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Alcohol Use after Combat-Acquired Traumatic Brain Injury: What We Know and Don't Know

RACHEL SAYKO ADAMS, MPH, MA[Doctoral Candidate],

Brandeis University, Heller School, Institute for Behavioral Health, Waltham, MA, USA

JOHN D. CORRIGAN, PH.D., ABPP[Professor], and

Department of Physical Medicine and Rehabilitation, The Ohio State University, Columbus, OH, USA

MARY JO LARSON, PH.D., MPA[Senior Scientist]

Brandeis University, Heller School, Institute for Behavioral Health, Waltham, MA, USA

Abstract

Military personnel engage in unhealthy alcohol use at rates higher than their same age, civilian peers, resulting in negative consequences for the individual and jeopardized force readiness for the armed services. Among those returning from combat deployment, unhealthy drinking may be exacerbated by acute stress reactions and injury, including traumatic brain injury (TBI). Combat-acquired TBI is common among personnel in the current conflicts. Although research suggests that impairments due to TBI leads to an increased risk for unhealthy drinking and consequences among civilians, there has been little research to examine whether TBI influences drinking behaviors among military personnel. This article examines TBI and drinking in both civilian and military populations and discusses implications for clinical care and policy.

Keywords

traumatic brain injury; alcohol use; combat-acquired injury; military deployment

Since military operations began in Afghanistan and Iraq, several studies have examined the combat-related injuries that service members experience while deployed, and the ongoing psychological health problems that may occur as they reintegrate into their communities post-deployment. Traumatic brain injury (TBI) is a common combat-related injury among those who have served in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). While the true prevalence of combat-acquired TBI is unknown (Jaffee et al., 2009), studies have concluded that approximately 20 to 22 percent of those who served in OEF/OIF screen positive for a TBI, the majority of which were blast-related (Carlson, Nelson, Orazem, Nugent, Cifu, & Sayer 2010; Tanielian & Jaycox, 2008; Terrio et al., 2009). Civilian studies have suggested that drinking after a TBI may be associated with engagement in dangerous behaviors (Graham & Cardon, 2008) and may impede successful rehabilitation (Corrigan, 1995). While numerous studies have shown that unhealthy drinking is also associated with deployment and combat exposure (Ferrier-Auerbach et al., 2009; Institute of Medicine, 2008a; Jacobson et al., 2008; Wilk et al., 2010), to date, only a few studies have explored how combat-acquired TBI may be associated with drinking behaviors

and negative consequences among service members (Carlson, et al., 2010; Heltemes, Dougherty, MacGregor, & Galarneau, 2011; Rona et al., 2011 in press).

The purpose of this paper is to discuss current knowledge of how combat-acquired TBI may be associated with post-deployment alcohol use behaviors and implications for practice, research, and policy. To do so, we begin by defining combat-acquired TBI and describing how comorbidities and polytrauma among service members may distinguish military from civilian injuries. Next, the paper describes the epidemiology of TBI within the military, detailing the identification of combat-acquired TBI, its consequences, and other co-occurring psychological health conditions that may complicate diagnosis and/or treatment. The remainder of the paper discusses our knowledge, and gaps in knowledge, related to alcohol use after a TBI. Existing information draws largely from civilian studies, but a discussion of the few military studies that have directly examined drinking post-TBI is included as well. We will place TBI in the context of the pervasive culture of alcohol use in the military. The paper concludes with a discussion of practice implications, research gaps and potential areas of policy development, including the relevance of TBI and post-deployment alcohol use for social workers.

DEFINING TRAUMATIC BRAIN INJURY

According to the standard case definition of TBI from the Centers for Disease Control and Prevention (CDC), a TBI is an injury to the head that results in a decreased level of consciousness, loss of memory, skull fracture, intracranial lesion or neurological or neuropsychological abnormality (Thurman, Sniezek, Johnson, Greenspan, & Smith, 1995). TBIs can occur as a result of blunt or penetrating trauma, with the former referred to as closed head injury, the latter open head injury. The greater the physical force applied to the head, the more damage occurs from the acceleration or deceleration forces. Brain damage is inferred from temporally associated alteration of consciousness that may range from transient confusion to coma. In rare circumstances damage to the brain may be inferred solely from abnormalities evident in neuroimaging or clinical exam, including neuropsychological assessment. The primary mechanical injury from the blow or jolt to the head is followed by a secondary injury that results from metabolic changes, bleeding and/or swelling (Kochanek, Clark, & Jenkins, 2007).

