MEASURING TEACHERS' KNOWLEDGE OF PEDIATRIC TRAUMATIC BRAIN INJURY IN THE CLASSROOM

by

Alana Corley Moser

Liberty University

A Dissertation Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

Liberty University

2022

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APPROVED BY:

Laura Mansfield, Ed. D., Committee Chair

Michelle Barthlow, Ed. D., Committee Member

ABSTRACT

As more children reintegrate into the educational classrooms with traumatic brain injuries (TBI), educational teams must know the best ways to assist these students as they return to school. This predictive correlational study used multiple regression to analyze the linear relationship between the need for additional training of classroom teachers in the area of traumatic brain injury (TBI) based on the number of hours of TBI training teachers have received and their years of teaching experience. The sample included 74 elementary, middle, and high school general and special education classroom teachers throughout Texas. In this non-experimental study, participants submitted their online responses to the 40-item survey, Common Misconceptions of Traumatic Brain Injury (CM-TBI), and demographic information via REDCap. To analyze the participants' anonymous responses, the researcher used multiple regression. In using multiple linear regression analysis to examine the CM-TBI Survey results, the researcher will provide results, conclusions, and recommendations for further research. In using a multiple linear regression analysis, the researcher examined results and concluded that the predictor variables did not display an ability to predict a classroom teachers' knowledge of TBI based on the CM-TBI survey.

Keywords: traumatic brain injury, teachers, special education, school reintegration, education

Dedication

To those who dare to take a leap of faith.

Acknowledgments

Throughout this process, I am grateful to the many friends and family who have supported me along the way. This is a life-long milestone that caused many sleepless nights, and I am thankful to those who were there to push, pull, and carry me along the way.

To my husband, whose unwavering support helped me see this through. Thanks for listening to my ideas that made no sense to you and offering advice that made sense to me. For being patient with me when I needed to get "one more thought down". Thanks for always being supportive, understanding, and encouraging of this crazy goal of mine that does not even allow me to write a prescription. To my children, who were always my greatest supporters and were the greatest cheerleaders this mom could have asked for. Even though I was a more absent mom than present, you never seemed to complain, and for that, I am forever thankful. To my parents, who valued education and invested in my educational future way back when. Thank you for believing in me then and now. Last, but certainly not least, to my chair, Dr. Mansfield, and committee member, Dr. Barthlow, your sound, supportive advice and wonderful suggestions kept me moving along at a steady pace and were an inspiration. Thank you for your motivation, feedback, expertise, and grace throughout this process. Your continuous encouragement was crucial to my success, and I am forever grateful!

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List of Abbreviations

Center for Disease Control (CDC)

Common Misconceptions of Traumatic Brain Injury (CM-TBI)

Emergency Department (ED)

Glasgow Coma Scale (GCS)

Individuals with Disabilities Educational Act (IDEA)

Individual Education Plan (IEP)

Intelligence Quotient (IQ)

Loss of Consciousness (LOC)

Post Traumatic Amnesia (PTA)

Traumatic Brain Injury (TBI)

CHAPTER ONE: INTRODUCTION

Overview

Chapter one provides a background for the historical overview of traumatic brain injury (TBI) as it relates to age at time of injury, as well as factors impacting a student's return to school. The theoretical framework for this study was presented, followed by the problem statement, which examines the scope of recent literature on this topic. The purpose of this study was followed by the significance of the current study. Finally, the research questions are introduced and definitions pertinent to this study are provided.

Background

The Center for Disease Control and Prevention (2018) (CDC) reported that the leading cause of death among children and adolescents was Traumatic Brain Injury (TBI); however, these numbers are not reflected by the students receiving special education services under the Traumatic Brain Injury disability category. TBI is the leading cause of disability among children and youth, and a successful hospital-to-school reintegration is essential to the rehabilitative process (Haarbauer-Krupa et al., 2017). Unfortunately, there is limited research about the effectiveness of such interventions. Given TBI incidence among school-age populations, many educators are likely to encounter a child with a brain injury (Prasad et al., 2017). In addition, following a TBI, students continue to deal with the cognitive and developmental demands placed on their brains as they continue to mature (Mealings et al., 2017). As students return to school, the expectation is that they carry the same educational load as before acquiring a TBI.

Historical Overview

Thirty years ago, TBI was included as a disability category in the Individuals with Disabilities Education Act (IDEA). Prior to this recognition, children diagnosed with a brain injury, exhibiting various cognitive, emotional, behavioral, or physical difficulties were either not identified at all or misidentified as having a disability of a different type (Davies, 2016; Nagele et al., 2019). These children were frequently misidentified with severe cognitive, learning, or emotional disabilities and placed in special programs to address the characteristics of the disability they were exhibiting (Davies, 2016; Graham et al., 1996).

