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The TBI Impact: The Truth About Traumatic Brain Injuries and Their Indeterminate Effects on Elderly, Minority, and Female Veterans of All Wars

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THE TBI IMPACT: THE TRUTH ABOUT TRAUMATIC BRAIN INJURIES AND THEIR INDETERMINATE EFFECTS ON ELDERLY, MINORITY, AND FEMALE VETERANS OF ALL WARS

Craig M. Kabatchnick*

"As we express our gratitude, we must never forget
That the highest appreciation is not to utter words,
But to live by them."
– John Fitzgerald Kennedy

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INTRODUCTION TO TBI

Traumatic Brain Injury (TBI) is a condition caused by a head injury that results in lasting damage to the brain.[1] "TBI is a recognized neurological disorder occurring as the result of a blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain."[2] TBI occurs in more than 1.4 million[3] Americans annually; 9% of whom will suffer lifelong impairments.[4] TBI ranges from "mild" occurrences (accounting for 1.1 million of the national cases) to "severe" cases, which cause 50,000 deaths each year in the United States.[5] The most typical cause of TBI ordinarily occurs with general falls, while other causes include: motor vehicle-traffic crashes, struck by/against events, physical assaults,[6] and combat blasts.[7]

MILD TBI

TBI is considered a "Silent Epidemic"[8] because the vast majority of cases, nearly 80%, involve cases that are considered to be mild.[9] Mild TBI, also referred to as a concussion, typically involves a brief and intermittent alteration of mental status, which may lead to dizziness and/or confusion, although, often times, no observable head injury is present.[10]

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1. Traumatic Brain Injury: Hope Through Research, http://www.ninds.nih.gov/disorders/tbi/tbi.htm (last visited Sept. 27, 2009).

2. TBI Facts, http://www.biausa.org/SC/facts.htm (last visited Sept. 27, 2009).

3. *Id.*

4. J.A. Langlois et al., *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations, and Deaths*, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (2006), http://www.cdc.gov/ncipc (last visited Sept. 27, 2009).

5. TBI Facts, *supra* note 2.

6. Langlois et al., *supra* note 4, at 11.

7. TBI Facts, *supra* note 2.

8. *Id.*

9. Peggy Eastman, *Overcoming Research Challenges Necessary to Better Understand Course of TBI, Speakers Say*, 9(13) NEUROLOGY TODAY 29, 29 (2009).

10. GAO Rep. No. 08-276, *Mild Traumatic Brain Injury Screening and Evaluation Implemented for OEF/OIF Veterans, but Challenges Remain* (Feb. 2008), http://www.gao.gov/new.items/d08276.pdf [hereinafter GAO 08-276].

While no consensus has been established, the American Congress of Rehabilitation Medicine and the Department of Veterans Affairs have distinguished mild TBI as injuries involving no more than thirty minutes loss of consciousness, post-traumatic amnesia of twenty-four hours or less, and a Glasgow Coma Score[11] of less than thirteen.[12] Most people who experience a mild TBI will recover within two to three weeks and without any further symptoms or ill effects.[13] However, if left untreated, even mild cases of TBI can lead to serious long-term impairments, disabilities, and death.[14]

Mild TBI can go undiagnosed or untreated due to the commonality of the symptoms and their relation to other conditions. Common physical symptoms attributed to TBI include headache, nausea, vomiting, and dizziness.[15] Emotional symptoms include irritability, sadness, and nervousness, while cognitive effects ordinarily include feelings of mental inadequacy and difficulty concentrating, remembering, and making decisions.[16]

These clusters of symptoms have led to controversial and inconsistent findings as to the seriousness and interminableness of the condition.[17] Moreover, diagnostics can prove problematic due to a significant symptom overlap with:

- Depression
- Posttraumatic Stress Disorder (PTSD)
- Fibromyalgia

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11. Glasgow Coma Score is a fifteen-point scoring system used to evaluate comas and impaired consciousness. Low scores indicate an increase in severity while higher scores are incrementally milder.

12. GAO 08-276, *supra* note 10, at 2.

13. *Id.* at 9.

14. *Invisible Wounds of War: Summary of Key Findings on Psychological and Cognitive Injuries: Before the H. Comm. on Veterans' Affairs*, 110th Congress (June 11, 2008) (statement of Lisa H. Jaycox, the RAND corporation).

15. GAO 08-276, *supra* note 10, at 10.

16. *Id.*

17. TERRI TANIELIAN & LISA H. JAYCOX, INVISIBLE WOUNDS OF WAR: PSYCHOLOGICAL AND COGNITIVE INJURIES 119 (RAND Corp. 2008).

- Chronic pain associated with headaches, whiplash, etc.[18]

In a survey of 2525 U.S. Army infantry soldiers reporting symptoms of TBI three to four months after returning from a one-year deployment to Iraq, nearly half (43.9%) of the cases diagnosed as TBI (due to loss of consciousness) were later concluded to be PTSD.[19]

MODERATE AND SEVERE TBI

Moderate TBI will display many of the same symptoms as that of the mild cases. However, only 60% of moderate TBI patients, having Glasgow Coma Scores ranging nine to twelve, will make a good recovery, while almost 26% remain moderately disabled.[20] The remaining 14% will either remain severely disabled (7%) or suffer vegetation and/or death (7%).[21]

Severe TBI is particularly difficult to measure. People in this state are often hemodynamically and neurologically unstable, which can often result in significant secondary injury.[22] More so than with mild and moderate TBI, the outcome following Severe TBI can be linked directly with the Glasgow Coma Score and the patient's age.[23] All factors remaining equal, a patient whose age falls within the younger (0-24)[24] and older (75+)[25] age ranges will suffer greater effects as their Glasgow Coma Score decreases.

