

Long-Term Survival in Traumatic Brain Injury and Near-Death Experience Increases Suicide Risks: A Personal Experience and Related Literature

Robert E. Brandt^{1,2*}, Akihiro Takeuchi², Hirotohi Kamata³

¹MedEd Japan, 3-2-12 Eifuku, Suginami, Tokyo, Japan

²Department of Medical Informatics, Kitasato University School of Medicine, Kanagawa, Japan

³Department of Hematology, Kitasato University School of Medicine, Kanagawa, Japan

Email: *robertbrandt@gmail.com

How to cite this paper: Brandt, R.E., Takeuchi, A. and Kamata, H. (2022) Long-Term Survival in Traumatic Brain Injury and Near-Death Experience Increases Suicide Risks: A Personal Experience and Related Literature. *Open Journal of Medical Psychology*, 11, 112-124.

<https://doi.org/10.4236/ojmp.2022.113009>

Received: April 1, 2022

Accepted: July 5, 2022

Published: July 8, 2022

Copyright © 2022 by author(s) and Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Background: Traumatic brain injury (TBI) remains a cause of lifelong disability, death, and suicide worldwide. TBI-induced near-death experience (NDE) could increase suicide risks. **Objective:** We investigated TBI coupled with NDE and posttraumatic stress disorder (PTSD) as a possible indicator of suicide. **Methods:** A 17-year-old male who sustained an acute severe TBI in a traffic collision, was comatose 14 days, had an NDE awakening from the coma, and, years after rehabilitation, suffered PTSD, clinical depression, and survived a suicide attempt. This personal experience of a TBI-induced NDE and lingering PTSD was acquired directly from the patient by interview. We discuss his case while considering relevant literature. **Results:** Longitudinal data from 1961 to 2021 generated from the PubMed interface revealed 4056 TBI patients committed suicide. NDE was only reported in one of those cases and, although not a suicide, in the personal experience. Neuropsychological assessment at long-term follow-ups revealed few TBI patients exhibited normal mental/physical functions compared to the general population. Unfavorable GOS scores were risk predictors for neuropsychological/physical impairments later in life, with outcomes of depression, PTSD, poor QOL, and/or suicide. **Conclusions:** For TBI-NDE survivors, including those with PTSD, long-term periodic neuropsychological follow-ups and psychosocial support may help decrease suicide risks.

Keywords

Traumatic Brain Injury, Long-Term Outcome, Posttraumatic Stress Disorder, Near-Death Experience, Suicide

1. Introduction

Traumatic brain injury (TBI) remains a major cause of death, suicide, and life-long disability worldwide [1] [2]. Regarding causes of TBI, traffic collisions are the most common, followed in descending order by falls, sports, and violent physical attacks (e.g., those sustained in muggings and acts of domestic violence) [1]. TBI sufferers can have serious long-term consequences and psychiatric disorders: depression, anxiety, and posttraumatic stress disorder [PTSD] [2]. At low points in their lives, people with those disorders may manifest suicidal ideations and decide to attempt suicide. Ernest Hemingway was such a person. He sustained severe concussions, survived TBIs, and then decided to end his life in suicide [3].

Relatively unknown, due to it being largely underreported, some TBI patients experience a unique post-coma consequence that is felt physically and experienced mentally as a real sensation but like a dream. In it, one becomes aware of existing in the darkness, not in your body but in your being, in your “Self,” your essential essence. Time seems to stop. You feel no pain. You feel like you are floating through a tunnel toward a light at the end of it. Suddenly you are emersed in the light. You feel your mind and body bathed in wisdom. You feel you know universal truth. You feel like you have lived through everything and fear nothing. You have seen the other side and come back out on this side—the side of life. Revenants know this experience as a “near-death experience” (NDE) [4] [5], and it lasts forever. You never forget it.

Hemingway might have had an NDE. That of course is unknowable. But while he was recuperating from a concussion and a TBI he sustained in World War I, he wrote, “Dying is a very simple thing. I’ve looked at death, and really I know. If I should have died, it would have been very easy for me. Quite the easiest thing I ever did” [4].

Of the hundreds of thousands of reports of TBIs and NDEs, only scant evidence relates these two, possibly indicating that relatively few TBI patients have had NDEs. In China, Hou *et al.* reported only 3 of 86 severe TBI patients remembered having an NDE [5]. Perhaps those who had a post-coma NDE, later thought, during troubled times in their lives, of trying to duplicate that experience of death, believing they knew death was not the end but a transition to another realm of existence, they thought they would attempt to commit suicide. In view of that light, we present one patient’s thoughts on a TBI-induced NDE, his battle through PTSD, depression, substance abuse, his present long-term quality of life (QOL), and show that TBI-induced NDE could indicate a warning for suicidal ideation and real risk of suicide.