According to the CDC (2018), about 837,000 children sustain TBI's every year, while the National Report to Congress on the IDEA (2020) reported less than 25,000 children received services under the category of TBI. Thus, this low incidence disability in public education is a high incidence medical event (Nagele et al., 2019). Children from birth to 4 years of age, and adolescents aged 15 through 19, are individuals with the highest risk of sustaining a TBI. IDEA mandates that schools provide special education services to children with TBI (Clark, 1997), however, the numbers reported by the National Report to Congress on the IDEA (2019) showed that many students are not being served under the TBI category (Nagele et al., 2019). There is still much work to be done to implement a 'best practices' model where there is open communication between home, school, and the medical team to ensure sharing of comprehensive and meaningful information (Gioia, 2016; Haarbauer-Krupa et al., 2017; Nagele et al., 2019; Prasad et al., 2017). Identifying children with a TBI and providing them with the proper educational support is not the only responsibility of school personnel. School personnel also handle teaching, remediating, supplying accommodations and modifications for those students in their classrooms. Cantor et al. (2004) provided indicators contributing to this problem, including school personnel lacking insight into whether an injury has occurred, and students who show no outward signs of physical injury. Adding to these issues is poor communication between the hospital and school regarding diagnosis upon discharge.

Another contributing factor for students' inability to receive appropriate educational support when they return to school is teachers' lack of knowledge in TBI (Davies, 2016; Ernst et al., 2016; Ettel et al., 2016). Lack of knowledge, experience, and confidence in meeting the needs of students with TBI impacts proper identification of these students (Anderson et al., 2021; Davies, 2016). This can be seen in Hawley's (2012) case study of an adolescent five years post-TBI. This ‘disruptive’ adolescent had cognitive-communication deficits related to his TBI and did not receive special education services. He severely struggled because his teachers did not link his academic and behavioral struggles to his TBI. Lastly, TBI symptoms may not appear until later in educational development (Kingery et al., 2017).

Age at Injury

The child's age and stage of brain development are critical in determining educational impact for a child who has sustained a TBI. Sustaining a TBI during critical brain and cognitive development can significantly impact future difficulties (Davies, 2016; Nagele et al., 2019). Sirois et al. (2019) examined the school readiness of preschool children across the United States (US) with TBI. This study investigated the association between TBI in children and school readiness domains: early learning skills, self-regulation, social-emotional development, and physical health/motor development. It was discovered that there was a decrease in pre-school readiness in children with TBI across all school readiness domains. Children with TBI often demonstrate increased deficits in memory over time due to improved cognitive demands and decreased ability to develop age-expected skills (Anderson et al., 2021). These deficits impact the typically developing brain, affecting previously learned information and the learning of future skills. As children continue to progress through school, cognitive demands increase, revealing the deficits created by the TBI. Young children may not manifest any cognitive or behavioral deficits related to their TBI initially; however, these problems can continue to surface as educational demands increase (CDC, 2018; Keenan et al., 2018; Kingery et al., 2017). TBI before the age of 7 will cause more significant deficits with school readiness skills, such as memory, spatial reasoning, and executive functioning (CDC, 2018; Haarbauer-Krupa et al., 2018). Children who sustain a TBI when they are younger experience more detrimental impact than those who sustain a brain injury later in adolescents (Anderson et al., 2005; Anderson et al., 2010; Keenan et al., 2021; Todis & Glang, 2008).

TBI in youth impacts the developing brain (CDC, 2018). As the brain continues to develop well into early adulthood, the age at the time of injury can significantly impact the developing brain. Having a poor transition back to school can only negatively impact these outcomes. It is essential to understand and identify which interventions are essential to developing appropriate educational supports. Ettel et al. (2016) stated that lack of classroom teacher training in TBI might increase the misidentification of students in special education in alternate eligibility categories.

The earlier a child acquires a TBI, the more they will struggle when required to obtain new academic knowledge (Deidrick & Farmer, 2005). Babikian et al. (2015) discussed that those late-maturing abilities are not established at 2-years-old, so the effects of a TBI may not be apparent until the child is much older when those abilities are fully developed. A TBI injury occurring around the time a child is 7 to 9 years of age, Babikian et al. found evidence that correlates with the worst cognitive outcomes and suggested that this is the most critical period for brain and cognitive development.