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18. *Id.*

19. Charles W. Hoge et al., *Mild Traumatic Brain Injury in U.S. Soldiers Returning from Iraq*, 358:5 NEW ENG. J. MED. 453, 453 (2008).

20. GERALD M. DOHERTY, CURRENT SURGICAL AND DIAGNOSTIC TREATMENT 884 (12th Ed. McGraw-Hill 2006).

21. *Id.*

22. *Id.*

23. *Id.*

24. TBI Facts, *supra* note 2.

25. *Id.*

THE STATE OF TBI

Currently, there are approximately 3.2 million Americans living with long-term disabilities from TBI.[26] Males are about 1.5 times more likely than females to be at risk.[27]

The two age groups at highest risk for TBI are zero to four year olds (falls) and fifteen to nineteen year olds (motor vehicle crashes).[28] "African Americans have the highest death rate from TBI."[29] "People who abuse alcohol/drugs are more at risk, and they have poorer outcomes after a TBI."[30] Members of the military, especially veterans of Iraq or Afghanistan are exposed to greater risks of brain injuries.[31]

TRAUMATIC BRAIN INJURIES AND COMBAT

Little is known about the role of combat as it pertains to TBI. Most TBI studies have been conducted on civilian populations.[32] TBI is a physical injury rather than a mental disorder such as Posttraumatic Stress Disorder (PTSD);[33] however, physical injury will sometimes never be present, while other times the physical injuries may be credited to the primary concurrent injury, *i.e.*, flesh wounds, broken bones, dismemberment, etc. It is estimated that 20%, or 320,000 of the 1.64 million, of all service members deployed to Operation Enduring Freedom (OEF) or

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26. Lee Woodruff, *Can Brains Be Saved?*, http://health.msn.com (last visited Sept 27, 2009).

27. Langlois et al., *supra* note 4, at 9.

28. TBI Facts, *supra* note 2.

29. *Id.*

30. North Carolina Division of Mental Health, Developmental Disabilities and Substance Abuse Services, http://www.dhhs.state.nc.us/MHDDSAS/tbi/index.htm (last visited Sept. 27, 2009).

31. Brian J. Ivins et al., *Traumatic Brain Injury in U.S. Army Paratroopers: Prevalence and Character*, 55 J. OF TRAUMA INJURY, INFECTION AND CRITICAL CARE 617, 617 (2003).

32. Hoge et al., *supra* note 19.

33. GAO Rep. No. 08-615 *Mental Health and Traumatic Brain Injury Screening Efforts Implemented, but Consistent Pre-Deployment Medical Record Review Policies Needed* 9 (2008), http://www.gao.gov/new.items/d08615.pdf (last visited Sept. 27, 2009) [hereinafter GAO 08-615].

Operation Iraq Freedom (OIF) have suffered a TBI.[34] According to a study conducted by the Defense and Veterans Brain Injury Center (DVBIC), 30% of all service members requiring medical evacuation from OEF/OIF from January 2003 through January 2007 suffered some form of TBI.[35] For these reasons, it is now the leading injury among OEF and OIF service members[36] "and has been labeled a Signature Injury for the Afghanistan and Iraq wars."[37]

A study conducted at Fort Lewis, WA, which "involved 978 U.S. Army soldiers returning from Iraq or Afghanistan in 2008" all of whom had experienced a "concussion, head injury, or blast exposure while deployed" showed that nearly 98% suffered headaches during their final three months of deployment.[38] Within one week of suffering the traumatic head injury, headaches occurred for approximately 37% of the soldiers.[39] Another 20% suffered headaches within one to four weeks of sustaining head trauma.[40] "Among the soldiers whose headaches started within a week of the injury, 60% had migraine-like headaches and 40% had headaches that interfered with their ability to do their daily activities."[41]

The failure to properly examine and treat minority soldiers who suffer TBI while deployed is a growing concern for the United States. First, this failure impedes the soldier's ability to be combat ready and properly perform his or her job.[42] Second, this failure to diagnose TBI amongst minority soldiers will ultimately cost the United States government and its citizens billions of dollars to deal with the long-term effects and

34. *Id.* at 1.
35. GAO 08-276, *supra* note 10, at 1.
36. GAO 08-615, *supra* note 33, at 1.
37. Hoge et al., *supra* note 19, at 454.
38. *For Iraq Veterans, Headaches Continue After Traumatic Brain Injury,* http://www.medicalnewstoday.com/articles/140049.php (last visited Sept. 27, 2009).
39. *Id.*
40. *Id.*
41. *Id.*
42. *Id.*

increased probability for Alzheimer's and Parkinson's disease.[43] Brett J. Theeler, MD, a medical doctor at the Madigan Army Medical Center in Tacoma, WA, and a member of the American Academy of Neurology, suggests that "the associated headaches can be a source of impaired occupational functioning. These findings should alert health care providers, especially those affiliated with the military or veteran health care systems, to the need to identify and properly treat headaches among soldiers."[44]

Moreover, lots of individuals join the armed forces due to economic strains that may be placed upon their family. When they suffer TBI and become veterans, it will become difficult for them to function within society. TBI can lead to several neurological impairments,[45] and these impairments will hinder a minority veteran's likelihood of obtaining gainful employment and becoming a productive member of society. Although these numbers are imprecise, the Department of Veterans Affairs (VA) "estimates that 131,000 veterans are homeless on any given night."[46] One out of every three homeless persons in the United States has served his or her country.[47] A continued failure to diagnose and treat minority military personnel may lead to an increased number of veterans who are homeless.