2. Methods

The authors acquired a young male TBI patient’s medical history and his Greyson NDE score [6] by interview and medical records, and reviewed relevant TBI and NDE data from the PubMed interface, while considering the patient’s per-

sonal perspective, in order to formulate the hypothesis for the present report, simply stated, that NDE might contribute to suicide among TBI survivors. For that young man, neurological and functional outcomes were assessed with the Glasgow Outcome Scale (GOS) and the GOS-Extended (GOSE), long-term QOL with the RAND SF-36 questionnaire, and the depth of his NDE with the Greyson NDE Scale developed in 1983 [6]. Written informed consent was obtained from that patient to use his personal information in this report.

2.1. A Personal TBI Perspective

A 17-year-old male, was comatose upon arrival to the ICU due to an automobile collision resulting in a right femur fracture, closed head contusion, and acute severe TBI. The head trauma was treated in the emergency department and carefully maintained and observed in the ICU. The patient remained unconscious (GOS-2, vegetative state) and right-side hemiplegic for 14 days. Although hemiplegic, the fractured right leg in traction, and limbs restrained in the bed, having told no one at the time, he still vividly remembers a dream he had, one of those nights in the ICU, in which he attempted to break a bottle and slit his wrists.

While regaining consciousness, the patient evolved through stages of acute disorder of consciousness: unresponsive wakefulness syndrome (24 hours), minimally conscious state (24 hours), then regained full consciousness but remained in a posttraumatic confusional state (48 hours). The patient successfully regained consciousness on the 15th day post-injury and underwent orthopedic surgery to emplace an intermedullary nail in the right femur for the fracture fixation. He was taken to recovery then back to the ICU for the next few days.

To be moved out of the ICU, a patient must exhibit full recovery of consciousness when functional networks reemerge [7]. *i.e.*, the patient must be able to perform externally orientated cognitive tasks, including responding correctly to verbal commands. Thus, days later, this being possible, the patient was moved to a private room. Daily rehabilitation sessions started in bed, then in a wheelchair, progressed to parallel bars, then up onto a walker, until he could be discharged to home on the 30th day post-injury.

Follow-up rehabilitation sessions, on an outpatient basis, included 1 week on a walker, without putting his weight on the right foot, followed by Lofstrand crutches, still without bearing any weight on the right leg, for 1 year. He then underwent surgery to remove the intermedullary nail from the femur. Follow-up neurological and orthopedic examinations continued throughout the year. Neurological and functional outcomes were assessed at the end of that year with the following results: a Glasgow Outcome Scale (GOS) of 4 (*i.e.*, Moderate disability: No need for assistance in everyday life, employment is possible but may require special equipment); a GOS-Extended (GOSE) of 6 (*i.e.*, Upper moderate disability: Some disability but can potentially return to some form of employment); and a poor long-term QOL indicated by a RAND SF-36 of 13%.

Four years after the accident, in which he sustained the acute severe TBI, his rehabilitation and therapy culminated with the final neurological evaluation noting a remarkable improvement: GOSE-7 (*i.e.*, Lower good recovery: Minor physical and mental defect, respectively, further evidence of motor dysfunction had occurred, vis-a-vis the use of his right hand and being unable to remember details of ordinary life activities) and an SF-36 of 90%.

Regarding the patient's experience of death revealed to us in an interview for the present article, he explained that although his NDE was exceedingly vivid, he had neglected to tell anyone about it. Now, 54 years later, he still clearly remembers his NDE, the depth of which was 28 of 32 (87.5%) on the Greyson NDE Scale [6]. He explained that it felt very real to him at the time. Now, when he thinks about it, he still remembers it vividly but like a dream. The pleasant feeling of being enclosed in pure blackness, totally painless, like floating vertically through a tunnel, toward and into an instant realm of dazzling light, like a billion stars bursting into his consciousness and inviting him and enveloping him in wonder and beauty and awareness. That is the reason he never told anyone about it, for fear they would not believe him, or think him odd. An only child, no siblings and no family nearby, other than his parents, he thought no one could possibly comprehend such an outlandish concept, not his parents, not his best friends, his doctors, not even the minister of his church.

However, years after his accident, and through self-rehabilitation, struggling with PTSD, clinical depression, brought on by grief from deaths in his family (his father, his daughter, and then his mother), and substance abuse disorders, his considerations of how to repeat that NDE developed into actual, possible, suicidal ideations. In the long run, legal drugs, caffeine, tobacco, alcohol, and analgesics, did not help him self-medicate. He dove into the ocean, swam down, and exhaled. That failed attempt, made him start thinking that NDE might contribute to suicide among TBI survivors—the hypothesis of this article. Therefore we propose that TBI-induced NDE be added to the list of risk factors for mortality.

