

An Analysis of the Differences in Educational Attainment between TBI Severity Level, Gender,

and Injury Cause

by

Justin Jordan

Master of Public Health, California Baptist University, 2021

Thesis Submitted in Partial Fulfillment

of the Requirements for the Degree of

Master of Public Health

California Baptist University

August 2021

© 2021

Justin Jordan

The College of Health Science

California Baptist University

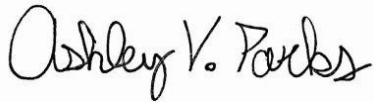
Riverside, California

This is to certify that the Master's Thesis of

Justin Jordan

has met the thesis requirements  
for the degree of  
Master of Public Health

Approved by:



---

Ashley Parks, DrPH, MPH  
Associate Professor  
Committee Chair



---

Marshare Penny, DrPH, MPH  
Clinical Professor of Public Health  
Committee Member



---

Lindsay Fahnestock, DrPH, MPH  
Assistant Professor  
Committee Member

## **Abstract**

Traumatic Brain Injury (TBI) has become increasingly prevalent in the last ten years and poses a major threat to public health. TBI continues to plague millions of individuals around the world on an annual basis (Galgano et al., 2017). The purpose of this study was to evaluate the differences in the educational attainment of TBI survivors across injury severity, gender, and cause of injury. This study examined the differences in the educational attainment across severity levels classified as mild, moderate, and severe. Second, this study examined differences in educational attainment of TBI survivors between males and females. Lastly, this study evaluated the differences between the educational attainment of TBI survivors across injury cause categories. Secondary data was utilized from the 2019 Traumatic Brain Injury Model Systems National Data and Statistical Center (TBINDSC). In this study, a One-Way ANOVA and Independent Samples *t*-test were used to evaluate the data and examine differences in educational attainment across gender and severity categories. It was found that there was a significant difference in educational attainment across severity levels, however, there was not a significant difference found between educational attainment and gender. Furthermore, this study found that there was a significant difference in educational attainment across injury cause categories. This shows a need for increased promotion of safety measures to avoid injuries due to risky behaviors.

*Key Words: cause, education, gender, severity, traumatic brain injury*

## **Acknowledgments**

I would like to express my gratitude to all of the amazing individuals who have guided and supported me throughout this project and my MPH program. First, to my thesis chair, Dr. Parks, thank you for your support and understanding during this thesis. Your support, guidance, and expertise were incredibly helpful during my MPH program. Thank you for always being so understanding and helping through the tough times. Next, I want to thank Dr. Penny and Dr. Fahnestock for serving on my committee. The support, time spent, and feedback you provided to me on this project and throughout my time at CBU are greatly appreciated. I would also like to thank my family and friends for always pushing me to reach my goals and the opportunities you have provided.

Lastly, I would like to give a special acknowledgment to my dearest cousin, Samantha. You are the reason I chose to pursue a degree in healthcare. Watching your amazing recovery from your traumatic brain injury throughout the last fifteen years has shown me that anything is possible. You are a true testament to the miracles that God can perform.

## Table of Contents

<b>List of Tables .....</b>	<b>ii</b>
<b>Introduction.....</b>	<b>3</b>
Overview of the Literature.....	3
Purpose of the Study .....	7
Research Questions.....	7
Hypotheses.....	7
<b>Methods.....</b>	<b>9</b>
Design .....	9
Procedures.....	9
Participants.....	10
Independent Variable and Dependent Variable .....	10
Data Analysis .....	11
<b>Results .....</b>	<b>13</b>
Major Findings.....	13
<b>Discussion .....</b>	<b>16</b>
Public Health Implications.....	17
Study Limitations.....	18
Conclusion. ....	19
<b>References.....</b>	<b>20</b>

## List of Tables

Table 1. <i>Demographic Details for 2019 TBINDSC Participants</i> .....	13
Table 2. <i>Educational Attainment Across TBI Severity Levels</i> .....	14
Table 3. <i>Education Attainment and Gender</i> .....	15
Table 4. <i>Educational Attainment Across TBI Injury Cause</i> .....	15