WHY TBI IN SOLDIERS IS OCCURRING AT AN ALARMING RATE

Combat blasts are the primary source of soldier-specific TBI cases.[48] Improvised Explosive Devices (IED's), which have been systematically used by insurgents in roadside bombings and other attacks, were labeled the number one threat to soldiers in Afghanistan.[49] Blast injuries are classified into four categories:

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43. TBI Facts, *supra* note 2.

44. *For Iraq Veterans, Headaches Continue After Traumatic Brain Injury*, *supra* note 38.

45. *Id.*

46. *Most Often Asked Questions Concerning Homeless Veterans*, http://www.nchv.org/background.cfm (last visited Oct. 26, 2009).

47. *Id.*

48. TBI Facts, *supra* note 2.

49. *Roadside Bombs 'No. 1 Threat' to Troops in Afghanistan*, http://www.

primary (overpressure or "blast wave"), secondary (flying debris), tertiary (structural collapse), and quaternary (burns, inhalation, etc.)[50] The Pentagon reported 736 IED attacks in June of 2009 in Afghanistan.[51] Roadside bombings accounted for 75% of coalition casualties in 2008, which was up 50% from 2007.[52]

The answer to roadside bombings was the increase in Mine Resistant Ambush Protective (MRAP) vehicles. The million-dollar MRAP's use a highly technological design to deflect blasts at a greater rate than other military vehicles[53] and has successfully reduced the fatality rate proportionately to the number of vehicles sent to war zones.[54] And while preempting attacks and avoiding death are the best actions against IED's, the steady rate of roadside attacks, coupled with a decreasing overall death rate, assumes that soldiers are being subjected to more attacks and blasts, which ultimately cause TBI whether mild, moderate, or severe.

EVALUATING TBI AT THE DEPARTMENT OF VETERAN AFFAIRS

The Code of Federal Regulations Schedule of Ratings—neurological conditions and convulsive disorders—rates diseases and their residuals "from 10 percent to 100 percent in proportion to the impairment of motor, sensory, or mental function."[55] Ratings are then used to determine a disability rating.[56] Diagnostic Code 8045 identifies three main areas of

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cnn.com/2009/WORLD/asiapcf/07/09/afghanistan.ieds/ (last visited Sept. 27, 2009) [hereinafter CNN].

50. Gary M. Abrams M.D., *Clinical Aspects of Traumatic Brain Injury (TBI)*, http://www.warrelatedillness.va.gov/paloalto/conferences/january-2009/handouts/abrams-handout.pdf (last visited Sept. 27, 2009).

51. CNN, *supra* note 49.

52. *Casualties caused by IEDs in Afghanistan on the rise*, http://www.usatoday.com/news/military/2009-04-02-IEDs_N.htm (last visited Sept. 27, 2009) [hereinafter USA Today].

53. *Id.*

54. *Id.*

55. 38 C.F.R. § 4.124(a) (2008).

56. The VA updated the disability rating schedule for TBI veterans in September 2008.

dysfunction that may result from TBI and have acute effects on functioning: cognitive, emotional/behavioral, and physical.[57] Cognitive impairment is defined as decreased memory, concentration, attention, and executive functions of the brain.[58] Executive functions are goal setting, speed of information processing, planning, organizing, prioritizing, self-monitoring, problem solving, judgment, decision-making, spontaneity, and flexibility in changing actions when they are not productive.[59] Emotional/behavioral and physical (subjective) symptoms are classified as the "residual" effects of TBI.[60]

Diagnostic Code 8045 provides a table entitled "Evaluation of Cognitive Impairment and Other Residuals of TBI Not Otherwise Classified."[61] The table contains ten important facets of TBI related to cognitive impairment and subjective symptoms.[62] It provides criteria for four levels of impairment for each facet, as appropriate, ranging from zero to three, and a fifth level, the highest level of impairment, labeled "total."[63] The residuals evaluated through this model include: judgment, social interaction, orientation, motor activity, visual spatial orientation, subjective symptoms, neurobehavioral effects, communication, and consciousness.[64]

Veterans whose residuals of TBI are rated under a version of § 4.124(a), Diagnostic Code 8045, in effect before October 23, 2008 may request review under Diagnostic Code 8045, irrespective of whether his or her disability has worsened since the last review. VA will review that veteran's disability rating to determine whether the veteran may be entitled to a higher disability rating under Diagnostic Code 8045.

