

Annotated Bibliography - Suicide and Traumatic Brain Injury (TBI)

Resources are organized under the following headings:

- Suicidal Behavior & Ideation in Those with TBI
- Risk Factors, Suicidal Thoughts & Behavior, and TBI
- Psychiatric Hospitalization in Veterans with TBI
- Screening and Assessment of Suicide Risk in Those with TBI
- Depression and TBI
- Other TBI Articles of Interest

Within each heading articles are arranged in alphabetical order.

Suicidal Behavior & Ideation in Those with TBI

Brenner LA, Ignacio RV, Blow FC. (2011). Suicide and traumatic brain injury among individuals seeking Veterans Health Administration services. *Journal of Head Trauma Rehabilitation, 26(4): 257 – 264.*

Medical records of all Veterans Health Administration users (from 2001 – 2006) were examined for TBI diagnosis, psychiatric diagnosis, and vital statistics including death records. Researchers found that those individuals diagnosed with TBI were 1.55 times more likely to have died by suicide than non-TBI counterparts. Analysis also indicated that TBI presence seems to exert an independent influence, not explained by psychiatric (or demographic) factors. Findings from this study suggest that all veterans should be evaluated for TBI, as well as possible needed reevaluation and/or changes to current screening methods.

Harrison-Felix, C.L., Whiteneck, G.G., Jha, A., DeVivo, M.J., Hammond, F.M., Hart, D.M. (2009). Mortality over four decades after traumatic brain injury rehabilitation: a retrospective cohort study. *Archives of Physical Medicine and Rehabilitation, 90(9), 1506 – 1513.*

This retrospective cohort study highlights issues of life expectancy, risk factors for death, and actual causes of death within a TBI population. Records from 1,678 TBI individuals admitted to the rehabilitative Craig Hospital (Englewood, CO), including the Social Security Death Index as well as death certificates, discovered that TBI individuals displayed elevated risk for death. One hundred thirty actual deaths, as opposed to an

expected 85.83 absent TBI produced an SMR of 1.51, with TBI individuals one and a half times more likely to die than those of similar status in the general population. Also, of this group, 18% expired due to external causes of injury, half from unintentional injury and the other half suicide. The study supplies important clues on specific risk factors clinicians will want to follow-up with individual TBI patients.

Silver, J. M., Kramer, R., Greenwald, S., et al. (2001). The association between head injuries and psychiatric disorders: Findings from the New Haven NIMH Epidemiological Catchment Area Study. *Brain Injury, 15*, 935–945.

This study examined lifetime prevalence of psychiatric disorders and suicide attempts in individuals with and without a history of traumatic brain injury. Results showed a higher prevalence of psychiatric diagnoses, except bipolar disorder and schizophrenia, in those with a history of brain injury compared to those with no history of a brain injury after adjusting for age, sex, race, socio-economic status, and quality of life. In addition, those with a TBI were significantly more likely to have had a lifetime history of a suicide attempt. This risk remained significant after adjusting for demographics, quality of life variables, and alcohol abuse, and also after controlling for the presence of psychiatric co-morbidity.

Teasdale, T.W., & Engberg, A.W. (2001). Suicide after traumatic brain injury: A population study. *Journal of Neurology, Neurosurgery, and Psychiatry, 71*, 436-440.

In this archival study, the authors examined the prevalence of suicide that occurred among all patients diagnosed with TBIs in Denmark over a 15-year span, consisting of over 145,000 persons. Statistical analyses revealed that those with traumatic brain injuries had anywhere from 2.7 to 4.1 times a higher rate of completed suicide than did the general population, largely depending on the type of TBI incurred. Teasdale and Engberg importantly concluded that “awareness of a suicide risk should be present in the assessment of any traumatic brain injury” (p. 440).

Tsaousides, T., Cantor, J.B., Gordon, W.A. (2011). Suicidal ideation following traumatic brain injury: prevalence rates and correlates in adults living in the community. *Journal of Head Trauma Rehabilitation, 26(4)*, 265- 275.