Return to School after TBI

Returning to school following a TBI can be challenging for students, as returning to school adversely affects cognitive and behavior problems (Anderson et al., 2021; Davies, 2016; Nagele et al., 2019). Children who have sustained a TBI have varied performance when they return to the classroom, due to the difficulty they have learning new material and deficits in memory and cognition. Memory and cognition deficits related to difficulties with concentration and processing speed negatively affect a student's learning ability, making returning to the classroom challenging (Davies, 2016; Nagele et al., 2019; Prasad et al., 2017).

Children often return to school following a TBI without communication between the medical team and academic staff (Anderson et al., 2021; CDC, 2018; Davies, 2016; Lundine et al., 2021). This is especially true with preschoolers because they are not yet enrolled in school (Haarbauer-Krupa, 2012). Due to this communication breakdown, children return to the educational setting without any support for cognitive, behavioral, or academic tasks (Anderson et al., 2021; Cermak et al., 2019; Hartman et al., 2015; Roscigno et al., 2015). The professional's role within the school is to help students reintegrate efficiently and determine which accommodations and modifications will support the student to be successful within the guidelines of IDEA or Section 504. Frustrations are lessened when parents know what to expect, and school personnel can accommodate students returning to school following a TBI (Richey, 2008). Educators need to understand TBI symptoms and classroom impacts so they can be equipped to support educational interventions.

Social Cognitive Theory

Social cognitive theory (Bandura, 1986) provides an ideal construct to examine educator's perceived knowledge of TBI and investigate the difficulty of students reintegrating into school following a TBI. Bandura (2001) posited that learning is derived from the interactions between an individual's personal factors, environment, and behaviors. An educator's personal factors might include their prior knowledge or the challenges they have experienced in life; an educator's environment is typically the room in which they teach students; behaviors are indicative of the methods they utilize to implement their lessons, engage in activities, and make decisions with grading. Bandura (1986) referred to this interactive process as the triadic reciprocity causation. Triadic reciprocity causation offers a model of changed behavior based on the influences of person, behavior, and environment. Exploring a teacher's experiences through the social cognitive theory lens provides the optimal construct to evaluate educators and their perceived knowledge of TBI, understanding how a teacher's personal factors interact with students who have sustained TBI's. Since cognition plays a significant role in determining behavior in Bandura's self-efficacy model, cognition becomes a crucial factor in an educator's preparation for teaching students with TBI, to be able to decide the appropriate manipulatives and activities for their interventions (Bandura, 1977).

Problem Statement

This quantitative research seeks to determine how well a classroom teacher’s overall knowledge of traumatic brain injury can be predicted from the linear combination of number of hours of TBI training teachers have received and their years of teaching experience. Researchers stated that educators lack knowledge, confidence, training, and expertise when it comes to teaching and working with students who have a TBI (Ettel et al., 2016). Additionally, research suggested an overall lack of formal education about TBI and how to work with students who have sustained a TBI in the school setting (Glang et al., 2018; Kahn et al., 2018). The reported underrepresentation of students with TBI for educational services may be due to this lack of training and limited knowledge of the professionals in the educational setting on TBI. Buck and McKinlay (2020) stated that several studies have reported classroom teachers receive minimal professional development, pre-service, in-service, on TBI despite the guidelines recommending that teachers have access to this training (Case et al., 2017; McKinlay et al., 2016). There is a gap in the literature of TBI knowledge in the areas of prevention, brain damage, brain injury sequelae, unconsciousness, amnesia, and recovery with general and special education classroom teachers.

Few studies provide an in-depth review of a teacher's knowledge and training in TBI. It was noted in Prasad et al. (2017) that there was a gap in literature regarding the barriers to educational services and educational supports around TBI, while Ettel et al. (2016) noted that teachers lacked training and were unable to meet the needs of students with TBI. Ernst et al. (2016) recognized another contributing factor for children not receiving appropriate educational supports following a TBI is the general and special education teachers' level of knowledge of TBI and their ability to appropriately support these children as they return to school. The problem is that there is a gap in the literature that suggests the need for additional training of classroom teachers based on their perceived lack of knowledge on TBI (Buck & McKinlay, 2020; Ernst et al., 2016)

Purpose Statement

The purpose of this quantitative, predictive correlational study was to investigate how well a classroom teacher’s overall knowledge of traumatic brain injury could be predicted by the linear combination of number of hours of TBI training teachers have received and their years of teaching experience. The predictor variables were the number of hours of TBI training teachers had received and their years of teaching experience. TBI training was defined as any training a teacher has received in undergraduate school, graduate school, or through an in-service, workshop, conference, or online training. The continuous criterion variable was defined as the classroom teacher's overall knowledge of TBI, as measured by the Common Misconceptions-Traumatic Brain Injury (CM-TBI) survey. Classroom teachers across Texas were asked to participate in this study through their school districts, and those that chose to respond were the participants in this study numbering 74 respondents.