2.2. Subjects

Gleaning TBI and NDE data from the PubMed interface, thinking it the most reliable for this kind of study, the 60-year longitudinal data, from 1961 to 2021, from 11 countries, were reviewed of patients with mild to severe TBI, who had up to 15 days in the intensive care unit (ICU), the inclusion criteria for this study. As many as 4057 individuals, including a beloved and well-known, world-famous author, Ernest Hemingway, who survived TBI but ended their lives by committing suicide (unlike the one TBI patient who followed through his NDE and suicide ideation but fortunately survived a single suicide attempt), comprised the subjects of this article.

3. Results and Discussion

Longitudinal data from the PubMed interface, for the 60 years from 1961 to

2021, revealed 4056 patients who survived TBI and then ended their lives by committing suicide. There was only one case of living through the experience of near death which was revealed to us in the young man's personal interview in the present study. Even though there were 924,745 published articles reporting NDEs, those experiences were not reported as being consequences of TBIs. In the 4056 TBI-to-suicide reports, neuropsychological assessment at long-term follow-ups widely evidenced that few TBI patients exhibited normal mental/physical functions compared to the general population, and that unfavorable GOS scores were risk predictors for neuropsychological and physical impairments later in life, with outcomes of depression, PTSD, poor QOL, and suicide. To our knowledge, this is the first report that links TBI to NDE and suicide.

In 1998, a National Institutes of Health (NIH) Consensus Statement mentioned that TBI may result in lifelong impairment of an individual's physical, cognitive, and psychosocial functioning, for which the prevalence was estimated to be from 2.5 to 6.5 million individuals in the United States [8]. TBI therefore remains a disorder of major public health significance. Presenting effective rehabilitation measures for persons suffering a TBI was the objective of the NIH statement.

Long-term survival prognosis after a TBI sustained in an automobile accident, a fall, a sports injury, or a domestic violence attack is related to the patient's age (at both the time of the injury and at the last follow-up), sex, and severity of disability [9] [10]. For many TBI survivors, in addition to various clinical symptoms and sequela, including neuromuscular involvement, and, over time, eventual cognitive and executive functioning decline, they experience unique effects and embarrassing, often, belittling situations [11] [12]. Situations that interfere with social life causing frustration and self-devaluing. In the course of time, during rehabilitation or its avoidance and merely observation, TBI survivors may also sustain other unrelated injuries. These could develop into a comorbid condition or secondary disability, and/or a psychological affectation or disorder, causing a general on-going decline in QOL [13] [14]. Moreover, such physical and psychological degeneration could subsequently develop in the short term, or gradually evolve over the long term, into suicidal ideations.

Physicians rely on standard modalities in long-term prognoses of TBI survivors. Evidence suggests that the close agreement between model predictions and actual mortality rates confirm the external validity of current prognostic models [9]. Therefore, careful and continued coordinated use of the available diagnostic tools, questionnaires, models, and scales help insure better long-term outcomes for TBI survivors, and may be helpful for individuals who have had TBI-induced NDEs. The association of NDE with suicidal ideation could thus be investigated through enhanced evaluation psychotherapy, rehabilitation, and long-term follow-up of these survivors, while taking into consideration numerous confounding variables of other risk factors for suicidal ideation that would most likely overlap with NDE, e.g., pain, grief, cognitive decline, addictions, neuropsychological impairments, marital and/or family issues, and work-related, socioeco-

conomic difficulties, among a myriad of others. These modalities, and the anticipated findings from future studies, may prove useful to aid in diagnoses and monitoring the recovery progress to help individuals live longer and enjoy a higher QOL. For post-coma patients, Brooks *et al.* showed that the GOS or the GOSE (5- or 8-point scales, respectively), the SF-36-COG to assess cognitive difficulties, the RAND SF-36 or the SF-12 to assess QOL, and the Greyson NDE Scale to assess the depth of an individual's NDE [6], can be used in combination, as a battery, to determine possible risks of neuropsychological impairments that may be revealed down the road in long-term follow-up examinations [9]. Properly employed, these could help to avoid suicidal ideations.