The research findings presented in this article seek to augment limited information regarding prevalence rates and risk factors for suicidal ideation (as opposed to suicide attempts or completed suicides) in a TBI population. Based upon data from a cohort study at an urban medical center, researchers found SI at a rate of 28.3% in participants. Demographic characteristics such as age, gender, race, income, etc, were not significantly related to SI, nor was most pre-morbid psychiatric conditions (other than alcohol and/or substance abuse). Post-injury, a diagnosis of depression or anxiety placed TBI individuals at greater risk for SI, while the strongest relationship was expressed through psychosocial functioning, such as lack of social support or appropriate professional medical/psychiatric treatment. These findings supply key information highlighting areas of needed further research, as well as clues regarding the development of future, effective intervention.

Risk Factors, Suicidal Thoughts & Behaviors, and TBI

Brenner, L.A., Carlson, N.E., Harrison-Felix, C., Ashman, T., Hammond, F.M., & Hirschberg, R.E. (2009). Self-inflicted traumatic brain injury: Characteristics and outcomes. *Brain Injury, 23 (13 – 14)*, 991 – 998.

This retrospective study compared persons who sustained TBIs from suicide attempts to persons who sustained TBIs through unintentional means. Findings suggest that those who sustained self-inflicted TBIs are more likely to (a) have had psychiatric and psychosocial difficulties pre-TBI, (b) cost more to treat, and (c) demonstrate a greater degree of disability upon discharge. The authors provide assessment and treatment strategies aimed at reducing suicide risk in this population.

Brenner, L.A., Homaifar, B.Y., Adler, L.E., Wolfman, J.H., & Kemp, J. (2009). Suicidality and veterans with a history of traumatic brain injury: Precipitating events, protective factors, and prevention strategies. *Rehabilitation Psychology, 54(4)*, 390 – 397.

Prior research has exposed both veterans and those with a history of TBI as two distinct groups to be at risk for increased suicidal behavior. In response, Brenner and colleagues gathered qualitative information from veterans with a history of TBI who had previously reported suicidality. Veterans identified numerous common precipitating events for suicidality, including feelings of loss due to role changes, difficulties in cognitive functioning, and emotional and psychiatric difficulties. Commonly mentioned preventative factors for suicide included mental health care, religion or spirituality, the recognition of social support, and having a sense of purpose and hope for the future. The veterans also provided many recommendations for how suicide prevention services could be enhanced for their specific population.

Mainio, A., Kyllönen, T., Viilo, K., Hakko, H., Särkioja, T., Räsänen, P. (2007). Traumatic brain injury, psychiatric disorders and suicide: a population-based study of suicide victims during the years 1988 – 2004 in Northern Finland. *Brain Injury*, 21(8), 851 – 855.

This study garnered data from all completed suicides (1877) in the Oulu province (Northern Finland) during the years 1988 – 2004. Using records from Finnish Hospital Discharge Registers, authors determined that 5.5% of suicides had TBI. The 103 with TBI also showed significant rate of pre-traumatic psychiatric history: 75% of those with lesions and 60% with concussions had pre-existing psychiatric disorders. Additionally, one-third of the lesion group were categorized with depression and were three times more likely to have an alcohol disorder, while one-fourth of the concussion group were depressed and two times more likely to have had alcohol disorders prior to injury.

Authors highlight these findings as evidence that prior co-morbid disorders may increase likelihood, and/or accelerate the suicidal process.

Oquendo, M. A., Friedman, J. H., Grunebaum, M. F., et al. (2004). Suicidal behavior and mild traumatic brain injury in major depression. *Journal of Nervous and Mental Disease*, 192, 430–434.

Authors investigated the relationship between mild TBI (mTBI) and other risk factors for suicidal behavior in a population of patients presenting with a major depressive episode.

Results showed that mTBI was associated with increased likelihood of suicidal behavior for males, but not for females. Findings also revealed that among mTBI patients, those with a history of suicidal behavior had higher aggression scores, greater hostility, and were more likely to have a history of substance abuse compared to mTBI patients without a history of suicidal behavior. Findings suggest that a diagnosis of depression alone may not be the best predictor of increased suicide risk in persons with mTBI, and encourage clinicians to also consider other risk factors, such as aggression (pre-morbid and post-TBI) and substance abuse when assessing suicide risk in patients with a history of mTBI.

Rodger, L.L., Wood, C.W., Lewis, R. (2010). Role of alexithymia in suicide ideation after traumatic brain injury. *Journal of the International Neuropsychological Society*, 16, 1108 – 1114.