## **Introduction**

### **Overview of the Literature**

A traumatic brain injury (TBI) is a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head, or penetrating head injury (Centers for Disease Control, 2020). Symptoms of a TBI can be mild, moderate, or severe, depending on the extent of damage to the brain. Most commonly severity of a TBI is determined by the Glasgow Coma Scale. The Glasgow Coma Scale (GCS) rates the severity of the injury based on spontaneous eye-opening to various stimuli, verbal response, and motor response (Jain, 2020). Each classification is given a number based on how successful or unsuccessful the person is at completing those requirements. For the eye response, the patient would receive a score of one for no eye-opening, a score of two for eye-opening with to pain, a score of three for eye-opening to sound, and a score of four for eye-opening spontaneously (Jain, 2020). A verbal response is scored as a one for no response, score of two for incomprehensible sounds, a score of three for unclear words, a core of four for confused noises, and a score of five for clear and orientated speech (Jain, 2020). Lastly, motor function is scored as one for no function, a score of two for an abnormal extension to pain, a score of three for abnormal flexion to pain, a score of four for withdrawal to pain, a score of five for localizing pain, and a score of five for obeying commands (Jain, 2020). The total Coma Score thus has values between three and 15, three being the worst and 15 being the highest (Jain, 2020). Brain injury is classified as mild if the GCS is 13-15, moderate if GCS is 9-12, and classified as severe if GCS is 8 or less. Mild cases may result in a brief change in mental state or consciousness. Severe cases may result in extended periods of unconsciousness, coma, or even death (Agarwal et al., 2020).



## **Mild TBI**

Symptoms of mild TBI are different for each person, and symptoms may change during the course of recovery. Mild TBI occurs when a victim does not lose consciousness or loss of consciousness is thirty minutes or less. Victims of mild TBI may experience confusion and disorientation, headache, dizziness, and trouble speaking clearly. Mild TBI symptoms can last anywhere from a couple of hours to a couple of weeks.

## **Moderate/Severe TBI**

A moderate or severe TBI is caused by a bump, blow, jolt to the head, or a penetrating injury (CDC, 2020). Severe TBI can result in bruising, torn tissues, bleeding, and other physical damage to the brain. These injuries can result in long-term complications or death. Symptoms of severe TBI may appear immediately, while others may appear days or weeks later. Severe TBI victims can lose consciousness from a few minutes to multiple hours. Other symptoms associated with a severe TBI include seizures, inability to wake up after sleep, numbness and tingling in fingers and toes, and slurred speech.

## **Prevalence of TBI**

Traumatic brain injury is a leading cause of death and disability for children and teens ages one to nineteen years in the United States (CDC, 2004). The Centers for Disease Control and Prevention reported that annually between 1995 and 2003, an average of 44,000 children aged five to 18 sustained brain injuries requiring hospitalization (CDC, 2005). According to the CDC, approximately 5.3 million people with traumatic brain injuries live in the United States, with about 80,000 to 90,000 new cases occurring every year (CDC, 2005). In 2013, there were approximately 640,000 TBI-related emergency department visits, 18,000 TBI-related hospitalizations, and 1,500 TBI-related deaths among children 14 years of age and younger

(Taylor et al., 2017). The leading causes of non-fatal TBI in the United States are falls (35%), motor vehicle-related injuries (17%), and strikes or blows to the head from or against an object (17%), such as in sports injuries (Faul et al., 2010). The leading causes of TBI-related deaths are motor vehicle crashes, suicides, and falls (Coronado et al., 2011). According to a new report from the US Centers for Disease Control and Prevention, fall-related TBI deaths increased from 3.86 per 100,000 individuals in 2008 to 4.52 per 100,000 people in 2017, representing a 17% increase (Walter, 2020).

### **Difficulties Related to TBI**

Individuals with TBIs of all severities report cognitive impairments in areas such as memory, attention, and executive function (Kennedy & Krause, 2011). For college students with histories of TBI, the cognitive deficits they face as well as the hidden nature of these deficits may affect both academic performance and social participation (Konrad et al., 2011). College students with TBI's routinely experience academic, cognitive, and social-emotional challenges that have the potential to affect their postsecondary experiences. Kennedy and colleagues (2008) confirmed this through a survey. They found approximately 50% of college students with TBI's of varying severities reported difficulty with relationships, and close to 30% indicated they had problems maintaining friendships.