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57. 38 C.F.R. § 4.124(a).
58. *Id.*
59. *Id.*
60. *Id.*
61. *Id.*
62. *Id.*
63. *Id.*
64. *Id.*

SCREENING SOLDIERS

The Department of Defense (DOD) is becoming increasingly aware of the frequency and complexity of TBI. In response, the DVBIC, as part of a collaborative effort between DOD, VA, and two civilian organizations, designed and implemented screening software to help identify mild occurrences of TBI in a select population of returning OEF/OIF service members.[65] The VA later revised the computer-based tool to be used at various VA medical facilities.[66]

Pursuant to VA protocol, service members are evaluated from a series of questions that include:

- Does the veteran have a separation date after 9/11/01?[67]
- Did the veteran serve in OEF or OIF?[68]
- Does the veteran have a prior diagnosis of TBI?[69]

If no prior diagnosis of TBI, service members are asked a second series of questions related to: combat experiences, *i.e.*, blasts, falls, crashes etc., immediate or prolonged symptoms after deployment, and the severity, if any, of those symptoms.[70] Veterans who meet the requisite level of consideration are referred to a specialist for further TBI evaluation.

IMPACT ON ELDERLY VETERANS

The United States Census Bureau reported that the fastest growing age group in the United States is citizens "over 65 years of age, with the number expected to increase by 53.2% by 2020."[71] With the growth in numbers of individuals over the age

65. GAO 08-276, *supra* note 10, at 13.
66. *Id.*
67. *Id.* at 16.
68. *Id.*
69. *Id.*
70. *Id.*
71. Steven Flanagan et al., *Aging with a Disability*, 16 PHYSICAL MEDICINE AND REHABILITATION CLINICS N. AM. 163, 163 (2005).

of sixty-five, the number of elderly individuals affected by medical complications will also likely rise. While the greatest incidence of traumatic brain injury among veterans occurs as young adults, "a second peak incidence occurs in the elderly population."[72] This second peak has led researchers to study the effects of TBI on the elderly.

PSYCHIATRIC DISORDERS AS A LONG TERM EFFECT

Doctors have found that "the associated physical, emotional, and cognitive manifestations of the symptoms of TBI are typically more pronounced in elderly patients."[73] In 2000, researchers with the American Academy of Neurology conducted a study of TBI and its effect on elderly veterans. It included male World War II Navy and Marine veterans who were hospitalized during their military service with a diagnosis of either a non-penetrating head injury or another unrelated condition. In 1996 to 1997, military medical records were abstracted to document the occurrence and details of closed head injury. The entire sample was then evaluated for dementia and AD using a multistage procedure. "There were 548 veterans with head injury and 1228 without head injury who completed all assigned stages of the study."[74] The study found in conclusion that both moderate head injury and severe head injury were associated with a statistically significant increased risk of Alzheimer's disease.[75] The results also found an increased risk of dementia.[76]

Another study in 2002, published in American Journal of Psychiatry, found that of all patients treated for traumatic brain injuries:

[Fourteen percent] experienced a severe psychiatric

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72. *Id.*

73. *Id.*

74. B.L. Plassman et al., *Documented Head Injury in Early Adulthood and Risk of Alzheimer's Disease and Other Dementias*, 55 NEUROLOGY 1158, 1158 (2000).

75. *Id.*

76. *Id.*

> disorder. Of that 14%, specific percentages of diagnosis were approximately 75% of treatments for major depression, 2% - 14% for dysthymia, 2% - 17% for bipolar disorder, 3% - 28% for generalized anxiety disorder, 4% - 17% for panic disorder, 1% - 10% for phobic disorders, 2% - 15% for obsessive-compulsive disorder, 3% - 27% for posttraumatic stress disorder (PTSD), 5% - 28% for substance abuse or dependence, and 1% for schizophrenia.[77]

Numerous veterans were diagnosed with multiple severe psychiatric disorders as a result of their TBI.[78]

TREATMENT

Progressive loss of cognitive and physical abilities is frequently caused by expanding subdural hemorrhages in veterans that have experienced a TBI.[79] For elderly persons presenting with psychiatric disorders post TBI, the combined use of antidepressant/anti-anxiety medications and individual psychotherapy is indicated to prevent further functional deterioration.[80] Special care must be taken by medical professionals in examining these subjects as these individuals may be erroneously diagnosed with dementia rather a treatable psychiatric disorder caused by the TBI.[81]

LONG TERM SURVIVAL AND QUALITY OF LIFE

A study from the NeuroRehabilitation Journal indicates that "persons who experience mild TBI exhibit a small but statistically significant reduction in long-term survival compared to the general population."[82] The severity of the TBI

77. Salla Koponen et al., *Axis I and II Psychiatric Disorders after Traumatic Brain Injury: A 30-Year Follow-Up Study*, 159 AM. J. PSYCHIATRY 1315, 1315 (2002).

78. *Id.* at 1318.

79. Flanagan, *supra* note 71, at 165-66.

80. *Id.* at 171.