Building upon previous studies (Simpson & Tate, 2002; Teasdale & Engberg, 2001), Wood et al. further inspects possibly increased rate of suicidal ideation (SI) among a TBI population, and especially the potential roles of alexithymia and depression (with sub-components of hopelessness and worthlessness). This study also found elevated frequency of SI in TBI patients (33% versus 1.4% of control group), and scores from the Toronto Alexithymia Scale (TAS-20), Beck Depression Inventory (BDI-II), and several BDI-II sub-scales detected significantly higher rates of both depression and alexithymia for the TBI group reporting SI. Greatest predictor for SI was feelings of worthlessness, with those reporting worthlessness 1.908 times more likely to also report SI.

Comparative analyses of studies on alexithymia and depression in non-TBI groups suggest that alexithymia may be an independently contributing factor, and one for clinicians to consider when evaluating TBI patients long-term ability to cope with the reality of their injury.

Simpson, G. & Tate, R. (2002). Suicidality after traumatic brain injury: Demographic, injury, and clinical correlates. *Psychological Medicine*, 32, 687–697.

This study examined the prevalence of hopelessness, suicide ideation and suicide attempts after TBI as well as pre-morbid and post-injury predictors of suicide ideation and suicide attempts in a sample of 172 outpatients with TBI. A substantial proportion of participants had clinically significant levels of hopelessness (35%) and suicidal ideation (23%), and 18% had made a suicide attempt post-injury. Compared to pre-injury vulnerabilities or injury variables, post-injury psychosocial factors, namely hopelessness and psychiatric disturbance, had far greater significance in predicting post-injury suicidal ideation and suicide attempts, respectively. Results suggest that assessment of post-injury adjustment to TBI, and close monitoring of hopelessness and suicidal ideation are important features of managing suicidality in patients who have sustained a TBI.

Simpson, G. & Tate, R. (2005). Clinical features of suicide attempts after traumatic brain injury. *Journal of Nervous & Mental Disease*, 193, 680– 685.

This article discusses the clinical features of suicide attempts made among individuals with a history of TBI. Results showed that individuals with a co-morbid psychiatric disorder and substance abuse post-injury were 21 times more likely to have made an attempt post-TBI compared with individuals with no such history. Approximately half of the patients with a post-injury suicide attempt made a repeat attempt, and 26% of those who made a repeat attempted did so within a year of their initial post-injury attempt.

Simpson, G., & Tate, R. (2007). Suicidality in people surviving a traumatic brain injury: Prevalence, risk factors, and implications for clinical management. *Brain Injury*, 21, 1335-1551.

This literature review details much of the recent research to date on suicidality among those with a history of TBI. Strong attention is paid toward the identification of specific risk factors for suicidal behaviors among this population. Such risk factors discussed include demographic and injury-related characteristics (e.g., initial injury severity), pre-morbid variables (e.g., prior mental health issues), post-injury neuropathology and neuropsychological impairments (e.g., patterns of lesion location), post-injury psychiatric

disorders (e.g., depression or substance abuse), and post-injury psychosocial functioning (e.g., degree of social isolation). Among other recommendations, the authors call for additional population-based studies to be done that could take into account the various regional and national disparities in suicide rates.

Wasserman, L., Shaw, T., Vu, M., Ko, C., Bollegala, D., & Bhalerao, S. (2008). Overview of traumatic brain injury and suicide. *Brain Injury, 22*, 811-819.

This comprehensive summary highlights much of the most current research on the connection between TBI and suicidality. Included as well are sections delineating many of the risk factors for this population, timing matters of suicide in relation to a TBI, guidelines for appropriate assessment of TBI patients, and useful intervention methods geared to reduce suicide risk. Given the complexity of understanding and working with this population, the authors encourage clinicians to undergo further training and education in this arena, particularly with regard to suicide assessment.

Yurgelun-Todd, D.A., Bueller, C.E., McGlade, E.C., Churchwell, J.C., Brenner, L.A., Lopez-Larson, M.P. (2011). Neuroimaging correlates of traumatic brain injury and suicidal behavior. *Journal of Head Trauma Rehabilitation, 26(4)*, 276 – 289.