TBIs are categorized on a spectrum of mild to moderate to severe, with the majority experienced in both civilian and military populations being mild (Kraus & Chu, 2005; Tanielian, et al., 2008). All concussions are mild TBIs, though all mild TBIs are not concussions. The term “concussion” has been reserved for mild TBIs that temporarily disrupt brain function but do not cause damage to brain structures. The certainty of this distinction has been challenged by studies showing cumulative effects of multiple TBIs, though the mechanism of this effect is not known (Guskiewicz et al., 2003; Zemper, 2003). The term “mild TBI” refers to the extent of altered consciousness, regardless of the nature of the underlying damage, and can range from those injuries that cause confusion or memory loss without loss of consciousness through injuries resulting in 30 minutes or less of loss of consciousness (Centers for Disease Control and Prevention National Center for Injury Prevention and Control [NCIPC], 2003; Defense and Veterans Brain Injury Center, 2010; Kay et al., 1993).

The health consequences of TBI are numerous and often vary by severity of TBI. After a thorough review of outcomes research, both civilian and military, the Institute of Medicine [IOM] (2008b) found that moderate and severe TBI is associated with unprovoked seizures, cognitive impairment, depression, aggressive behavior, unemployment, and social isolation (IOM, 2008b). These conclusions were consistent with the generally held observation that

many of the long-term effects of TBI arise from damage to the frontal lobes of the brain and subsequent problems with self-regulation (Bigler, 2007). Damage to the frontal areas of the brain have been called the “fingerprint” of TBI and occur frequently due to the mechanism of brain damage that result from mechanical forces (Lux, 2007). Further, the IOM report also found that premature death, later life decline in cognitive function, progressive dementia, Parkinsonism and endocrine dysfunction, particularly hypopituitarism, are associated with moderate to severe TBI. These findings suggested that TBI is both an acute event and a chronic health condition that has a long-term, deleterious effect on overall health for some individuals.

Mild TBI also has long-term consequences for some. A Centers for Disease Control and Prevention expert panel on mild TBI reported that the term “mild TBI” does not imply an inconsequential injury because some mild TBIs result in ongoing residual consequences (NCIPC, 2003). The IOM report (2008b) found that depression, aggressive behaviors, and post-concussive symptoms are associated with mild as well as more severe TBIs. Post-concussive symptoms, or post-concussive syndrome, has been a source of controversy, including recently with regard to combat-acquired TBI (see below). While the vast majority of those who experience a mild TBI undergo a restorative process in the brain during the first months after injury, a minority experience ongoing residual effects (Corrigan, Selassie, & Orman, 2010). Risk factors for experiencing these post-concussive symptoms include prior TBI, prior emotional or developmental conditions, co-occurring psychological trauma, and the opportunity for financial compensation or other benefit from maintaining the symptoms (Mittenberg & Strauman, 2000). More research is needed with population-based studies to determine what proportion of those with mild TBI experience ongoing symptoms post-injury (Corrigan, et al., 2010).

Combat-Acquired TBI

Sophisticated wartime medical treatment, improved body armor, and advances in war zone evacuation, have contributed to an increase in the ratio of wounded to killed service members in OEF/OIF compared to previous military operations (IOM, 2008b). Consequently, there has been an increase in the ratio of those surviving combat injuries, often with co-occurring physical and psychological conditions. During these wars, most injuries, and particularly TBIs, have been caused by blasts from improvised explosive devices, or IEDs (Friedemann-Sanchez, Sayer, & Pickett, 2008). Due to the high proportion of blast-related injuries (Okie, 2006), TBI has become known as one of the signature injuries of the OEF/OIF conflicts (Institute of Medicine, 2008b). Service members with blast-induced TBI may experience multiple symptoms from their injuries, both physical and psychological (Friedemann-Sanchez, et al., 2008).

Service members with this “polytrauma” often also experience disabling pain due to multiple injuries incurred in the same event, which complicates physical rehabilitation and psychological recovery (Clark, Scholten, Walker, & Girona, 2009). Combat-related TBIs are often accompanied by other physical and emotional trauma (French, Spector, Stiers, & Kane, 2010), which distinguishes this type of TBI from sports-related mild TBI in athletes.

In common with civilian injuries, TBI screening in the military is difficult because: 1) mild TBI symptoms may not be easily apparent and manifest in cognitive and behavioral functioning, and 2) those who experience a blow or jolt to the head often do not associate symptoms that they experience with a TBI (Gordon et al., 1998). Additionally, military, non-penetrating TBIs may go undiagnosed due to a focus on immediate ‘visible’ injuries that have occurred in combat (Belanger, Uomoto, & Vanderploeg, 2009).

It remains unclear if service members who sustain a blast-related TBI in combat experience the same nature and severity of TBI as civilians with non-combat related TBI (Maas et al., 2010). Recovery from combat-acquired mild TBI in the military is complicated by other factors: 1) the coincident emotional and physical trauma, 2) the potential for recurrent, unrecognized TBIs and its cumulative effect, and 3) the challenges in pursuing typical treatment recommendations while in the military theater, such as a rest period (Lew et al., 2008).