From Israel, Rassoovsky *et al.* [15] evaluated 89 TBI patients 14.2 years on average post-injury (range, 1 - 53 years) with a neuropsychological battery, multiple medical examinations, clinical interviews, and various questionnaires. They found the cognitive reserve construct helps explain significant variances in TBI outcomes exceeding what would be considered natural due to the severity of the initial or multiple injuries. Moreover, they declared TBI the most common cause of brain damage, resulting in long-term disability [15]. Over the years, long-term functional physical and/or mental disability, and continued aging, often lead to a variety of sequela including: stress, addictions, anxiety, depression, dysfunctional relationships, dementia, and a general decline in QOL [16]. These mount and, at some point later in their lives, bring on further comorbidities, self-devaluation, and even, in the direst circumstances, as for the 4516 individuals in the present study, develop into suicidal ideations of either self-inflicted suicide or physician-assisted suicide, active euthanasia.

The life expectancy of persons recovering from a TBI has been shown to be lower than that of the general population [10]. Regardless of age, sex, and severity of disability, mortality rates of persons who have sustained a TBI are higher compared to those who have never suffered from the mental strife, social indignations, and the various sequela stemming from a brain injury. The evidence shows that the older a person is at the initial injury or being male or female affects an individual's prospects of a long-term outcome. While survival has been shown to be poorer for TBI survivors than for the general population, it has also been shown that age, sex, and functional disability are significant risk factors for mortality [17].

Not only in the elderly, but even in young and previously healthy people, TBIs cause multiple problems including suicide. In an 11-year study of 315 mild TBI cases in USA army soldiers deployed to the Iraq War between 2003 and 2014, Vasterling *et al.* reported longitudinal associations among TBIs, PTSD symptoms, and neurocognitive functioning and posited that these decrements may contribute to sustained emotional and neurocognitive symptoms over time [18]. Numerous studies of Iranian soldiers reveal various accounts of suicides, but to our knowledge, none of those directly relate TBI to suicide.

In a study from Sweden, Stålnacke *et al.* reported that the Barrow Neurological Institute Screen for Higher Cerebral Functions (BNIS) subscale "speech/language"

at 1 year was significantly associated with favourable outcomes on the GOSE at 7 years [19]. *i.e.*, their results evidenced that cognitive function, as evaluated using the BNIS produced similar results as those using the GOSE for as long as 7 years post-injury. Their study was of 21 individuals, 14 males and 7 females, from 18 to 65 years old, who had sustained severe TBIs from traffic collisions, falls, sports, and unreported types of injuries. They suggested long-term, periodic screening and follow-up of cognitive function could be beneficial for the rehabilitation of severe TBI survivors [19].

Physical and psychological well-being play important roles in the patient's lengthy progress on the road to recovery. However, complicating the issue, the NIH found the rehabilitative measures for long-term cognitive and behavioral consequences of TBI to be lax and inadequate [8]. Therefore, what could be avoidable accidents and suicidal ideation leading to untimely deaths (e.g., reported as "accidental deaths" or suicides) may be remedied by longer rehabilitation and neuropsychological support through the many years of prolonged recovery.

Regarding this idea of long-term rehabilitation, impacting that is the fact that severe TBI changes the brain's ability to change, repair itself, and grow. It has been shown that neural plasticity changes after severe TBI, specifically, motor function recovery can occur even beyond 6 years after severe TBI, as evidenced by neural plasticity and clinical outcomes [20]. This suggests that even after severe TBI, long-term rehabilitation to improve physical function can be beneficial. Furthermore, Gautschi *et al.*, found that in TBI patients, in Switzerland, who had favorable GOS scores after receiving rehabilitation, as many as 75% had at least one severe neuropsychological deficit [13]. Therefore, they concluded that to help improve outcomes, neuropsychological support in rehabilitation should be continued even as long as decades after an individual sustains a TBI.

Post-Coma TBI-Induced NDE

As noted in the introduction, some patients, coming out of a coma, experience a TBI-induced NDE. This manifests as a visual sensation of floating through an expansive black void into a gradually intensifying, mystical, brilliant, white light, and feeling completely emerged in universal perfection and wisdom. Individuals who have had such an experience may feel a calling later in life to repeat that experience. Books have been written and movies produced about this kind of NDE and spiritual rebirth. In *Reborn in the Light*, Sutherland expounds her own experience of near death, and those of many others, and discusses the topics of religious beliefs, spiritual awareness, and even suicide following NDEs [21].

How an individual's religion and spirituality or philosophical beliefs play a part in this mix warrants further investigation. However, upon a cursory glance, there is little tangible evidence of this ephemeral realm that can be definitively or scientifically purposed. Some researchers have tried [22] [23], however, their studies remain largely inconclusive. To our knowledge, none have discussed the consequences of an NDE brought on by a TBI leading to suicidal ideation or sui-

ciality. For professionals in such cases, it would be helpful if the therapist or psychiatrist has knowledge of NDE. Without such knowledge, listening to and understanding what the patient is trying to convey, following along in the patient's sometimes rambling explanations, may prove difficult for them.