Work here builds upon previous research in a non-TBI population, linking increased impulsivity to suicidal behaviors. Additional research has also found a relation between white matter (WM) abnormalities and higher levels of impulsivity. Utilizing diffusion tensor imaging (DTI) in addition to standard MRI, Yurgelun-Todd et al. explore possible neurobiological underpinnings to elevated suicide risk factors among veterans with TBI. This study's findings demonstrate reduced fractional anisotropy (FA) in TBI subjects, and indicate a correlation between these changes in integrity of WM connective structure to increased levels of both impulsivity and suicidal ideation. This study marks one of the first attempts to account for increased suicide risk among TBI veterans via a neurobiological mechanism.

Psychiatric Hospitalization in Veterans with TBI

Brenner, L.A., Harwood, J.E.F., Homaifar, B.Y., Cawthra, E., Waldman, J., & Adler, L.E. (2008). Psychiatric hospitalization and veterans with traumatic brain injury: A retrospective study. *Journal of Head Trauma Rehabilitation, 23*, 401-406.

The authors procured medical records of veteran TBI-sufferers in an effort to observe for risk factors leading to psychiatric hospitalizations among this group. Findings provided noteworthy lifetime rates for psychiatric symptoms (95%), problematic alcohol use (34%), and polysubstance use (30%). Results also indicated that those with lifetime histories of problematic polysubstance use were significantly more likely to be hospitalized for psychiatric reasons post-TBI as opposed to those without said use.

Gutierrez, P.M., Brenner, L.A., & Huggins, J.A. (2008). A preliminary investigation of suicidality in psychiatrically hospitalized veterans with traumatic brain injury. *Archives of Suicide Research, 12*, 336-343.

In this archival study, inpatient psychiatric records of 22 veterans with a history of traumatic brain injury were examined over a fifteen-year span. Over that timeframe, this group was hospitalized 114 times for psychiatric reasons alone. Active suicidal ideation during acute psychiatric admission occurred over 50% of the time. Over one-fourth also had engaged in some sort of non-lethal self-harming behavior. The authors encouraged both researchers and clinicians alike to make suicide prevention an increased focus when working with those with histories of TBI.

Screening and Assessment of Suicide Risk in Those with TBI

Brenner, L.A., Homaifar, B.Y. (2009). Deployment-acquired TBI and suicidality: risk and assessment. In L. Sher & A. Vilens (Eds.), *War and Suicide, 189 – 202*. New York: Nova Science Publishers, Inc.

A conceptual framework for understanding complex, inter-related factors associated with suicide risk assessment, military deployment and the increasingly common war-related injury traumatic brain injury is presented in this book chapter. Joiner's Interpersonal-Psychological Theory of Attempted and Completed Suicide explores key elements whose presence may suggest an elevated risk for suicide: burdensomeness, failed

belongingness, and habituation to pain. Utilized in conjunction with the International Classification of Functioning (ICF) assessing the extent of physical and cognitive injury, this dynamic model offers clinicians tools to approach and treat clients who may be at risk for suicide following a TBI.

Breshears, R.E., Brenner, L.A., Harwood, J.E.F., Gutierrez, P.M. (2010). Predicting suicidal behavior in veterans with traumatic brain injury: the utility of the Personality Assessment Inventory. *Journal of Personality Assessment*, 92(4), 349 – 355.

Authors explore use of the self-report Personality Assessment Inventory (PAI) –in particular the Suicide Ideation Index (SUI) and Suicide Potential Index (SPI) – to gauge psychopathology and suicidality among a TBI population. VA medical records were examined for 154 veterans who acquired a TBI from 1954 – 2005, and also received a PAI. The team found the PAI to be a valid predictive tool for suicide risk, with the most accurate predictor to be elevated SPI scores combined with a prior history of suicidal behavior (SB). Additionally, findings indicated that the cutoff point maximizing both sensitivity and specificity for a TBI population was an SPI greater than or equal to 15. Results help supply first steps in identifying effective personality measures, and useful information for clinicians treating TBI patients who may be at risk for SB.

Dennis, J.P., Ghahramanlou-Holloway, M., Cox, D.W., Brown, G.K. (2011). A guide for the assessment and treatment of suicidal patients with traumatic brain injuries. *Journal of Head Trauma Rehabilitation*, 26(4), 244 – 256.