81. *Id.*

82. Allen W. Brown et al., *Long-Term Survival after Traumatic Brain Injury: A Population-Based Analysis*, 19 NEUROREHABILITATION 37, 37 (2004).

also influences the percentages of long-term survival.[83] "The case fatality rate for persons with moderate to severe TBI is very high, but among six-month survivors, long-term survival is similar to that for persons with mild TBI."[84] The mortality rates of the elderly are affected by TBI despite the overall decline in mortality rates for those over seventy-five years of age, which represents a 21% increase in elderly TBI-related deaths during the period studied.[85]

IMPACT ON RACIAL MINORITIES

Minority veterans and soldiers are achieving less desirable medical outcomes than non-minority veterans and soldiers.[86] This disparity is present even when socio-economic factors are accounted for.[87] It has been theorized that the disparity in outcomes is attributable to "broader historic and contemporary, social and economic inequality,"[88] rather than simple access to health care.[89] Research suggests that there are two main causes of the disparity in minority treatment outcomes: ineffective diagnosis strategies[90] coupled with a lack of scientific understanding of TBI injuries,[91] and reciprocal inter-personal biases between minority soldiers and their treating physicians.[92]

CLINICAL UNCERTAINTY

Military doctors may not be effectively treating all instances of TBI.[93] PTSD and TBI have very similar symptoms and may in

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83. *Id.* at 39.
84. *Id.* at 37.
85. Flanagan et al., *supra* note 71, at 175.
86. BRIAN D. SMEDLEY, ADRIENNE Y. STITH, & ALAN R. NELSON, UNEQUAL TREATMENT 6 (2003).
87. *Id.* at 7.
88. *Id.* at 6.
89. *Id.* at 7.
90. GAO 08-276, *supra* note 10, at 24.
91. *Id.* at 8.
92. SMEDLEY ET AL., *supra* note 86, at 7.
93. *See* GAO 08-276, *supra* note 10, at 2.

fact be inter-related conditions.[94] Many soldiers are being diagnosed with PTSD when their condition is actually caused by a TBI injury or a combination of both.[95] The military has acknowledged that a problem exists regarding the diagnosis and treatment of TBI among armed forces and better screening methods are necessary.[96] TBI requires immediate medical treatment, and the longer a soldier goes untreated, the more detrimental and permanent the damage may become.[97] Doctors tend to recognize and treat potential TBI injuries based on their practical experience.[98] Military doctors may have become too attuned to wartime injury and may not be realizing the possibility and extent of a TBI injury, based on the outward appearance of that injury.[99] This is a plausible explanation for the disparities seen in the treatment outcomes of minority veterans with TBI injuries. Additionally, inconsistencies in treatment are almost certainly causally related to a lack of understanding of both the nature and extent of injuries, which may cause TBI injuries to occur.[100]

MINORITY AND SOLDIER STATUS

Soldiers are more likely to not report injuries or be examined for potential injuries than other groups.[101] Given the nature of TBI injuries, that they are often not associated with visible traumatic injuries, it is easy to see how peer pressure and

94. Laura M. Colarusso, *Concerns Grow About Veteran's Misdiagnoses*, BOSTON GLOBE, June 10, 2007 at 1, *available at* http://www.boston.com/news/nation/articles/2007/06/10/concerns_grow_about_war_veterans_misdiagnoses/.

95. *Id.*

96. GAO 08-276, *supra* note 10, at 2.

97. Chol Kim, *Traumatic Brain Injury Screening for the Armed Forces*, 40 MCGEORGE L. REV. 449, 451 (2009).

98. Colarusso, *supra* note 94, at 1.

99. *Id.*

100. Kim, *supra* note 97, at 452.

101. National Council on Disability, *Invisible Wounds: Serving Service Members and Veterans with PTSD and TBI* (Mar. 4, 2009), http://74.125.113.132/search?q=cache:uvHNOGn2oXgJ:www.ncd.gov/newsroom/publications/2009/veterans.doc+TBI+injury+among+minority+veterans&cd=2&hl=en&ct=clnk&gl=us&client=firefox-a.

machismo can lead soldiers to not seek treatment.[102] Furthermore, minorities are more likely to refuse medical treatment than their white counterparts.[103] There is a question as to how much bias or at least unconscious personal perception of a minority, may tie into how a doctor perceives a patient's injuries in a clinical setting.[104] Studies show that there is no disparity between treatments received between whites and racial minorities.[105] However, the decisions to treat and seek treatment are influenced by such factors.[106]

Minority veterans and soldiers are achieving less desirable medical outcomes than non-minority veterans and soldiers.[107] The solution to thwart this deficiency in care is two-fold. First, treating physicians need to have an increased awareness of their own potential biases and minority psychology.[108] Second, more research is needed to fully understand how TBI injuries occur and what methods can be used to more effectively recognize them when they occur.[109] At this point in time, the only way to realistically ensure the health of our soldiers, minority or not, is to mandate a standardized series of TBI screenings whenever a soldier is exposed to any blast or head trauma, regardless of the presence of external injury.

IMPACT ON FEMALE VETERANS

As of August 2009, women made up more than 1.8 million of the U.S. veteran population.[110] With this many women in the service, the awareness regarding the impact of traumatic brain

102. GAO 08-276, *supra* note 10, at 25.
103. SMEDLEY ET AL., *supra* note 86, at 6.
104. *Id.* at 9.
105. *Id.* at 13.
106. *Id.*
107. *Id.*
108. *Id.*
109. *See* GAO 08-276, *supra* note 10, at 2.
110. National Center for Veterans Analysis and Statistics, U.S. Department of Veterans Affairs, *VA Stats at a Glance,* http://www1.va.gov/vetdata/docs/4X6_summer09_sharepoint.pdf (last visited Oct. 26, 2009).

injury is of increasing importance. Currently, there is not much information available concerning TBI and its impact on women, but the information that is available suggests that TBI may have a more severe impact on women.