Harrison-Felix *et al.* showed, from 1961 to 2002, among a cohort of 1678 patients, in the USA, that, after 1 year post-injury, persons with TBI were three times more likely to commit suicide than were persons in the general population of similar age, sex, and race [24]. In 2011, Brenner *et al.* reported that U.S. veterans with a diagnosis of TBI were at greater risk for suicide than those without this diagnosis [25]. And in 2019, Hostetter *et al.* reported that in their study of U.S. veterans with TBI, the hazard of suicide by drug overdose or firearm was more than twice as higher than for those without TBI [26].

In Denmark, Madsen *et al.* also found that individuals with TBI had a two-fold increased suicide risk, compared with those without TBI [27]. In their study, from 1977 to 2014, a brief 37-year period, as many as 3362 patients, who had sustained a TBI, all fell victim to suicide. Remarkably, all those people, after surviving a TBI, developed suicidal ideations and decided to end their lives during their recovery. Those suicides occurred even after they had had medical treatment and a 10-year or longer follow-up [27].

From our observations over the last 60 years, we found that of more than 653,000 patients, who were reported as having survived TBIs, 4056 later committed suicide. Because it is so underreported, we will never know how many of those also had NDEs. This is a possible interpretation of causal effects suggesting what an NDE-TBI survivor might think before he or she decides to end it. Perhaps they are in hopes of attempting to attain that enlightenment they experienced, even years following the NDE.

Humphrey wrote, "... because of an individual's supremely euphoric and blissful NDE, that rather than bringing to an end a person's bodily and mental presence in the world, that an individual would choose to bring to a beginning a person's bodily, mental, and spiritual presence in (for that individual) a new realm of the universe. So, not seeking to escape physical or mental pain, would an individual choose to kill themselves, but rather choose to do so, to move on, devoid of physical or mental pain, to expand one's self into a new existence, into the light and perfect harmony in, and tranquility of knowledge and intellect" [28] [29].

For those individuals, who also may be suffering with dementia, and/or years of depression, thoughts on how to end it, in hopes of repeating their enlightening NDE, are within reason and surprisingly not far from the truth [30]. Bethune *et al.* found that suicidal ideation is common 3 months after mild TBI, and appears more at the 6-month follow-up [31]. They suggest earlier screening for predisposing factors and closer monitoring of those at risk for suicidality [31]. However, if at that point an individual seeks professional help, the therapist or psychiatrist must gauge the intensity of the patient's suicidal ideation, the existence of plans, the availability of means, the depth of depression, the extent of

social isolation, addictions (e.g., substance abuse, alcohol and/or legal or illegal drugs), and the degree to which the patient's communications are trustworthy in order to accurately evaluate the situation so that they can provide effective treatment [32]. At some point in their psychotherapy during TBI rehabilitation, the psychiatrist or psychologist could ask the patient about a possible NDE. And if the patient had such an experience, the subject of any suicide ideations could subsequently be delicately broached. In that regard, if the patient had both an NDE and suicidal ideations, discussions could be incorporated into the psychotherapy to help the patient better come to terms with such a unique conundrum and then explore ways how to cope with the feelings surrounding that remarkable set of experiences.

Hippocrates wrote, some 2500 years ago, "It's more important to know what sort of person has a disease than to know what sort of disease a person has." So that if a person sustains a TBI, and lives through the experience of near death, and if that person is now having suicidal ideations, you would think that the medical professionals and psychiatrists treating that person ought to want to know about such experiences. These findings will help guide psychosocial rehabilitation support teams, medical professionals, psychiatrists and psychologists to meet this challenge of keeping revenants alive—away from suicide, and keeping them on this side of the great river. That way, they may contribute to humanity by sharing their unique experiences and awareness.

The events leading up to Ernest Hemingway's death could support our hypothesis of TBI-induced NDE leading to increased suicide risk. Albeit posthumously, it could help to explain the thinking of TBI survivors who then decide to commit suicide. In 1999, the U.S. Surgeon General wrote, "A patient's suicidal intent has been a common justification for the involuntary use of electroconvulsive therapy (ECT), especially when other treatments are ineffective" [33]. Furthermore, in the movie, *One Flew Over the Cuckoo's Nest*, with Jack Nicholson (Fantasy Films, United Artists, 1975), the images of the effects the ECT medical treatment had on a patient's mind are painfully clear. Hemingway had sustained TBIs, from surviving multiple airplane crashes and an artillery shell explosion, and had been just such a patient who had undergone ECT, at the Mayo Clinic, MN, USA, in 1961. Soon after returning home from the hospital, he committed suicide with his favorite shotgun [34] [35] [36]. His own written words echo in silence in our ears, "If I should have died, it would have been very easy for me. Quite the easiest thing I ever did" [4]. Not long before he ended his life, he wrote, "What is the sense of ruining my head and erasing my memory? It was a brilliant cure but we lost the patient" [37]. He was worried that the ECT would destroy his mind and memories, and then he could not live the life he was used to.