### **Factors Influencing Outcomes**

Recovering from a TBI has many factors, such as health status, social and environmental situation, genetics, and access to proper care. A person's medical history, age, and gender can all be factors that influence their recovery after a TBI. The classification of the severity of the injury will determine the extent that personal factors influence recovery. Social and environmental factors are some of the most significant concerns surrounding TBI. Many patients

never recover full social independence, even though they may have no physical disabilities and a normal life expectancy. After suffering a moderate to severe TBI, that survivor will likely need immense daily care and support (Humphreys et al., 2013). The ability to acquire such extensive care is greatly influenced by socioeconomic status, peer support, and access to effective healthcare (Hart et al., 2018). TBI is a specific injury which requires many types of specialists to get the best treatments (Hart et al., 2018). Often, there are no specialists available in all areas, and it places a burden on the person if they cannot easily access them (Hart et al., 2018).

### **TBI and Education/Employment**

Severe TBI cases result in long lasting and difficult challenges for people pursuing education. TBI survivors pursuing education often receive support from therapists and rehabilitation specialists as well as support from programs in place by the school they attend. The primary concern with school-based support is that often the accommodations are focused on students with physical disabilities. TBI symptoms are not always easily noticed. A person may have no visible disabilities, but could have neurological disabilities that can go unseen. Students with TBI often have acquired challenges rather than developmental challenges and they are forced to manage pre- and post-injury learning styles and abilities (Ylvisaker et al., 2001). Teachers in school may not realize that the student has a major neurological disability and could assume that they should be able to do tasks just as someone without an injury would. This assumption can lead to poor educational outcomes for the students because they may not receive the amount of attention they truly need. Various methods of accommodating students and attempting to expedite learning has been ignored by researchers and educational professionals and has received minimal attention (Ylvisaker et al., 2001). Students with TBI were included in

the second National Longitudinal Transition Study (NLTS2), a 10-year study of outcomes for more than 11,000 students with disabilities (Wagner et al., 2005). The study found that two or more years after transition from high school, young adults with TBI who received special education services in high school are employed and enrolled in post-secondary education at lower rates than peers in the general population (Wagner et al., 2005).

### **Purpose of the Study**

The purpose of this study will serve to find opportunities to improve educational resources and graduation rates for TBI survivors. The study explores the medical aspects of TBI, the treatment and recovery process, costs involved in living with a TBI, and educational resources and graduation rate of TBI survivors.

### **Research Questions**

This study will address the following research questions:

- 1) Is there a statistically significant difference in educational attainment across TBI severity levels?
- 2) Is there a statistically significant difference in educational attainment for TBI survivors between genders?
- 3) Is there a statistically significant difference in educational attainment across injury cause categories?

### **Hypotheses**

H1: There is a difference in educational attainment level across TBI severity levels.

H2: Male TBI survivors will have a lower educational attainment level than females.

H3: There is a difference in educational attainment level across injury cause categories.

## **Methods**

### **Design**

This study utilizes a longitudinal analysis and includes secondary data from the 2019 Traumatic Brain Injury Model Systems National Data and Statistical Center (TBINDSC). The TBINDSC located at Craig Hospital in Englewood, Colorado, is a central resource for researchers and data collectors within the Traumatic Brain Injury Model Systems (TBIMS) program. Because the data used was collected as secondary data, there was no need to obtain Institutional Review Board (IRB) approval. The primary purpose of the TBINDSC is to advance medical rehabilitation by increasing the rigor and efficiency of scientific efforts to longitudinally assess the experience of individuals with traumatic brain injury (TBI). The TBIMS National Database includes demographic information, pre-injury history, long-term medical and social outcomes, community integration outcomes, daily living and employment outcomes, and Information related to the degree of disability associated with TBI (TBIMS, 2019).