Although men are diagnosed with TBI at higher rates than women, women still make up 25% of the TBI population.[111] A study conducted by researchers at the University of Virginia concluded that women with TBI tended to have worse outcomes than men.[112] Women fared less favorably regarding length of hospitalization, impaired memory, dizziness, fatigue, anxiety, and depression.[113] Other research has found higher mortality rates in women with TBI as opposed to their male counterparts.[114] One study suggests that women experience higher rates of brain swelling and intercranial hypertension.[115] Studies have highlighted the impact of TBI on women in the work place[116] as well as the differences in medical treatment of women with TBI.[117]

Just as the aforementioned research suggests that there are differences between the impact and outcomes of TBI in women, other studies show no significant differences between TBI in men and women. The contradictory and limited information in this area leaves more questions than answers. Even more alarming is the lack of information concerning women veterans and traumatic brain injury.

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111. Amy K. Wagner et al., *Evaluation of Estrous Cycle Stage and Gender on Behavioral Outcome After Experimental Traumatic Brain Injury*, 998 BRAIN RES. 113, 113 (2004).

112. Elana Farace et al., *Do Women Fare Worse: A Metaanalysis of Gender Differences in Traumatic Brain Injury Outcome*, 93 J. Neurosurgery 539, 541 (2000).

113. *Id.* at 541-42.

114. Jennie L. Ponsford et al., *Gender Differences in Outcome in Patients with Hypotension and Severe Traumatic Brain Injury*, 39 INJURY 67, 68 (2008).

115. *Id.*

116. John D. Corrigan et al., *Employment After Traumatic Brain Injury: Differences between Men and Women*, 88 ARCHIVES OF PHYSICAL MED. REHABIL. 1400 (2007).

117. Anbesaw Wolde Selassie et al., *The Effect of Insurance Status, Race, and Gender on ED Disposition of Persons with Traumatic Brain Injury*, 22 AM. J. EMERGENCY MED. 465, 472 (2004).

TBI AS A LEGAL DEFENSE: LEONARD V. SIMPSON

An appropriate indication as to the indeterminateness of TBI lies within case law. While researchers and physicians are beginning to understand and explain the complex disorder, courts are still reluctant to recognize TBI as a legal defense.

In *Leonard v. Simpson*, Jeffrey Leonard (who was tried and convicted under the incorrect name of James Earl Slaughter) was sentenced to death for first-degree murder.[118] On petition for Writ of Certiorari to the United States Supreme Court, Leonard argued that the details and medical expert opinions of a childhood injury, later diagnosed by Dr. Eric Engum as cognitive deficits resulting from traumatic brain injury, should have been admitted into evidence for the jury to consider.[119] The brief by the National Disability Rights Network, Kentucky Protection & Advocacy, the Brain Injury Association of America, and the Brain Injury Association of Kentucky as Amici Curiae in Support of Petitioner (Leonard) argued: (1) TBI causes dramatic changes in cognition and functioning that mitigate a defendant's culpability; (2) juries cannot be expected to understand the significance of TBI without the assistance of appropriate expert testimony based on a comprehensive evaluation that includes neuropsychological testing; and (3) confusion regarding the relevance of TBI to the question of moral culpability has led some courts to undervalue mitigating evidence.[120]

Prior to Leonard's petition to the U.S. Supreme Court, Leonard's death sentence was upheld by the Supreme Court of Kentucky, however counsel for Leonard did not argue TBI as a mitigating defense for a reduced sentence.[121] Evidence of the

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118. *See* Slaughter v. Commonwealth, 744 S.W.2d 407 (Ky. 1987); Leonard v. Simpson, 551 U.S. 1103 (2007).

119. 2007 WL 1424687, Appellant Petition.

120. 2007 WL 1319342, Appellant Petition.

121. *Slaughter*, 744 S.W.2d at 407. Leonard was then, later, granted a Writ of Habeas Corpus by the Western District, United States Federal District, for inadequate representation by counsel. Slaughter v. Parker, 187 F. Supp. 2d 755 (W.D. Ky. 2001).

TBI-related defense was asserted to the United States Court of Appeals, Sixth Circuit.[122] However, the death sentence was upheld.[123] Counsel for Leonard argued that failure to present brain injury evidence undermines the confidence in a death sentence.[124] Counsel further argued that the "absence of this readily available mitigation evidence left the jury with a *pitifully incomplete* picture of the defendant."[125] However, despite the medical evidence raised in his defense, the Sixth Circuit denied Leonard's Writ of Habeas Corpus granting an appeal of his death sentence,[126] and the United States Supreme Court affirmed.[127] Circuit Judge R. Guy Cole, Jr., dissented after the Sixth Circuit's denial for rehearing stating that, "we are particularly troubled about executing someone who likely suffers [from] brain damage. We rarely, if ever, allow that-especially when the jury is not afforded the opportunity to even consider that evidence."[128]

SOCIAL AND ECONOMIC EFFECTS

Members of a National Institutes of Health Consensus Development Conference found that, "[s]ocial consequences of mild, moderate, and severe TBI are many and serious, including increased risk of suicide, divorce, chronic unemployment, economic strain, and substance abuse."[129] The functional outcome is the measure of the activity level of patients after their injury.[130] Reduced time and intensity of physical rehabilitation

122. 2007 WL 1319342, Appellant Petition.