Significance of the Study

This study is significant as it addresses the gap in the literature on classroom teachers' general understanding of TBI and indicates whether teachers should receive additional training in TBI to support a successful school reentry for students. This study on TBI and classroom teacher knowledge is essential as it relates to other studies that explored the same issues in the broader body of knowledge on the subject. The results may be used to encourage school districts to provide yearly training for classroom teachers in TBI. It may also be used to create a TBI training and yearly tracking program for students with TBI for the state of Texas. This study can also be used to remind school districts of the impact that TBI can have on long-term academic outcomes.

When children obtain a TBI, their lives are forever changed. Every day children return to school having sustained a TBI. “The possible negative outcome of a TBI can range from mild to severe and include neurological, cognitive, emotional, social, and behavioral difficulties” (Jantz et al., 2014, p. 1). TBI causes changes in the brain. These changes cause severe disruption to their learning and future (Anderson et al., 2021; Blankenship & Canto, 2018; Keenan et al., 2019; Kingery et al., 2017; Nagele et al., 2019).

Poor transitions from home to school can negatively influence a child recovering from a TBI. Prasad et al. (2017) stated that, when a child's brain is injured, they have difficulty with learning and socialization, needing support from their teachers as they reintegrate into school. Buck and McKinlay (2020) stated that even when schools are made aware of a student's return to school following a TBI, the lack of training in TBI will often result in the classroom teacher being unsure of how to work with and help the student. This study focused on general and special education classroom teachers and investigated if their years of service have an impact on their knowledge of TBI. It is well documented that TBI in children is associated with impairments in working memory, motor skills, language (i.e., pragmatics, verbal fluency, word-finding, concept formation, and verbal comprehension), general cognition, and behavior (Ettel et al., 2016; Harvey et al., 2020; Kingery et al., 2017). Overall, the literature on children with TBI suggested the support needed through special education services relates positively to those cognitive deficits (Haarbauer-Krupa et al., 2018; Nagele et al., 2019). Strategies can be given to students with a TBI to help them succeed in the classroom because TBI affects students cognitively, behaviorally, and socially.

Research Questions

RQ1: How accurately can classroom teacher's overall knowledge of traumatic brain injury be predicted from the linear combination of number of hours of TBI training teachers have received and their years of teaching experience?

Definitions

The following definitions are provided to understand as they will be used in this dissertation.

1. *Direct instruction* - a systematic instructional approach to increase a student's ability to acquire and retain new learning, thus helping the student believe they will be successful (Glang et al., 2008b).
2. *Glasgow Comma Scale* - The *Glasgow Comma Scale* is a tool used to assess eye-opening, verbal, and motor responses that generates a score to help medical professionals assess levels of consciousness (Blankenship & Canto, 2018; Pavlovic et al., 2019).
3. *Individualized Education Plan*- written individualized plan to meet a child's educational needs (Jantz et al., 2014).
4. *Initial Force* – an initial force injury occurs when a child's moving head (acceleration) encounters a nonmoving object (deceleration) (Jantz et al., 2014; Rotto, 1998).
5. *Section 504*- (Rehabilitation Act of 1973, 29 U.S.C. § 794) is designed to help a student access the curriculum to be successful. The accommodation does not change what a student learns, just how they learn. A 504 plan might include physical accommodation, assistive technology, or a modified class schedule (Glang et al., 2008a).
6. *Social Cognitive Theory*- is derived from observational learning and is generally a process of acquiring learning from others (Bandura, 2001).
7. *Traumatic Brain Injury* – An alteration in brain functioning because of an injury or medical condition where the degree of functioning is impacted to a greater degree than the symptomology associated with TBI (Zasler et al., 2013).

CHAPTER TWO: LITERATURE REVIEW

Overview

A systematic review of the literature was completed to investigate students' difficulty reintegrating into school following a TBI, including their classroom teachers' knowledge of TBI's. This chapter will present an analysis of current literature related to the topic of study. Finally, a gap in literature will be identified, and information will be presented to confirm a feasible need for the current study and future research to investigate further.