### **Procedures**

The TBIMS National Database includes data collect through questionnaires and through review of patient charts on preinjury, injury, acute care, rehabilitation, and outcomes at one, two, and five years post-injury and every five years with information on persons, so far, up to 30 years post-injury (NDSC,2020). The primary purpose of the TBINDSC is to advance medical rehabilitation by increasing the rigor and efficiency of scientific efforts to longitudinally assess the experience of individuals with traumatic brain injury (NDSC, 2020). Data is collected through a series of pre- and post-injury questionnaires and surveys. On a quarterly basis, the NDSC is responsible for generating TBIMS reports, and preparing datasets for statistical analysis (NDSC, 2020).

## **Participants**

Participants are selected to participate in the TBIMS survey by meeting certain inclusion criteria. Participants must meet one of the following criteria to be in the study: Post Traumatic Amnesia for longer than 24 hours, 16 years or older at time of injury, presenting to the TBIMS's acute care hospital within 72 hours of injury, Trauma related intracranial neuroimaging abnormalities, Loss of consciousness exceeding 30 minutes, Glasgow Coma Scale score in the emergency department of less than 13 (TBINDSC, 2019). The minimum sample size for the research questions was determined by G\*Power Software, version 3.1.9.2. A medium effect size, alpha level of 0.5, and power of 80% were used to determine a minimal sample size of 352 for a two-tailed independent samples t-test and a minimum sample size of 111 for the one-way ANOVA. However, due to the distribution of respondents across injury categories used in the analysis, a sample size of 1,000 was used to allow for a sufficient sample size in each category for all four research questions. Since not all individuals provided a response to all the questions, the sample size for each research question was not the same. Research questions one and two included 695 respondents who answered education level, severity, and gender questions. Research question three had a sample size of 694 participants with an additional missing response for the cause of injury. By having a larger sample size, the results were more reliable, and each research question's study was more precise.

## **Independent Variable and Dependent Variable**

The study consisted of three research questions. The first research question asking, "Is there a statistically significant difference in educational attainment across TBI severity levels?" had an independent variable of severity. Severity is categorized as mild, moderate, or severe. The second research question asking, "Is there a statistically significant difference in educational

attainment for TBI survivors between genders?” had an independent variable of gender. Gender was defined as male or female. The final research question asking, “Is there a statistically significant difference in educational attainment across injury cause categories?” had an independent variable of injury cause. The injury cause categories in the study were 1 - Motor Vehicle; 2 - Motorcycle; 3 - Bicycle; 4 - All-Terrain Vehicle and All-Terrain Cycle; 5 - Other Vehicular: Unclassified; 10 - Gunshot Wound; 11 - Assaults With Blunt Instrument; 12 - Other Violence; 13 - Water Sports; 14 - Field/Track Sports; 15 - Gymnastic Activities; 16 - Winter Sports; 17 - Air Sports; 18 - Other Sports; 19 - Fall; 20 - Hit By Falling/Flying Object; 21 - Pedestrian; 77 - Other Unclassified; and 99 – Unknown. In this study, the dependent variable remained constant amongst all research questions. The dependent variable for all research questions was Education Level Post-TBI. Education Level Post – TBI was classified as 1 - 1 Year or Less; 2 - 2 Years; 3 - 3 Years; 4 - 4 Years; 5 - 5 Years; 6 - 6 Years; 7 - 7 Years; 8 - 8 Years; 9 - 9 Years; 10 - 10 Years; 11 - 11 or 12 years: No diploma; 12 - HS Diploma; 13 - Work Toward Associate's; 14 - Associate's Degree; 15 - Work Toward Bachelor's; 16 - Bachelor's Degree; 17 - Work Toward Master's; 18 - Master's Degree; 19 - Work Toward Doctoral Level; 20 - Doctoral Level Degree.

### **Data Analysis**

The first research question was evaluated by using a one-way ANOVA to determine if there were differences in educational attainment across patients classified within the different severity levels of TBI. The second research question of the study used an independent samples t-test to determine if there was a difference in educational attainment for TBI survivors between genders, male and female. The final research question of the study also utilized a One-Way



ANOVA to determine if there was a difference in educational attainment across injury cause categories.