123. *Id.*

124. *Id.*

125. *Id.*

126. *Id.*

127. Leonard petitioned the U.S. Supreme Court for Writ of Certiorari to review the decision by the Sixth Circuit but was denied.

128. Slaughter v. Parker, 467 F.3d 511, 512 (6th Cir. 2006) (Cole, J., dissenting).

129. Rehabilitation of Persons With Traumatic Brain Injury, http://consensus.nih.gov/1998/1998TraumaticBrainInjury109html.htm (last visited Aug. 27, 2009).

130. Sharon A. Brown et al., *Perception of Health and Quality of Life in Minorities After Mild-to-Moderate Traumatic Brain Injury*, 11(1) APPLIED NEUROPSYCHOLOGY 54, 62 (March 2004).

and psychotherapy play a significant role in the patient's recovery after injury.[131] Noted behavioral outcomes resulting from TBI include hyperactivity, depression, anxiety, aggressive conduct, negligence, obsessive traits, and paranoid ideas.[132] These behavioral outcomes are major factors interfering with social and work relations of TBI patients.[133] The effects are not limited to family, friends, and professional acquaintances. Traumatic brain injuries also place burdens on social service agencies, law enforcement, and the courts.[134] Difficulties for minorities begin at the time of injury, as they receive less medical care and less support services following TBI and have worse functional outcomes following treatment.[135]

Understanding the social effects of TBI for the patient and the community can be as complicated as understanding the symptoms of the illness. As previously discussed, TBI affects multiple combinations of neurological processes from motor function to autonomic functions such as level of consciousness.[136] The manifestations of the injury impair social interaction between patients, their family, their friends, and their coworkers.

The challenges to reenter their communities may be exacerbated for the minority, female, and elderly patients. Minorities, in particular, face difficulties in reintegrating socially into family and their community due to lack of quantity and intensity of services generally provided for non-minorities.[137] Women experience the same lack of services because service providers historically designed rehabilitative support services for men that did not address gender specific health concerns of

131. *Id.* at 61.

132. M.G. Inzaghi et al., *The Effects of Traumatic Brain Injury on Patients and Their Families*, 41 EURA MEDICOPHYS. 265 (Dec. 2005).

133. *Id.*

134. *Id.*

135. Juan Carlos Arango-Lasprilla et al., *Traumatic Brain Injury and Functional Outcomes: Does Minority Status Matter?*, 21 BRAIN INJURY 701, 705 (June 2007).

136. P. Corso et al., *The Incidence and Economic Burden of Injuries in the United States*, 12(4) INJURY PREV. 212 (Aug. 2006).

137. Arango-Lasprilla et al., *supra* note 135, at 707.

women.[138] Long-term effects of TBI continue to affect a patient's capacity to interact throughout his or her life. In particular, elderly TBI patients who compete with the natural effects of aging are particularly challenged by the injury. They have reduced recovery rates, including greater rates of mortality compared to their younger counterparts.[139] Reduced health particularly complicates integration of elderly patients into their families and work without imposing a heavy burden on both finances and emotional dynamics.[140]

TBI can affect a patient's ability to maintain strong friendships and intimate partnerships or pursue recreational activities where social relationships may be created.[141] A TBI patient who returns to an existing family may experience a diminished role in family affairs, including a passive role in household management and future family planning.[142] For example, tasks such as driving are difficult, or non-existent for TBI patients, reducing their contribution to household activities and negatively impacting the family by relying on others for travel.[143] Those patients that can drive also create anxiety for their families because their families worry about the patient's safety.[144] Conversely, without being able to drive, patients have reduced opportunities to socialize and competitively enter the work force after injury.[145]

Only a small percentage of TBI patients return to the work force and even less return to a job status comparable to the status attained before injury.[146] Evidence has shown that

138. D. Mukherjee et al:, *Women Living with Traumatic Brain Injury: Social Isolation, Emotional Functioning and Implications for Psychotherapy*, 26 WOMEN & THERAPY 3 (Mar. 2003).

139. J. Leblanc et al., *Comparison of Functional Outcome Following Acute Care in Young, Middle-aged and Elderly Patients with Traumatic Brain Injury*, 20 BRAIN INJURY 779 (July 2006).

140. *Id.*

141. Inzaghi et al., *supra* note 132 at 265.

142. *Id.*

143. *Id.*

144. *Id.*

145. *Id.*

146. *Id.*

minorities, women, and the elderly may be strongly affected. For example, historical patient data shows that African American TBI patients had significantly decreased income one year after injury compared to their white counterparts.

The argument can be made that veterans, regardless of age, ethnic background, or gender, receive equal health treatment through the Veteran's Administration's health system following injury.[147] Regardless of treatment levels, minority patients in particular negatively perceive any progress in their health and quality of life, post injury,[148] and a greater percentage of African Americans perceive that their integration within their communities is more difficult.[149] The loss of income because of reduced job status may be a factor in the African American patient's negative perception.[150] Hispanics receiving the same treatment levels, post injury, in similar studies faired as poorly as African Americans in functional outcome.[151] Hispanics also developed a similar rate of negative perceptions of their health and quality of life compared to their white counterparts.[152] These perceptions may result in a higher likelihood of poor integration into family and work life. Ultimately those perceptions impact family and work life by straining those relationships, severing those relationships, or creating roadblocks to building new relationships.