Dennis et al highlight and focus on three key aspects for clinicians to consider in the assessment and treatment of suicidality for patients with TBI: utilization of a common suicide nomenclature (based on the VA and CDC Self-Directed Violence Classification System, or SDVCS); understanding of current suicide epidemiology; and knowledge regarding both risk and protective factors for suicide prevention. Authors provide concrete information and tools on assessment methods, including structured clinical interviews, self-report measures, etc, as well as a discussion on several evidence-informed interventions such as pharmacotherapy, psychotherapy and inpatient

psychiatric hospitalization. The article emphasizes a team approach that features frequent risk assessment for a TBI population that may be at continued risk over time as patients adjust to life post-TBI.

Depression and TBI

Bombardier, C.H., Fann, J.R., Temkin, N.R., Esselman, P.C., Barber, J., Dikmen, S.S. (2010). Rates of major depressive disorder and clinical outcomes following traumatic brain injury. *JAMA*, 303(19), 1938 – 1945.

Findings from this study underscore the importance of adequately screening for and treating incidences of Major Depressive Disorder (MDD) among a TBI population. From data gathered via depression and anxiety modules of the Patient Health Questionnaire (PHQ) as well as the European Quality of Life, 559 patients with complicated mild to severe TBI were found to be 7.9 times more likely to meet criteria for diagnosis of MDD following injury than the greater population (53.1%, and 41% with no prior history of depression). Also, MDD was found to independently predict a lower reported quality of life. This group received a low rate of treatment (particularly psychotherapy) for depression, demonstrating the need for greater access to services, clinician education, better screening tools, and further intervention studies.

Homaifar, B.Y., Brenner, L.A., Gutierrez, P.M., Harwood, J.E.F., Thompson, C., Filley, C.M., et al. (2009). Sensitivity and specificity of the Beck Depression Inventory-II (BDI-II) in individuals with traumatic brain injury (TBI). *Archives of Physical Medicine and Rehabilitation*, 90, 652-656.

Depression is noted to occur with high frequency among the ever-increasing number of those with a history of TBI. Given this reality, Homaifar and colleagues stress the need for more efficient and less time-intensive mental health diagnostic and screening methods to be used among this population. The authors found that the Beck Depression Inventory–II (BDI-II) to be an appropriately sensitive screening tool of depressive symptomatology for those with a history of TBI; however, they encouraged that clinicians

use a more comprehensive means of assessment when making such a diagnosis in this regard.

Hudak, A., Warner, M., de la Plaza, C.M., Moore, C., Harper, C., Diaz-Arrastia, R. (2011). Brain morphometry changes and depressive symptoms after traumatic brain injury. *Psychiatry Research: Neuroimaging*, 191, 160 – 165.

Atrophy of certain brain regions has been well-studied in relation to spontaneous depression. Hudak et al. seeks to add to the sparse available literature on brain pathophysiology associated with depressive symptoms following TBI. In a pilot study, authors found a significant link between symptoms (as measured by the Beck Depression Inventory II, BDI-II) and volumetric changes (FDR corrected to 0.05) in three brain regions: left rostral anterior cingulate, left and right anterior orbitofrontal. These preliminary findings seem to suggest an overlap in regions found associated with spontaneous depression, providing some support for the limbic-frontal model of depression, and offer direction for needed future studies.

Seel, R.T., Macciocchi, S., Kreutzer, J.S. (2010). Clinical considerations for the diagnosis of Major Depression after moderate to severe TBI. *Journal of Head Trauma Rehabilitation*, 25(2), 99 – 112.

A review of relevant literature and research highlights multiple complex issues when attempting to untangle the often overlapping symptoms found in both Major Depression (MD) and moderate or severe TBI. This article examines best practices for diagnosing MD using tools and information currently available, and makes recommendations on specific areas requiring further research to enhance future diagnostic and treatment improvements.

Silver JM, McAllister TW, Arciniegas DB. (2009). Depression and cognitive complaints following mild traumatic brain injury. *American Journal of Psychiatry*. 166(6):653-61.

Authors discuss pharmacological and behavioral approaches to treating neuropsychiatric symptoms, particularly depression and cognitive complaints following mTBI. They review the literature on pharmacological treatment of depressive symptoms post-TBI, which

currently provides the greatest support for sertraline or citalopram. The potential benefits and adverse effects of other SSRIs such as fluoxetine and paroxetine, and atypical antidepressants with this population are also discussed. In addition to pharmacotherapy, authors emphasize that psycho-education and other behavioral interventions to increase compensatory strategies may also reduce complications and facilitate recovery in those sustaining mTBI.

