fitness programs to reach more veterans and caregivers while also providing them with coping strategies and opportunities to network.

Continue to Invest in Research

Given the gaps in the knowledge base about the long-term effects of TBI, VA and veteran-serving organizations should both support ongoing research and fund additional data collection and analysis.

- **Integrate data on TBI and related conditions across record systems.** In the next five to ten years, the U.S. Department of Defense and VA are expected to integrate their electronic health records, making it easier to link veterans' current health and wellness to their military experiences. In the meantime, those organizations could merge service member and veteran data to allow longitudinal analyses of TBI symptoms and treatment.
- **Enhance the WWP Annual Warrior Survey.** Creating a longitudinal data file across survey years would help researchers track veterans over time and inform the development of specialized surveys of veterans with particular conditions or shared characteristics.
- **Conduct longitudinal studies examining variations in outcomes and across veteran populations, as well as studies of evidence-based treatments for TBI.** A better understanding of veterans' TBI treatment, needs, and access can help identify disparities in care and potential implications for veterans' long-term outcomes. This research should extend to holistic interventions that have shown promise in treating TBI symptoms and polytraumas.
- **Expand basic science research.** A better understanding of the underlying physiology of TBI could improve TBI diagnosis and treatment. Investments should also target research on biomarkers for TBI severity and chronic traumatic encephalitis.

This brief describes research conducted in RAND Health Care with funding from Wounded Warrior Project and documented in *Improving Care for Veterans with Traumatic Brain Injury Across the Lifespan*, by Kathryn E. Bouskill, Carrie M. Farmer, Irineo Cabrerros, Jonathan H. Cantor, Natalie Ernecoff, Lynn Hu, Shira H. Fischer, Aaron Kofner, Lisa S. Meredith, Matthew L. Mizel, Aneesa Motala, Tepring Piquado, Zachary Predmore, and Rajeev Ramchand, RR-A1205-1, 2022 (available at www.rand.org/t/RR-A1205-1). To view this brief online, visit www.rand.org/t/RBA1205-1. The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors. RAND® is a registered trademark.

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