Epidemiology of Combat-Acquired TBI

While the true prevalence of combat-acquired TBIs among OEF/OIF service members and veterans is unknown (Jaffee, et al., 2009), rates of TBI are believed to be high among OEF/OIF service members. The Department of Defense's (DOD) Defense and Veterans Brain Injury Center (DVBIC) and the Armed Forces Health Surveillance Center (AFHSC) publish incidence data for TBIs, by TBI severity and service branch, that have been diagnosed in military health facilities (DOD, 2009). These figures are compiled using TBI diagnosis codes that appear in military electronic medical records. In 2009, there were 27,862 TBI diagnoses with the majority being mild (78.5%), followed by moderate (11% percent), not classifiable (8.2%), penetrating (1.5%), and severe (0.9%). During the early years of OEF/OIF, the TBI diagnosis rates were generally lower, ranging from 12,886 in 2003 to 16,873 in 2006. These TBI diagnosis frequencies were likely effected by changes in the number of personnel exposed to combat and diagnostic improvements, including increased awareness of TBI after 2007 by both service members and medical staff.

While mild TBI is most common, it also most likely goes undetected (IOM, 2010b). The RAND Corporation projected based on telephone survey data that as of October 2007, over 320,000 military personnel and veterans have experienced a TBI with the majority experiencing a mild TBI, representing over 20% of the 1.64 million service members who had been deployed to OEF/OIF at that time (Tanielian, et al., 2008). Other studies with convenience samples of returning OEF/OIF services members have provided similar estimates. A study of a returning Army Brigade Combat Team from Iraq found a similar estimate of over 22% having experienced at least one clinician-confirmed TBI (Terrio, et al., 2009). Similarly, a recent study of over 13,000 OEF/OIF veterans who were patients seeking treatment in the Veterans Health Administration (VA) found that 22% screened positive for a probable history of TBI while deployed (Carlson, et al., 2010).

These estimates that approximately 20% of service members have experienced a TBI are based on a self-reported exposure to an injury event, such as a blast, and experiencing an alteration in consciousness, which may include a loss of consciousness or being dazed after the event. This definition of TBI is consistent with the minimal criteria for mild TBI established by the American Congress of Rehabilitation Medicine (Kay, et al., 1993) and the Centers for Disease Control and Prevention (NCIP, 2003). This minimal definition of self-reported mild TBI by service members does not require a clinical diagnosis, and therefore likely captures more cases of service members who actually experience a TBI. Alternatively, it is possible that this definition classifies some individuals as having experienced a TBI who actually did not.

TBI and Co-Occurring Psychological Health Conditions

Service members who have experienced a TBI may experience ongoing somatic symptoms, including those manifesting a psychological or behavioral component. Headaches (81.3%) and dizziness (59.3%) are the most common somatic symptoms immediately following a TBI injury, while memory problems (52.3%) and irritability (48.6%) are the most common post-deployment (Terrio, et al., 2009). The large majority (77%) of OEF/OIF veterans in a

VA study who screened positive for a self-reported TBI, reported somatic symptoms in the past week (Carlson, et al., 2010). It is possible, however, that these somatic symptoms may be associated with other combat-related conditions and not necessarily attributable to the TBI event (Hoge, 2009). Further, another study of OEF/OIF Army personnel found that soldiers who experienced a mild TBI were no more likely than those without a mild TBI to experience long-term cognitive impairment (Ivins, Kane, & Schwab, 2009).

Service members deployed in OEF/OIF may have experienced both physical and psychological trauma that can result in co-occurring conditions (IOM, 2010b; Lew et al., 2009). Mild TBI and posttraumatic stress disorder (PTSD) have many symptoms in common, including depression/anxiety, insomnia, irritability/anger, trouble concentrating, fatigue, hyperarousal, and avoidance (Brady et al., 2009; Bryant, 2008; Stein & McAllister, 2009). Similarities in manifestation of some of these symptoms complicate the assessment and treatment for both TBI and PTSD (Brady, et al., 2009; Brenner, Vanderploeg, & Terrio, 2009; French, 2009; Pogoda, Vanderploeg, Cifu, Tun, & Lew, 2009; Stein & McAllister, 2009). Indeed, one study of over 2,500 Army soldiers found that the relationship between mild TBI and physical health problems were mediated by PTSD and depression (Hoge et al., 2008); a second study of over 2,200 OEF/OIF veterans reported that the presence of combat-acquired mild TBI doubled the risk for meeting criteria for PTSD (Schneiderman, Braver, & Kang, 2008). This latter study observed that the strongest risk factor associated with persistent post-concussive symptoms, or mild TBI, was PTSD (Schneiderman, et al., 2008). Further, clinicians confirmed that OEF/OIF veterans with co-occurring mild TBI and PTSD often have other comorbid conditions including pain and sleep disturbance (Lew, et al., 2008; Sayer et al., 2009). The DOD Task Force on Mental Health (2007) argued that since some of the symptoms of TBI and PTSD overlap, it may be more important to diagnose co-occurring diagnoses of TBI and PTSD rather than differential diagnoses.