Other TBI Articles of Interest

Ciurlie, P., Formisano, R., Bivona, U., Cantagallo, A., Angelelli, P. (2011). Neuropsychiatric disorders in persons with severe traumatic brain injury: prevalence, phenomenology, and relationship with demographic, clinical and functional features. *Journal of Head Trauma Rehabilitation, 26(2)*, 116 – 126.

Neuropsychiatric sequelae of 120 individuals with severe TBI are assessed via the Glasgow Outcome Scale (GOS) assessing disability level, and the Neuropsychiatric Inventory (NPI), and then compared with 77 healthy controls. Use of the NPI was found to be effective tool among persons with severe TBI, demonstrating a high prevalence of several neuropsychiatric symptoms including apathy (49%) and dysphoria/depressed mood at 29% (manifest in this study through crying, sadness, pessimism, a sense of uselessness, burdensomeness, and suicidal ideation). Discussion by the author underscores the importance of developing accurate neuropsychiatric tools to assess this population for neuropsychiatric symptoms (such as depression) that can have a direct effect on functional outcomes and overall recovery.

Corrigan JD. (1995). Substance abuse as a mediating factor in outcome from traumatic brain injury. *Archives of Physical Medicine and Rehabilitation, 76(4)*:302-9.

A review of the literature examining the extent to which substance abuse (SA) impacts outcome in TBI. History of SA was associated with more severe injuries, higher mortality rates, poorer neuropsychological outcomes, increased likelihood of multiple TBIs and greater deterioration following rehabilitation. Based on these findings, it can be expected

that individuals with a history of SA and TBI, particularly those who continue to abuse substances post-injury will have greater cognitive and functional impairment.

Hesdorffer, D.C., Rauch, S.L., Tamminga, C.A. (2009). Long-term psychiatric outcomes following traumatic brain injury: a review of the literature. *Journal of Head Trauma Rehabilitation, 24(6)*, 452 – 459.

This literature review focused on 350 studies (all from published, peer-reviewed journals) examining psychiatric outcomes subsequent to TBI. Authors drew conclusions on outcomes including depression, PTSD, aggression, alcohol and substance abuse, etc, as well as suicidal behaviors. Generally, the likelihood of psychiatric outcomes increased following a TBI, even without prior history of psychiatric disorders. Based on three studies for completed suicide and one on attempts, authors found “limited/suggestive” evidence of an association between TBI and completed suicides, and inadequate evidence to draw conclusions for SAs. Data was collected on contract with the Department of Veterans Affairs and presented to the National Academy of Sciences, Institute of Medicine.

Riggio, S. (2011). Traumatic brain injury and its neurobehavioral sequelae. *Neurologic Clinics, 29*, 35 – 47.

This article examines neurobehavioral sequelae (NBS) following TBI, and suggests a multidisciplinary framework and approach to treatment. Utilizing a review of recent literature, the author considers commonly cited NBS, including cognitive and somatic disorders, as well as behavioral disorders such as depression and enhanced suicidality. The author highlights the need to account for pre-morbid factors as well as a patients’ “social and functional framework.” Therefore, the question of antidepressant use, for example, relies on a careful examination of multiple, interactive factors, and requires individual analysis.

Simpson, G.K., Tate, R.L., Whiting, D.L., Cotter, R.E. (2011). Suicide prevention after traumatic brain injury: a randomized controlled trial of a program for the psychological treatment of hopelessness. *Journal of Head Trauma Rehabilitation, 26(4)*, 290 – 300.



Article examines the efficacy of a treatment program designed in response to evidence of elevated risk level for suicidal behavior among those dealing with TBI. Windows to Hope (WtoH) targets one risk factor shown to be a precursor for suicidal ideation (SI): hopelessness. This current research utilizes the Beck Hopelessness Scale (BHS) and Beck Scale for Suicidal Ideation (BSS), among others, with individuals who have severe TBI and are more than a year post-injury. WtoH, based on cognitive behavior therapy (CBT) techniques, was shown to reduce both hopelessness and SI compared to a control wait-list group.

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