It may be that to long-term NDE-TBI survivors, as it might have been to Hemingway, death is not really the end of life. In his novel, *Death in the Afternoon*, he wrote, "All stories, if continued far enough, end in death, and he is no true-story teller who would keep that from you" [38]. As a true-story teller, Ern-

est Hemingway ended his own life's story in death. A master of the story, he was; but of life and death, perhaps not so. It has also been said that all endings are but new beginnings. Who is to say that "life and death" does not fit that scheme? Those of us who have survived TBIs and had subsequent NDEs lost our natural, human, inborn fear of death. Confronted with it, we would say, "Okay, what's next? I'm ready. Let's go." And then we would look toward the infinite.

For the 4056 TBIs survivors who left this world by committing suicide, we will never know if they experienced near death following their brain injury. That will forever remain unproveable. The lack in known cases suggests that many NDEs go unreported. However subjective it may be, we cannot overlook the mounting anecdotal evidence that TBIs coupled with NDEs may lead to suicidal ideation and the real end of life.

4. Conclusion

Thousands of people, from countries all over the world, initially survived a TBI, a life-changing brain injury, then, for some reason or other, decided to end their lives by suicide. Therefore, further studies of long-term psychosocial rehabilitation following TBIs and on-going support for patients having had NDEs and suffering PTSD are warranted and may aid in reducing suicide risks and warding off preventable deaths. For TBI survivors, and their therapists, this article will hopefully help prevent suicides, especially of those souls who had an NDE and may be seeking to be relocated into the universal light, for those TBI survivors who have had that unique experience of actually having felt like they had already died.

Acknowledgements

The authors acknowledge the contributions of Takashi Katakura, Ph.D., Department of Physiology, Kitasato University School of Medicine, Kanagawa, Japan, and Daniel Brandt, Managing Director, MUFG Securities Americas, San Francisco, CA, USA, for their helpful advice.

Author Statement

R.E.B. conceptualized and conducted the study, collected and interpreted all the data, and drafted the manuscript. A.T. helped with interpreting the data and with H.K. critically reviewed the manuscript and provided critical insight into the paper. All authors have approved the final manuscript.

Data Availability

The data from this study will be available upon reasonable request to the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Levin, H.S., Shum, D. and Chan, R.C. (2014) Understanding Traumatic Brain Injury: Current Research and Future Directions. Oxford University Press, New York.
- [2] Herman, J. (2020) Complex PTSD at National Center for PTSD. http://www.ptsd.va.gov/professional/treat/essentials/complex_ptsd.asp
- [3] Smith, S.T. (2017) Hemingway's Chronic Traumatic Encephalopathy. *Psychiatric Times*, **34**.
- [4] Koch, C. (2020) What Near-Death Experiences Reveal about the Brain, in "Tales of the Dying Brain." *Scientific American*, **322**, 70-75.
- [5] Hou, Y., Huang, Q., Prakash, R. and Chaudhury, S. (2013) Infrequent near Death Experiences in Severe Brain Injury Survivors—A Quantitative and Qualitative Study. *Annals of Indian Academy of Neurology*, **16**, 75-81. <https://doi.org/10.4103/0972-2327.107715>
- [6] Greyson, B. (1983) The Near-Death Experience Scale: Construction, Reliability, and Validity. *The Journal of Nervous and Mental Disease*, **171**, 369-375. <https://doi.org/10.1097/00005053-198306000-00007>
- [7] Threlkeld, Z.D., Bodien, Y.G., Rosenthal, E.S., Giacino, J.T., Nieto-Castanon, A., Wu, O., Whitfield-Gabrieli, S. and Edlow, B.L. (2018) Functional Networks Reemerge during Recovery of Consciousness after Acute Severe Traumatic Brain Injury. *Cortex*, **106**, 299-308. <https://doi.org/10.1016/j.cortex.2018.05.004>
- [8] None (1998) Rehabilitation of Persons with Traumatic Brain Injury. *NIH Consensus Statement*, **16**, 1-41.
- [9] Brooks, J.C., Shavelle, R.M., Strauss, D.J., Hammond, F.M. and Harrison-Felix, C.L. (2015) Long-Term Survival after Traumatic Brain Injury Part I: External Validity of Prognostic Models. *Archives of Physical Medicine and Rehabilitation*, **96**, 994-999.E2. <https://doi.org/10.1016/j.apmr.2015.02.003>
- [10] Brooks, J.C., Shavelle, R.M., Strauss, D.J., Hammond, F.M. and Harrison-Felix, C.L. (2015) Long-Term Survival after Traumatic Brain Injury Part II: Life Expectancy. *Archives of Physical Medicine and Rehabilitation*, **96**, 1000-1005. <https://doi.org/10.1016/j.apmr.2015.02.002>
- [11] Himanen, L., Portin, R., Isoniemi, H., Helenius, H., Kurki, T. and Tenovuo, O. (2006) Longitudinal Cognitive Changes in Traumatic Brain Injury: A 30-Year Follow-Up Study. *Neurology*, **66**, 187-192. <https://doi.org/10.1212/01.wnl.0000194264.60150.d3>
- [12] Dahm, J. and Ponsford, J. (2015) Comparison of Long-Term Outcomes Following Traumatic Injury: What Is the Unique Experience for Those with Brain Injury Compared with Orthopaedic Injury? *Injury*, **46**, 142-149. <https://doi.org/10.1016/j.injury.2014.07.012>
- [13] Gautschi, O.P., Huser, M.C., Smoll, N.R., Maedler, S., Bednarz, S., von Hessling, A., Lussmann, R., Hildebrandt, G. and Seule, M.A. (2013) Long-Term Neurological and Neuropsychological Outcome in Patients with Severe Traumatic Brain Injury. *Clinical Neurology and Neurosurgery*, **115**, 2482-2488. <https://doi.org/10.1016/j.clineuro.2013.09.038>
- [14] Andelic, N., Howe, E.I., Hellström, T., Sanchez, M.F., Lu, J., Løvstad, M. and Røe, C. (2018) Disability and Quality of Life 20 Years after Traumatic Brain Injury. *Brain and Behavior*, **8**, e01018. <https://doi.org/10.1002/brb3.1018>
- [15] Rassovsky, Y., Levi, Y., Agranov, E., Sela-Kaufman, M., Sverdlik, A. and Vakil, E. (2015) Predicting Long-Term Outcome Following Traumatic Brain Injury (TBI).