## Results

### Major Findings

Secondary data from the 2019 Traumatic Brain Injury Model Systems National Data and Statistical Center (TBINDSC) was analyzed to evaluate the three research questions in this study. The total sample size for this study was 1,000 participants. Of the 1,000 participants in the study, 263 identified as female and 737 identified as male. Furthermore, as shown in Table 1, 59.2% of participants identified as White, 22.6% identified as Black, 3% identified as Pacific Islander, 0.2% identified as Native American, 14% identified as Hispanic, and 1% identified as other.

**Table 1**

*Demographics Details for 2019 TBINDSC Participants (n=1,000)*

		N	%
Gender	Male	737	73.7
	Female	263	26.3
Age	0-10	55	5.5
	11-21	93	9.3
	22 – 32	45	4.5
	33 – 43	18	1.8
	44 – 54	15	1.5
	55 and Older	31	3.1
Ethnicity	White	592	59.2
	Black	226	22.6
	Asian/Pacific Islander	30	3.0
	Native American	2	0.2
	Hispanic	140	14.0
Education Level	0 -10 Years	107	10.7
	11 or 12 Years No Diploma	58	5.8
	HS Diploma	185	18.5
	Enrolled Associate’s or Associate’s Earned	113	11.3
	Enrolled Bachelor’s or Bachelor’s Earned	154	15.4
	Enrolled Master’s or Master’s Earned	56	5.6
	Enrolled Doctorate or Doctorate Earned	22	2.2

*Note: N = sample size; % = percentage. Data Source: 2019 TBINDSC*

## Educational Attainment Across Severity Level

To answer the question, “Is there a statistically significant difference in educational attainment across TBI severity levels?” a one-way ANOVA was performed using 695 respondents. In alignment with the original research hypothesis, there was a significant difference between severity and educational level at the  $p < .05$  level for the three conditions [ $F(2, 692) = 4.533, p = .011$ ]. These results showed that the severity level of a TBI, whether it be mild, moderate, or severe, does influence the educational attainment level for TBI survivors. A post hoc Tukey test indicated that educational attainment for patients in the mild severity group did not differ significantly from patients in the moderate severity group,  $p = 0.677$ , but did indicate a significant difference in educational attainment between patients in the mild severity group and patients in the severe severity group,  $p = 0.011$ .

**Table 2**

	N	Mean	SD	F	P
Severity Level				4.53	0.011
Mild	211	13.47	3.00		
Moderate	236	13.23	3.13		
Severe	248	12.65	2.91		
Total	695	13.10	3.03		

*Note: One Way ANOVA revealed a significant difference between severity and educational level at the  $p < .05$  level for the three conditions [ $F(2, 692) = 4.533, p = .011$ ].*

## Educational Attainment and Gender

To answer the second question, “Is there a statistically significant difference in educational attainment for TBI survivors between genders?” an Independent Samples T-Test was utilized. Contrary to the research hypothesis, the research showed that there was no significant difference in educational attainment for TBI survivors between genders. There was not a

significant difference in educational attainment for females (M= 13.28, SD=2.891) and males (M= 13.02, SD= 3.076) conditions;  $t(693) = 1.014, p = 0.311$ . These results suggest that gender does not influence the educational attainment level for TBI survivors.

**Table 3**

*Education Attainment and Gender*

	N	Mean	SD	T	P
Gender				1.014	Greater than .001
Female	194	13.28	2.891		
Male	501	13.02	3.076		
					* $p > .05$

*Note: n = 695, CI, Confidence Interval. Independent Samples t -test did not reveal a significant difference in educational attainment between genders  $p = .320$*

**Educational Attainment and Injury Cause**

Lastly, to answer the third research question, “Is there a statistically significant difference in educational attainment across injury cause categories?” a One-Way ANOVA was performed. In alignment with the original research hypothesis, there was a highly significant difference between injury cause categories and educational level at the  $p < .05$  level for the three conditions [ $F(15, 678) = 4.984, p = .001$ ]. These results show that the cause of a TBI has a large impact on the educational attainment level for TBI survivors.