EPIDEMIOLOGY OF TBI AND DRINKING

Based on research on drinking patterns after a TBI in civilian populations, heavy alcohol use may be problematic post-injury. However, few studies on alcohol use post-TBI have been conducted to date with military populations.

Alcohol as a Risk Factor

Not surprisingly, pre-injury heavy alcohol use is predictive of heavy alcohol use after a TBI (Bombardier, Temkin, Machamer, & Dikmen, 2003; Horner et al., 2005). In other words, drinking behaviors continue post-TBI. On the other hand, some civilians do reduce drinking after a TBI, and those who continue to drink are more likely to be those who are moderate or heavy alcohol users (Bombardier, Rimmele, & Zintel, 2002; Kolakowsky-Hayner et al., 2002). One study of patients with TBI referred to a substance abuse treatment program found that approximately 20% of those who were light drinkers or abstinent prior to their TBI, reported high-volume drinking post-injury, implying some individuals develop problematic drinking behaviors post-TBI (Corrigan, Rust, & Lambhart, 1995).

Graham and Cardon (2008) suggested that impairments in cognitive function and decision-making linked to mild TBI may increase risk for chronic alcohol or drug abuse. They reported that, "Less severe TBI may permit an insidious discounting of the implications of substance use and the association of dangerous behaviors" (Graham & Cardon, 2008, p. 159). Further, neurological deficits associated with TBI, such as injury to the frontal lobe of the brain which controls social behavior functions such as regulating emotions and goal planning, may contribute to an increased risk for alcohol or drug use disorders and PTSD (Corrigan & Cole, 2008).

The Institute of Medicine (2008b) reported that civilian studies show limited but suggestive evidence of an association between TBI and a decrease in alcohol use one to three years post-TBI; however, experiencing a TBI may be associated with an increase in alcohol use for some individuals (Corrigan & Cole, 2008). One Australian study found that among those hospitalized with TBI, hazardous drinking levels decreased on average in the first year post-TBI, but by two years post-injury over one-fourth of those with a TBI resumed drinking at hazardous levels (Ponsford, Whelan-Goodinson, & Bahar-Fuchs, 2007). Those who were young, male, and heavy drinkers prior to the injury were most at risk for hazardous drinking post-TBI (2007).

Consequences of Alcohol Use Post-TBI

More research is needed on the consequences of alcohol use and abuse post-TBI. Even if only a small proportion of TBI patients drink alcohol at harmful levels, there may be important implications. One hypothesis is that resuming or initiating alcohol misuse or abuse following a TBI will lead to a poorer trajectory of rehabilitation post-injury (Corrigan, 1995). It is unclear if alcohol abuse post-TBI is a consequence of TBI or comorbidity, which is more clinically challenging. The consequences of drinking post-TBI (Corrigan, et al., 1995) include a potential disruption in spontaneous healing (Jensen & Pakkenberg, 1993), increased risk of repeat injuries (Wong, Dornan, Schentag, Ip, & Keating, 1993) or seizures (Verma, Policheria, & Buber, 1992), and increased cognitive, motor, emotional, or behavioral impairments (Dunlop et al., 1991). Among those in treatment for alcohol or drug abuse, those with a history of TBI had greater comorbid psychiatric disorders (Walker, Cole, Logan, & Corrigan, 2007), implying more clinical challenges. Several studies have observed that TBI and alcohol misuse interact to increase the potential for suicide beyond the risk of either condition alone (Mainio et al., 2007; Simpson & Tate, 2007; Teasdale & Engberg, 2001) including among veteran populations (Brenner, Ignacio, & Blow, 2011). The source of this added risk has not been studied, but hypotheses would include the contribution of each to impulsivity, depression, or impairment of sensory or motor functions. Some speculate that a TBI may lead to a reduced alcohol tolerance, thus individuals who do not reduce or abstain from drinking may be exposed to greater alcohol-related consequences (The Management of Concussion/mTBI Working Group, 2009).

Preliminary Military Studies

The relationship between TBI and alcohol use among military personnel has been examined in only a few studies. One study examined the medical records of 3,123 service members who had deployed to OEF/OIF and were treated for blast-induced injuries from 2004 to 2007 (Heltemes, et al., 2011). While blast-injury patients who had a diagnosis of mild TBI had a slightly higher rate of diagnosed alcohol use disorders (6%) compared to patients with injuries other than TBI (4.9%), the difference in rates was confounded with other characteristics and not statistically significant in multivariate analyses. A second study used VA administrative health records and found that OEF/OIF veterans with positive TBI screens were two times more likely to have alcohol or drug related diagnoses compared to other OEF/OIF veterans (Carlson, et al., 2010). This study was limited by a lack of pre-injury alcohol or drug use behaviors and diagnoses. A third study of over 4,000 United Kingdom military personnel returning from OEF/OIF found that service members who experienced a mild TBI were 2.3 times more likely to report alcohol misuse, compared to those who did not experience a mild TBI (Rona, et al., 2011, in press). Interestingly, this study also found that alcohol misuse was associated with later reporting of mild TBI. While alcohol and drug intoxication is one of the dominant risk factors for events and injuries leading to a TBI among civilians (Corrigan, 1995; Hibbard, Uysal, Kepler, Bogdany, & Silver, 1998; Kreutzer, Doherty, Harris, & Zasler, 1990; Taylor, Kreutzer, Demm, & Meade, 2003), military personnel are prohibited from drinking while deployed, thus alcohol use is