Journal of Clinical and Experimental Neuropsychology, **37**, 354-366.

<https://doi.org/10.1080/13803395.2015.1015498>

- [16] Schwab, K.A., Gudmundsson, L.S. and Lew, H.L. (2015) Long-Term Functional Outcomes of Traumatic Brain Injury. *Handbook of Clinical Neurology*, **128**, 649-659. <https://doi.org/10.1016/B978-0-444-63521-1.00040-6>
- [17] Brooks, J.C., Strauss, D.J., Shavelle, R.M., Paculdo, D.R., Hammond, F.M. and Harrison-Felix, C.L. (2013) Long-Term Disability and Survival in Traumatic Brain Injury: Results from the National Institute on Disability and Rehabilitation Research Model Systems. *Archives of Physical Medicine and Rehabilitation*, **94**, 2203-2209. <https://doi.org/10.1016/j.apmr.2013.07.005>
- [18] Vasterling, J.J., Aslan, M., Lee, L.O., Proctor, S.P., Ko, J., Jacob, S. and Concato, J. (2018) Longitudinal Associations among Posttraumatic Stress Disorder Symptoms, Traumatic Brain Injury, and Neurocognitive Functioning in Army Soldiers Deployed to the Iraq War. *Journal of the International Neuropsychological Society*, **24**, 311-323. <https://doi.org/10.1017/S1355617717001059>
- [19] Stålnacke, B.M., Saveman, B.I. and Stenberg, M. (2019) Long-Term Follow-Up of Disability, Cognitive, and Emotional Impairments after Severe Traumatic Brain Injury. *Behavioural Neurology*, **2019**, Article ID: 9216931. <https://doi.org/10.1155/2019/9216931>
- [20] D'Arcy, R.C., Lindsay, D.S., Song, X., Gawryluk, J.R., Greene, D., Mayo, C., Hajra, S.G., Mandziuk, L., Mathieson, J. and Greene, T. (2016) Long-Term Motor Recovery after Severe Traumatic Brain Injury: Beyond Established Limits. *The Journal of Head Trauma Rehabilitation*, **31**, E50-E58. <https://doi.org/10.1097/HTR.000000000000185>
- [21] Sutherland, C. (1992) *Reborn in the Light: Life after Near-Death Experiences*. Bantam Books, New York.
- [22] Erminia, C. and Graham, M. (2008) Religion and Spirituality along the Suicidal Path. *Suicide and Life-Threatening Behavior*, **38**, 229-244. <https://doi.org/10.1521/suli.2008.38.2.229>
- [23] Rasic, D.T., Belik, S.L., Elias, B., Katz, L.Y., Enns, M., Sareen, J. and Swampy Cree Suicide Prevention Team. (2009) Spirituality, Religion and Suicidal Behavior in a Nationally Representative Sample. *Journal of Affective Disorders*, **114**, 32-40. <https://doi.org/10.1016/j.jad.2008.08.007>
- [24] Harrison-Felix, C.L., Whiteneck, G.G., Jha, A., DeVivo, M.J., Hammond, F.M. and Hart, D.M. (2009) Mortality Over Four Decades after Traumatic Brain Injury Rehabilitation: A Retrospective Cohort Study. *Archives of Physical Medicine and Rehabilitation*, **90**, 1506-1513. <https://doi.org/10.1016/j.apmr.2009.03.015>
- [25] Brenner, L.A., Ignacio, R.V. and Blow, F.C. (2011) Suicide and Traumatic Brain Injury among Individuals Seeking Veterans Health Administration Services. *The Journal of Head Trauma Rehabilitation*, **26**, 257-264. <https://doi.org/10.1097/HTR.0b013e31821fdb6e>
- [26] Hostetter, T.A., Hoffmire, C.A., Forster, J.E., Adams, R.S., Stearns-Yoder, K.A. and Brenner, L.A. (2019) Suicide and Traumatic Brain Injury Among Individuals Seeking Veterans Health Administration Services Between Fiscal Years 2006 and 2015. *The Journal of Head Trauma Rehabilitation*, **34**, E1-E9. <https://doi.org/10.1097/HTR.000000000000489>
- [27] Madsen, T., Erlangsen, A., Orlovská, S., Mofaddy, R., Nordentoft, M. and Benros, M.E. (2018) Association between Traumatic Brain Injury and Risk of Suicide. *Journal of the American Medical Association*, **320**, 580-588.