**Table 4**

	N	Mean	SD	F	P
Injury Cause				4.98	0.001
Motor Vehicle	221	12.93	2.87		
Motorcycle	66	13.15	2.21		
Bicycle	21	16.71	3.07		
ATV/ATC	8	13.63	2.39		
Other Vehicile	7	12.71	4.19		
Gunshot Wound	26	11.38	2.55		
Assault with Blunt Instrument	57	11.53	2.00		
Other Violence	5	12.00	2.45		
Water Sports	2	18.00	2.83		
Winter Sports	3	15.67	2.52		
Air Sports	1	14.00			
Other Sports	6	14.33	2.422		
Fall	206	13.40	3.33		
Hit by Falling/Flying Object	6	14.83	3.49		
Pedestrian	58	13.00	2.85		
Other	1	16.00			
Total	694	13.10	3.03		

*Educational Attainment Across TBI Injury Cause*

*Note: One Way ANOVA revealed a significant difference between injury cause categories and educational level at the  $p < .05$  level for the three conditions [ $F(15, 678) = 4.984, p = .001$ ].*

## Discussion

The first research question examined the difference in educational attainment level across TBI severity levels categorized as mild, moderate, or severe using a One-Way ANOVA. The results showed that there was a significant difference in educational attainment among severity levels (see Table 2). The results are aligned with previous research studies showing that children with severe TBI had low school competency ratings (Prasad, et al., 2017). According to De Netto and McKinlay (2019), adult childhood outcomes are influenced by initial injury severity, with those with mild traumatic brain injury having predominantly good outcomes, while those with moderate/severe traumatic brain injury have poorer outcomes in all areas of adult functioning.

The second research question addressed the difference in educational attainment between genders, male and female, by utilizing an independent samples *t*-test. The results showed that there is no significant difference between the educational attainment of TBI survivors related to gender. Other research studies have shown that men have a higher incidence of TBI than women, particularly during young adulthood (Mollayeva & Colantonio, 2020). Research suggests that this increased risk is likely related to males' often engaging in more risk-taking behavior, contact sports, and alcohol consumption (Frost, et al., 2013). However, despite men having a higher incidence rate of TBI overall, there has not been any findings that educational attainment is affected by gender.

Research question three examined the difference in educational attainment across injury cause categories. A One-Way ANOVA was utilized to evaluate this difference. Results showed a highly significant difference in educational attainment across injury cause categories. This analysis included injury causes such as vehicle accidents, gun violence, athletics, falls, and injury caused by various objects. The data showed the greatest cause of TBI injury was motor vehicle

accidents (32.3%) followed by falls (29.1%). This is consistent with current literature stating that “An increase in risk-taking behavior is also typically seen in adolescence” (Kennedy, et al., 2017). A similar study published in *Journal of Medicine and Life* found that the leading cause of TBI in the U.S. general population was motor vehicle accidents and were responsible for 50% of all TBI injuries and that falls accounted for 20 – 30% of all TBI injuries (Popescu, et al., 2015).

### **Public Health Implications**

This research focused on examining the TBI survivors and their educational attainment. The study intended to determine factors that allow or prohibit survivors from starting or advancing in their educational careers. The findings of this study explored the relationships between different situations and factors that can place individuals at risk for suffering a TBI. This research is valuable for policymakers, public health professionals, schools and universities, and community members to ensure they are taking preventative measures to avoid suffering a TBI. It is valuable because it can help to improve the prevention, screening, and treatment of TBI victims to save lives. The data further showed that the cause of injury and severity of the injury greatly affect an individual’s ability to complete an education. Public health agencies need to ensure that proper preventative measures are being promoted in their communities to avoid these tragedies.