not believed to be a risk factor for combat-acquired TBI. In sum, while in civilian studies it is clear that alcohol misuse increases the opportunity for risk-taking behavior that exposes individuals to a TBI, more research is needed on the consequences of heavy alcohol use and abuse post-injury in both civilian and military populations.

ALCOHOL USE PROBLEMS AMONG SERVICE MEMBERS

Our gap in knowledge regarding the relationship between combat-acquired TBI and post-deployment drinking behavior and consequences is important because of the long-standing history of the pervasiveness of excessive drinking in the military. A few years after the launch of OEF/OIF, differences between military personnel and their civilian counterparts in binge drinking in the past 30 days (five or more drinks on one occasion for men, four or more drinks for women), were largest among 21 to 25 year olds (60% vs. 46%) and 17 to 20 year olds (44% to 33%) (NIAAA, 2005; Stahre, Brewer, Fonseca, & Naimi, 2009; CSAT, 2009). Further, heavy drinking in the past 30 days (binge drinking at least once per week), was significantly more common among service members aged 18 to 25 than civilians of the same age (26% vs. 16%) (Bray et al., 2009). Current heavy drinking rates in the military are similar to those of almost three decades ago, suggesting that Department of Defense efforts to limit unhealthy drinking have been generally unsuccessful (Bray, et al., 2009). Currently, a third of service members meet screening criteria for hazardous drinking or greater based on the Alcohol Use Disorders Identification Test (AUDIT) (Fiellin, Reid, & O'Connor, 2000), including 5% who meet screening criteria for possible alcohol dependence (Bray, et al., 2009).

Alcohol Problems and Deployment

Given that alcohol use problems are most prevalent among the youngest service members, drinking is high among those with high deployment rates. Enlisted service members, often younger than others, are more likely to be in the age groups that report binge and heavy drinking than officers (Bray & Hourani, 2007; Brown, Bray, & Hartzell, 2010; Office of the Deputy Under Secretary of Defense, 2007; Ong & Joseph, 2008). Further, enlisted service members in the lowest pay-grades (E1–E3) are the youngest and 30 times more likely to report heavy alcohol use than officers at the highest pay-grades (Bray & Hourani, 2007).

Among both active duty service members and veterans, deployment has been associated with unhealthy drinking (Bray, et al., 2009; Federman, Bray, & Kroutil, 2000; Ferrier-Auerbach, et al., 2009; Hoge et al., 2004; IOM, 2008a, 2010a; Jacobson, et al., 2008; Spera, Thomas, Barlas, Szoc, & Cambridge, 2010; Wilk, et al., 2010). A recent survey of over 28,000 active duty personnel found that among all service branches in 2008, heavy alcohol use in the past 30 days was significantly higher among those who had been deployed to a combat zone since September 11th, 2001, compared to those who had not been combat deployed since 9/11/01 (21% vs. 18%) (Bray, et al., 2009). These findings may have been confounded because they were not adjusted for demographic characteristics, such as age. A study of three Army units and one Marine Corps unit deployed to Iraq and Afghanistan in the early years of the combat operations found that alcohol misuse was significantly higher among military personnel post-deployment compared to prior to deployment (Hoge, et al., 2004). Also, an anonymous survey of over 56,000 active duty Air Force members in 2008 found that a higher frequency of deployments and greater overall length of time deployed were associated with an increased risk of problem drinking, according to AUDIT criteria (Spera, et al., 2010).

Combat exposure, which consists of combat experiences such as viewing dead bodies, exposure to incoming fire or explosive devices, or firing on the enemy, has also been associated with unhealthy drinking (Bray, et al., 2009; Castro, Bienvenu, Hufmann, &

Adler, 2000; Hoge, et al., 2004). Among active duty service members aged 25 or younger, those deployed with combat exposure were 6.7 times more likely to experience new onset binge drinking and 4.7 times more likely to have new onset drinking problems, compared to those 45 years or older (Jacobson, et al., 2008). Among all service branches in 2008, unadjusted rates of heavy alcohol use were significantly higher among service members with high self-reported combat exposure, compared to those with low combat exposure (27% vs. 17%) (Bray, et al., 2009).