- <https://doi.org/10.1001/jama.2018.10211>
- [28] Humphrey, N. (2018) The Lure of Death: Suicide and Human. *Philosophical Transactions of the Royal Society B*, **373**, Article ID: 20170269. <https://doi.org/10.1098/rstb.2017.0269>
- [29] Farrar, J.T. (2019) Pain Interference on Quality of Life Is Not Just about Physical Function. *Pain Medicine*, **20**, 211-212. https://doi.org/10.1093/pm/pny147_2
- [30] Fann, J.R., Ribe, A.R., Pedersen, H.S., Fenger-Grøn, M., Christensen, J., Benros, M.E. and Vestergaard, M. (2018) Long-Term Risk of Dementia among People with Traumatic Brain Injury in Denmark: A Population-Based Observational Cohort Study. *The Lancet Psychiatry*, **5**, 424-431. [https://doi.org/10.1016/S2215-0366\(18\)30065-8](https://doi.org/10.1016/S2215-0366(18)30065-8)
- [31] Bethune, A., da Costa, L., van Niftrik, C.H.B., and Feinstein, A. (2017) Suicidal Ideation after Mild Traumatic Brain Injury: A Consecutive Canadian Sample. *Archives of Suicide Research*, **21**, 392-402. <https://doi.org/10.1080/13811118.2016.1199990>
- [32] Dammann, G. and Gerisch, B. (2005) [Narcissistic Personality Disorders and Suicidal Behaviour. A Psychodynamic Perspective on Treatment Difficulties.] *Schweizer Archiv für Neurologie und Psychiatrie*, **156**, 299-309. <https://doi.org/10.4414/sanp.2005.01625>
- [33] Satcher, D. (1999) Mental Health: A Report of the Surgeon General. US Public Health Service, Bethesda, MD.
- [34] Smith, D. (2001) Shock and Disbelief. *Atlantic Monthly*, **287**, 79-90.
- [35] Brean, J. (2019) Before Ernest Hemingway's Suicide, Nine Concussions Incapacitated His Brain, Forensic Psychiatrist Concludes. National Post. <http://nationalpost.com/entertainment/hemingways-depression-was-spurred-on-by-cte-blows-to-the-head-new-book-argues>
- [36] Byers, A.L., Li, Y., Barnes, D.E., Seal, K.H., Boscardin, W.J. and Yaffe, K. (2020) A National Study of TBI and Risk of Suicide and Unintended Death by Overdose and Firearms. *Brain Injury*, **34**, 328-334. <https://doi.org/10.1080/02699052.2019.1701708>
- [37] Hotchner, A.E. (1967) Papa Hemingway: A Personal Memoir. Bantam Books, New York.
- [38] Hemingway, E. (1932) Death in the Afternoon. Scribner, New York, 517 p.