In 1990, TBI was added to federal special education law as an educational disability, and reporting on TBI became mandatory in 1992 under the Individuals with Disability Education Act (IDEA) (Dettmer et al., 2014). Most states require that a student meet the following two criteria to qualify for TBI services under IDEA: (1) medical documentation of an event likely to have caused a TBI, and (2) assessment results that demonstrate that the student needs specially

designed instruction to benefit from the educational environment (Dettmer et al., 2014). Requiring medical documentation of TBI for students to be eligible for special education services or 504 plans can be a barrier to effective identification and service delivery (Dettmer et al., 2014). To provide services more effectively, the following four points be considered:

- Increase leadership within Department of Education on TBI initiatives.
- Identify new processes for referrals and collaborating between medical/rehab centers, and schools
- Create more effective policies that allow for identification and eligibility for educational supports in the absence of medical documentation.
- Increase funding and administrative support for personnel training.

### **Study Limitations**

This study did have limitations. First, the study utilized a pre-injury questionnaire to collect data. There was potential for some bias to be recorded due to the questionnaire being completed by the patient or their family. Due to the family being able to complete the questionnaire, there is the possibility that they did not know the exact answers regarding the patient or they may have introduced their own bias when answering the questions. Further limitations to this study include the fact that the study is based on follow-up data. Because the study relies on collecting follow-up data, there is the potential to not have complete continuity due to patients dropping out for various reasons. Further, this study only updates the highest education level attained if the patient is contacted for follow-up. This can lead to missing or incomplete data for some variables. Lastly, this study was unable to include a post-hoc test on severity level due to at least one group having fewer than 2 cases.



## **Conclusion**

Traumatic brain injuries are life-changing injuries that can affect a person's overall quality of life. TBI's can have effects on a person's social, mental, physical, and emotional well-being. This study examined TBI and the differences in educational attainment across severity, gender, and the cause of the injury. The study demonstrated that there is a significant difference in educational attainment across severity levels. The type of diagnosis a person receives, whether mild, moderate, or severe, is a factor in their ability to complete their educational career.

Further, the study displayed that there is no significant difference between males and females regarding educational attainment related to TBI and that the cause of the injury does in fact, show significant differences in educational attainment. This is likely due to the assumption that high risk activities can result in more severe injuries, which will have greater effects on the person's life. This study showed the importance of recognizing TBI and providing effective resources to survivors to help them succeed in their educational careers. It is imperative to develop TBI prevention strategies and effective support programs for TBI survivors that wish to obtain an education.

## References

- American Association of Neurological Surgeons. (2020). Traumatic brain injury.  
<https://www.aans.org/Patients/Neurosurgical-Conditions-and-Treatments/Traumatic-Brain-Injury>.
- Centers for Disease Control and Prevention. (2004). Traumatic brain injury: Incidence & distribution. <https://www.cdc.gov/node.do/id/900f3ec800dbdc/aspectId/A0400020>
- Centers for Disease Control and Prevention. Interactive data tables.  
<http://www.cdc.gov/nchs/health data for all ages.htm>. Published 2005.
- Center for Disease Control (2005). *Facts about traumatic brain injury*.  
[http://www.cdc.gov/Migrated Content/Fact Sheet/Freeform Fact Sheet \(General\)/FactsAbout TBI.pdf](http://www.cdc.gov/Migrated Content/Fact Sheet/Freeform Fact Sheet (General)/FactsAbout TBI.pdf).
- Centers for Disease Control and Prevention. (2020, August 28). *Traumatic brain injury / Concussion*. <https://www.cdc.gov/traumaticbraininjury/index.html>.
- Centers for Disease Control and Prevention. (2021, May 12). *Moderate and severe TBI*.  
<https://www.cdc.gov/traumaticbraininjury/moderate-severe/index.html>.
- Coronado, V., Xu., L., Basavarju, S., McGuire, L., Wald, M., Guzman, B., & Hemphill, J. (2011). Surveillance for traumatic brain injury-related deaths-United States, 1997-2007. *Morbidity and Mortality Weekly Report Surveillance Summaries*, 60(5), 1-32. PMID: 21544045
- Dettmer, J. Ettl, D., Glang, A., & McAvoy, K. (2014). Building statewide infrastructure for effective educational services for students with TBI: Promising practices and

recommendations. *Journal of Head Trauma Rehabilitation*, 29(3), 224-232. doi: 10.1097/HTR.ob013e3182a1cd68.