Binge drinking among service members has been associated with higher rates of alcohol-related problems, such as alcohol-impaired driving and criminal justice problems (Ames & Cunradi, 2004; Ong & Joseph, 2008; Stahre, et al., 2009). In 2008, almost one third (32%) of service members who were heavy drinkers reported alcohol-related productivity loss, such as missing work or being hurt on the job because of drinking (Bray, et al., 2009). Similarly, service members who report binge drinking have higher rates of job-performance problems, thus inhibiting the DOD's goal of ensuring the force readiness of its military personnel (Ames & Cunradi, 2004; Ong & Joseph, 2008; Stahre, et al., 2009; The TRICARE Management Activity, 2009). Further, alcohol use disorders are a risk factor for suicide among service members (Department of Defense Task Force on Mental Health, 2007), and unhealthy drinking among service members has been associated with spousal abuse and sexual assault (Bell, Harford, McCarroll, & Senier, 2004; Department of Defense Task Force on Mental Health, 2007).

TREATMENT IMPLICATIONS FOR MILD TBI

More research is warranted in both civilian and military fields for appropriate treatment methods for those with mild TBI. In the civilian sector, a systematic review of treatments for those with mild TBI found that interventions such as simple patient education and support improved patients' somatic and psychological symptoms (Comper, Bisschop, Carnide, & Tricco, 2005). Another systematic review concluded that it was useful to identify subgroups of those most at risk for worse outcomes and develop targeted interventions for them, rather than implement broad-based interventions to everyone with a mild TBI (Snell, Surgenor, Hay-Smith, & Siegert, 2009). Further, a randomized study of individuals with mild TBI found that targeting individuals with pre-injury psychiatric conditions was more effective and cost-efficient than routine treatment of everyone with mild TBI (Ghaffar, McCullagh, Ouchterlony, & Feinstein, 2006).

The 2009 *VA/DoD Clinical Practice Guidelines for Management of Concussion/Mild Traumatic Brain Injury*, prepared by an interagency group of experts, details the current guidelines for early intervention and symptom management for combat-acquired mild TBI (Department of Veterans Affairs and Department of Defense, 2009). The guidelines for early intervention include providing: 1) early education (e.g., information about mild TBI, strategies and self-monitoring skills for prevention symptoms, and normalizing symptoms) for service members and their families to prevent, or reduce, the development of ongoing symptoms, and 2) utilizing a primary care model and interdisciplinary team for appropriate management of mild TBI (2009). Table 1 details the six key guidelines for symptom management (2009). Experts believe that treatment models for OEF/OIF combat-injured service members, including those who suffer from TBI, should include attention to pain and psychiatric symptoms (Sayer et al., 2008).

More recently, the Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury (DCoE) released the "Case Management for Concussion/Mild TBI Guidance Document," which provides guidance for military case management of service members who are experiencing ongoing symptoms related to a mild TBI (Defense Centers of

Excellence for Psychological Health and TBI, 2010). The document provides case managers with the following information: an overview of mild TBI, guidelines for critical case management interventions, staffing requirements, training opportunities, case management interventions related to treatment, as well as useful resources for TBI case managers. Table 2 lists the guidelines for critical case management interventions for service members with mild TBI.

In June 2010, the DOD issued “Policy Guidance for Management of Concussion/Mild TBI in the Deployed Setting,” a Directive Type Memorandum (09–033) to improve the diagnosis and treatment of TBI while in deployed settings, also known as in theater (Deployment Health Clinical Center, 2011). The new directive is significant because it reflects a shift from self-initiated symptom reporting to an “event-based screening” mandatory protocol to screen any service member involved in a potentially concussive event (Helmick, 2011a). Therefore, military personnel do not need to come forward to self-report that they have experienced a concussion or TBI. The directive also includes a mandatory medical evaluation, standardized educational tests, rest, abstaining from exertion until medically cleared, and new attention to those who have experienced three or more concussions in the past year (Helmick, 2011b). The directive reflects a ‘cultural change’ of early identification and treatment of mild TBI close to the injury event, with the expectation of recovery (Helmick, 2011a).

Appropriate Treatment for Co-Occurring TBI and Alcohol Use Disorders

There has been little research regarding appropriate treatment models for co-occurring TBI and alcohol use disorders, and these conditions might require the development of new treatment models with integrated components (Corrigan & Cole, 2008; Graham & Cardon, 2008). Research should address which treatment models are most efficacious. For instance, we do not know if integrated treatment for substance use disorders and TBI is better (Lew, et al., 2008), or if individualized staging of treatment is preferred (Corrigan & Cole, 2008). Others have suggested important treatment components, such as a combination of group treatment and community case management (Delmonico, Hanley-Peterson, & Englander, 1998).