THE PRICE OF TBI

TBI has become a major concern, as far as potential economic costs are concerned, because there are financial costs, but the cost of life is the hardest to put a price on.[153] A single injury to

147. GAO 08-276, *supra* note 10, at 2.
148. Brown et al., *supra* note 82, at 62.
149. *Id.*
150. Arango-Lasprilla et al., *supra* note 135, at 705.
151. *Id.*
152. Brown et al., *supra* note 82, at 62.
153. Tom Novack, *TBI Facts and Stats*, www.neuroskills.com/tbi/facts.shtml (Sept. 1999).

the brain can produce a vast number of complications. These injuries can range in severity and can result in physical and/or psychological damage.[154] It has been estimated that only about "10 percent of TBI patients are ever hospitalized,"[155] which shows that even with current estimates of the costs associated with TBI we are "[u]nderestimating the true economic impact"[156] that such an injury has on individuals. As a result, "a price cannot be put on the cost of the emotional and physical issues that arise as a result of a brain injury."[157] Although the monetary costs of TBI may vary, it has been estimated that a TBI case can range anywhere from $85,000 for a mild head injury, to $3 million for a severe head injury.[158] These costs are staggering due to the complexity of the cases that are presented.[159] These injuries can, and often do, impair a person's "physical, cognitive, and psychosocial functioning, which in turn impacts their ability to return to their home, school, and work."[160] All of these various components require different and costly forms of rehabilitation. Additional costs such as "housing, transportation, personal care assistance, tutoring, job coaching, . . . and placement in [a] long term care setting,"[161] must also be taken into consideration when analyzing the economic effect of an injury of this magnitude.

IMPACT ON THE FAMILIES

A person with severe TBI could incur anywhere from $600,000 to $1,875,000 for the cost of care throughout his or her

154. Brain Injury Cost, www.braininjury.net/resources/cost_of_traumatic_brain_injury/cost-traumatic-brain-injury/index.html (last visited Oct. 26, 2009).

155. MICHAEL A. MCCREA, MILD TRAUMATIC BRAIN INJURY AND POSTCONCUSSION SYNDROME–THE NEW EVIDENCE BASE FOR DIAGNOSIS AND TREATMENT (Oxford University Press Inc. 2008).

156. *Id.*

157. Brain Injury Cost, *supra* note 154.

158. *Id.*

159. *Id.*

160. Traumatic Brain Injury: Did You Know?, www.nashia.org/issues/tbi.html (last visited Oct. 26, 2009).

161. *Id.*

lifetime.[162] As it is mentioned on the National Association of State Head Injury Administration webpage, "the economic consequences of TBI can be enormous" and the costs do "not include lost earnings, costs to social services systems, and the value of the time and foregone earnings of family members who care for persons with TBI."[163] These economic setbacks tend to create more financial burdens on individuals who are already overwhelmed by the cost associated with such an injury.[164] Family members are also burdened because in many instances they have to take time off from work, or in severe TBI cases, they have to quit their jobs in order to take care of the patient's daily needs.[165] As these costs add up, many individuals are faced with the "devastating decision to file bankruptcy."[166]

IMPACT ON THE TAXPAYER

When patients are unable to pay these expenses, the government and the taxpayers are left to incur the costs.[167] The annual cost for new-onset TBI was estimated to cost, in 1993 dollars, 6.5 billion dollars and ongoing care cost is estimated, in 1993 dollars, as $13.5 billion.[168] Rehabilitation and "acute care" services in the United States range from $9 billion to $10 billion a year.[169] The United States' current economic situation combined with the overwhelming number of individuals without health insurance, has had an economic impact on many people. Through programs such as Medicare, Medicaid, and Social Security Disability Insurance, taxpayers have the burden of having to compensate for these excessive costs.[170]

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162. *Id.*
163. *Id.*
164. Tonya Hellard, *Cost of Traumatic Brain Injury*, http://lapublishing.com/blog/2009/cost-traumatic-brain-injury (last visited Oct. 26, 2009).
165. *Id.*
166. *Id.*
167. *Id.*
168. Novack, *supra* note 153.
169. *Id.*
170. Hellard, *supra* note 164.

CONCLUSION

The truth is that there is still very little known about Traumatic Brain Injuries in combat veterans. Many Americans, whether young, old, male, female, African American, Hispanic, or Caucasian, join the armed forces due to economic strains that may be placed upon their family. When they suffer TBI and become veterans, it will become difficult for them to function within society. TBI can lead to several neurological impairments that will hinder the likelihood of obtaining gainful employment and becoming a productive member of society. Lack of gainful employment impacts an individual's ability to afford costs associated with living. Although precise numbers are "hard to come by—[because] no one keeps national records on homeless veterans—the VA estimates that 131,000 veterans are homeless on any given night."[171] One out of every three homeless persons in the United States has served his or her country.[172]

Factors contributing to the indeterminate assessment of the "TBI Impact" have been, and will continue to, improve as data becomes available and awareness becomes essential. However, it is not the responsibility of the veteran to demand the care that was originally promised. Nor is it enough to offer verbal affirmation to the returning troops. Take care of those that take care of you and do so fervently and zealously that the same may be done for you.

171. *Most Often Asked Questions Concerning Homeless Veterans*, http://www.nchv.org/background.cfm (last visited Oct. 26, 2009).

172. *Id.*