Faul, M., Xu, L., Wald, M.M., and Coronado, V.G. (2010). *Traumatic brain injury in the United States: Emergency department visits, hospitalizations, and deaths 2002–2006*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Frost, R., Farrer, T., Primosch, M., & Hedges, D. (2013). Prevalence of traumatic brain injury in the general adult population: A meta-analysis. *Neuroepidemiology*, 40(3), 154-159. <https://doi.org/10.1159/000343275>

Galgano, M., Toshkezi, G., Qiu, X., Russell, T., Chin, L., & Zhao, L. (2016). Traumatic brain injury: Current treatment strategies and future endeavors. *Cell Transplantation*, 26(7), 1118-1130. doi: 10.1177/0963689717714102

Hart, T., Driver, S., Sander, A., Pappadis, M., Dams-O'Connor, K., Bocage, C., Hinkens, E., Dahdah, M. N., & Cai, X. (2018). Traumatic brain injury education for adult patients and families: A scoping review. *Brain Injury*, 32(11), 1295-1306. <https://doi.org/10.1080/02699052.2018.1493226>

Jain, S., & Iverson, L. (2021). Glasgow coma scale. In: StatPearls [Internet]. StatPearls Publishing. PMID: 30020670.

Kennedy, E., Cohen, M., & Munafò, M. (2017). Childhood traumatic brain injury and the associations with risk behavior in adolescence and young adulthood: A systematic

review. *Journal of Head Trauma Rehabilitation*, 32(6), 425-432.

<https://doi.org/10.1097/htr.0000000000000289>

Kennedy, M., & Krause, M. (2011). Self-regulated learning in a dynamic coaching model for supporting college students with traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 26(3), 212-223. <https://doi.org/10.1097/htr.0b013e318218dd0e>

Konrad, C., Geburek, A. J., Rist, F., Blumenroth, H., Fischer, B., Husstedt, I., Arolt, V., Schiffbauer, H., & Lohmann, H. (2010). Long-term cognitive and emotional consequences of mild traumatic brain injury. *Psychological Medicine*, 41(6), 1197-1211. <https://doi.org/10.1017/s0033291710001728>

Popescu, C., Anghelescu, A., Daia, C., & Onose, G. (2015). Actual data on epidemiological evolution and prevention endeavours regarding traumatic brain injury. *Journal of Medicine Life*, 8(3), 272-277. PMID: 26351526.

Traumatic Brain Injury National Data Center, 2005, Traumatic brain injury: Facts and figures. [http://www.tbinc.org/registry/pdf/ff\\_winter2005.pdf](http://www.tbinc.org/registry/pdf/ff_winter2005.pdf).

Traumatic Brain Injury National Data and Statistical Center. TBI Model Systems National Data Center Annual Report for 2004. <http://www.tbindsc.org>.

Taylor, C., Bell, J., Breiding, M., & Xu, L. (2017). *Traumatic brain injury–related emergency department visits, hospitalizations, and deaths - United States, 2007 and 2013*. *Morbidity and Mortality Weekly Report Surveillance Summaries*, 66(SS-9), 1-16. doi: [http://dx.doi.org/10.15585/mmwr.ss6609a1external icon](http://dx.doi.org/10.15585/mmwr.ss6609a1external_icon).

Wagner M, Newman L, Cameto R, Garza N, Levine P. After High School: A First Look at the Postschool Experiences of Youth with Disabilities. A report from the National

Longitudinal Transition Study-2 (NLTS2). Menlo Park, CA: SRI International;  
2005.<http://www.nlts2.org>.

Walter, K. (2020, March 12). CDC study shows increase in fall-related traumatic brain injury deaths. <https://www.hcplive.com/view/cdc-fall-traumatic-brain-injury-deaths>

Ylvisaker, M., Todis, B., Glang, A., Urbanczyk, B., Franklin, C., DePompei, R., Feeney, T., Maxwell, N., Pearson, S., & Tyler, J. (2001). Educating students with TBI: Themes and recommendations. *Journal of Head Trauma Rehabilitation*, 16(1), 76-93.  
<https://doi.org/10.1097/00001199-200102000-00009>