In the Military Health System and VA, facilities often develop unique treatment protocols based on their specific areas of expertise, which consequently leads to separate treatment systems between psychological health needs and cognitive rehabilitation needs associated with TBI (Lew, et al., 2008). Therefore, service members with co-occurring needs are likely required to deal with two distinct treatment systems when they are most likely to require more coordinated, interdisciplinary care (French & Parkinson, 2008). In civilian, military, or VA healthcare delivery systems where TBI and alcohol misuse have been addressed by different specialties, an “integrated” approach to treatment may require a different way of providing services for co-occurring conditions. Integrated treatment is not sequential (address one first and then the other) or just simultaneous with communication between providers. Integrated treatment allows close enough collaboration that the approach used for each condition benefits by adapting to take advantage of the other. The DCoE recently released the *Co-occurring Conditions Toolkit: Mild Traumatic Brain Injury and Psychological Health for Concussion, Posttraumatic Stress, Depression, Chronic Pain, Headache, Substance Use Disorder* (DCoE, 2011a). This toolkit combines DOD and VA clinical guidelines to assist primary care providers to assess and treat service members with co-occurring mild TBI and other psychological health conditions, including the use of medication therapy for alcohol dependence (DCoE and TBI, 2011b).

FUTURE DIRECTIONS AND RELEVANCE TO SOCIAL WORK

Alcohol use and alcohol-related problems inflict great financial costs on the DOD and its Military Health System. In recent years, alcohol dependence has been one of the top mental health diagnoses among active duty military personnel who have been hospitalized (AFHSC, 2010b), and there has been a 72% increase in substance abuse related hospitalizations since 2006 which has cost implications for the DOD (AFHSC, 2010a). Social workers and other clinicians working with service members need to understand how specific combat-related injuries and conditions, including TBI, may make service members more vulnerable to unhealthy drinking and its consequences.

Practice Implications

If social workers or clinicians are working with military personnel for problems associated with TBI upon return from deployment, it is essential to also assess their alcohol use with validated screening instruments (e.g., the AUDIT) to assess both quantity and consequences of drinking, and to provide those exhibiting problematic drinking behaviors with targeted educational information and tools to reduce consumption and appropriate referral to treatment (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). Drinking levels and problems should be assessed frequently, because drinking patterns may change post-TBI or post-deployment. Similarly, if clinicians are working with service members for alcohol or drug use problems, it is essential to know their lifetime history of TBI. Lifetime history of TBI should include assessing possible TBIs from deployments, other military service, and prior lifetime exposure. Multiple TBIs, even if mild, one or more moderate or severe TBI, or early childhood TBIs (even if mild) may all predispose an individual to having greater problems due to excessive drinking (McKinlay, Grace, Horwood, Fergusson, & MacFarlane, 2009).

When TBI and excessive drinking co-exist, the service member or veteran may have greater problems (a) understanding the need to change drinking behavior, (b) identifying and anticipating triggers, (c) establishing alternate, healthy coping strategies and (d) sustaining motivation for change. In general, the treating social worker may need to think about environmental influences — both positive (e.g., incorporation of supportive family and friends in treatment or engagement in alcohol free activities) and negative (e.g., changing living situations or social circles where alcohol is used excessively). Social workers should not expect insight and internal motivation alone to sustain behavior change. Also social workers should consider longer-term treatment and/or support — a person with co-existing TBI and excessive drinking may require more time for a new behavior to become so integrated into their identity that the risk of relapse diminishes significantly. Related to this longer-term vulnerability, social workers should both anticipate and inoculate the service member for increased risk of relapse if life stressors increase.

Future Research

More research is needed to examine how combat-acquired TBI relates to service members' post-deployment drinking behaviors. Studies should assess several measures of drinking behaviors, both level and frequency, as well as potential alcohol use diagnoses, to detect potential problem drinking behaviors prior to a clinical diagnosis of alcohol abuse or dependence. Further, studies should assess if those who have experienced a TBI may be more vulnerable to other negative consequences of drinking, such as social and family problems, job-performance problems, or criminal justice problems. The effects of routine alcohol screening, education, and brief interventions with TBI populations should be tested in clinical trials to determine if these methods reduce negative alcohol outcomes with this population.

More longitudinal studies are needed to be able to assess lifetime history of TBI and psychological health, including drinking behaviors and problems, allowing us to understand the prevalence of TBI and its contribution to alcohol use behaviors and alcohol use diagnoses. Additionally, more studies are needed with population-based assessments of the military population, rather than convenience samples. As part of the 2009 Interagency Collaboration on Psychological Health and TBI (Thurmond et al., 2010), the Working Group on Demographics and Clinical Assessment recommended the development of survey instruments to gather relevant epidemiologic and environmental factors that may mediate sensitivity and resilience to TBI events among service members (Maas, et al., 2010).

Policy Implications

While more research is needed to determine the extent of the association between combat-acquired TBI and post-deployment drinking behaviors, the DOD could consider implementing routine alcohol screening, brief intervention, and referral for treatment among service members who have been exposed to a blast or may have experienced a TBI while deployed (Fleming, Barry, Manwell, Johnson, & London, 1997). If a screening for TBI indicates that a TBI event occurred, this could trigger an automatic educational intervention about the risks of excessive drinking and alcohol abuse, suggesting that any service member who has experienced a TBI needs to rethink his/her relationship with alcohol. These brief interventions could be implemented when population wide screenings for TBI are done post-deployment and upon entering the VA. Therefore, social workers and other clinicians working with service members both in theater and in post-deployment settings, as well as within military and civilian treatment settings, would need targeted education to be able to assess and identify those with a history of TBI. If experiencing a TBI makes service members more vulnerable to engage in problem drinking or dangerous behaviors, thus making them more likely to be exposed to dismissal from the military, the DOD should incorporate treatment alternatives that address co-occurring TBI and excessive drinking into military discipline procedures. The DOD and VA should provide integrated treatment for co-occurring TBI and substance abuse in military treatment facilities and VA clinics.

Similar to other chronic illnesses, early identification and proper treatment for alcohol abuse is essential (McLellan, Lewis, O'Brien, & Kleber, 2000). While the *VA/DOD Clinical Practice Guidelines for Management of Substance Use Disorders (SUD)* (2009) recommends screening, brief intervention, and referral to treatment for alcohol misuse, it is not being done systematically, particularly within the MHS. The SUD guidelines should mention high-risk groups, such as those with TBI, and give explicit guidance about providing ongoing screening and brief interventions for these individuals. A positive history of TBI should lead clinicians in primary care and specialty care settings to have a heightened awareness of alcohol use with this population because these service members may be a high-risk group for negative drinking outcomes. Even if screening and brief intervention for excessive drinking and alcohol use problems is not done on a system level for all service members, it should be considered for the population of service members who have experienced a TBI.

Despite the fact that alcohol abuse or dependence may be high in the military population, referral to alcohol treatment services is extremely low (Department of Defense Task Force on Mental Health, 2007; Milliken, Auchterlonie, & Hoge, 2007). This may be in part a result of the DOD's policy directive that mandates the automatic involvement of a military service member's commander when alcohol treatment is accessed. Engaging in alcohol treatment may have negative career repercussions or possibly result in dishonorable discharge from the military (Department of Defense Task Force on Mental Health, 2007; Institute of Medicine, 2010b; Milliken, et al., 2007; DOD, 1985). The lack of confidentiality and potential career repercussions may deter service members from seeking alcohol use

treatment (Department of Defense Task Force on Mental Health, 2007; Institute of Medicine, 2010b). Currently, the DOD is implementing the Confidential Alcohol Treatment and Education Project (CATEP) pilot program at three sites to assess the potential impact of providing confidential access to alcohol use treatment without involvement from commanders and fear of job repercussions (Pueschel, 2010).

CONCLUSION

While more research is needed to understand the relationship between combat-acquired TBI and post-deployment drinking behaviors, current research suggests that ongoing or increased heavy drinking after a TBI may impede rehabilitation and make service members more vulnerable to negative consequences of drinking. Social workers working in theater, or within military and civilian health care settings, have a unique opportunity to provide assessment, education, and clinical interventions to military personnel to address unhealthy drinking and its consequences, helping to reduce the negative impacts to our military personnel and the Department of Defense.

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Table 1**Clinical Practice Guidelines for Symptom Management of Mild TBI**

Symptom Management Guidelines
1. Base treatment of somatic symptoms (e.g., sleep, nausea, dizziness, fatigue, etc.) on the evaluation of individual factors and symptom presentation (rather than known or suspected etiology)
2. Manage headaches, the most common symptom associated with mild TBI, similar to headaches from other causes
3. Avoid the use of medications for treatment of cognitive effects
4. Carefully prescribe and monitor medications to treat comorbid conditions (e.g., headaches, pain, and depression) to avoid sedating properties
5. Include both behavioral and pharmacological treatments in the management of psychiatric symptoms
6. Assess other behavioral health factors, psychosocial support, and compensation/litigation issues for those with persistent post-concussive symptoms

Source: Department of Veterans Affairs and Department of Defense (2009). VA/DoD Clinical Practice Guidelines for Management of Concussion/Mild Traumatic Brain Injury – Version 1.

Table 2**Critical Case Management Interventions for Service Members with Mild TBI**

Critical Case Management Interventions
1. Provide early education regarding the course and recovery of mild TBI to the service member, family members, and military leadership to manage expectations and prevent the development or ongoing symptoms
2. Select an appropriate 'battle buddy' to assist the service member with memory problems
3. Provide written instructions and place follow-up calls to help the service member with short term memory problems
4. Assess for co-morbid conditions such as posttraumatic stress disorder and substance abuse symptoms at the initial and all ongoing visits
5. Encourage service members to utilize care and de-emphasize stigma
6. Communicate with the service member's chain of command

Source: Defense Centers of Excellence for Psychological Health and TBI. (2010) Case Management of Concussion/Mild TBI.