Theoretical Framework

Social Cognitive Theory

The theoretical foundation for this study is Albert Bandura's social cognitive theory (SCT), which started as social learning theory in the early 1960's. SCT provides an ideal construct to examine classroom teacher's knowledge of TBI and investigate the difficulty of students reintegrating into school following a TBI. Bandura (2001) posited that SCT is derived from observational learning and is generally a process of acquiring learning from others. Miller (2011) stated that information is acquired through observing other people, books, or media. Children observe behaviors and then form new behaviors. For example, a young child can watch peers playing a board game and learn to play after one game. SCT is frequently used to guide behavioral interventions. Bandura (1986) proposed that learning is derived from the interactions between an individual's personal factors, the environment, and behaviors. The personal factors of a classroom teacher might include their prior knowledge or the challenges they have experienced in life. A teacher's environment is typically the room in which they teach students, and their behaviors are indicative of the methods they utilize to implement their lessons, interventions, strategies, and decisions on how to teach. Bandura referred to this interactive process as the triadic reciprocity causation. Triadic reciprocity causation offers a model of changed behavior based on the influences of a person, their behavior, and the environment.

Bandura (1977) explained self-efficacy as a person having the ability to impact a successful performance on a task (behavior) by performing the task skillfully. There are two types of expectations according to Bandura, efficacy and outcome. An efficacy expectation is a belief that a person can successfully produce the desired behaviors to produce the necessary outcomes. An example of this is a teacher's belief that positive student outcomes will be achieved with new instructional methods being implemented. Cognitive processes are essential in obtaining and retaining new behavior patterns, and Bandura identified self-efficacy as an essential component in acquiring new behaviors. Self-efficacy provides the optimal construct to evaluate teachers and their knowledge of TBI.

Since children with TBI have multiple educational needs that vary over time, they pose a challenge to teachers. Within the school setting, teachers struggle with the inconsistent learning profiles and knowledge gaps that students with TBI exhibit (Glang et al., 2008b). Interventions specifically designed for this population are limited, however, there has been research completed on other disability populations with similar needs. Even though students with TBI have distinct behavioral and learning characteristics, these characteristics overlap with other disabilities providing generalization of successful strategies that might be beneficial for them.

In SCT, self-efficacy is developed when the student believes they can complete an academic task. Direct instruction (DI) uses a systematic instructional approach to increase a student's ability to acquire and retain new learning, thus helping the student believe they will be successful. DI is presented in a clear, logical format, with concise language in an errorless learning environment. If a student presents an error, a teacher immediately provides nonjudgmental correction to avoid future errors from occurring. Errorless correction is immediate corrective feedback that improves memory and learning following a TBI (Glang et al., 2008b). DI is based on the student's ability to master a skill before moving to the next skill. As the student gains success, the teacher fades away academic support so the student can perform the skill independently. Skills are pre-taught and applied across multiple examples eliminating the need for memorization. In DI, these skills are built upon, thus imbedding prior knowledge to the learning of new knowledge, helping students with TBI who have memory and cognitive deficits.

Glang et al. (2008b) evaluated the effects of DI on 3 students with learning disabilities due to TBI. Each DI intervention was specifically targeted at the specific students' individualized needs based on their neurological profile and academic/behavioral needs. Researchers noted gains in areas of both discrete and more complex skills, as well as self-management strategies. However, due to the small sample size of 3 case studies, these results are limited. The specific areas included sequential implementation of instruction delivery along with a plan for solving complex problems. This explicit, direct implementation of the teaching strategy allowed the teacher and learner to focus on the proficiency of the skill and for the student to obtain "automaticity" of the skill being taught. DI targeted specific areas that are relevant to students of TBI.

Cognitive strategies were noted to be beneficial for students with TBI and can be applied across academic disciplines (Swanson & Hoskyn, 1998). Since most students with TBI have deficits with executive functioning, resulting in weak problem solving and organizational skills, intensive cognitive strategy intervention is critical for this population, including self-regulated strategy development and graphic organizers (Glang et al., 2008b). Self-regulated strategy development focuses on writing and was developed by Harris and Graham (1996). This approach includes 3 basic goals of making writing automatic, routine, and flexible, helping students become self-regulated in their writing and enhancing motivation by helping students become more proficient writers. According to SCT, students feel they can complete academic tasks when the outcome is valuable, and the learning environment is valuable. As in DI, self-regulated instruction is explicit and individualized to meet the needs of the student. Graham and Harris (2003) completed a meta-analysis of 18 experimental studies of self-development with effect sizes from large to extremely large. The results of the "meta-analysis supported the conclusion that self-regulated strategy development is an evidence-based strategy and self-regulation intervention for normally achieving students with high incidence disabilities" (Glang et al., 2008b, p. 247). Therefore, Glang et al. (2008b) concluded that this strategy would also be effective for students who have cognitive and executive function impairments following a TBI.

Nurmi et al., (2012) investigated whether experienced teachers' active interactions with students improved their academic performance. The results of this research showed that the poorer the level of a student's performance in reading and math was in the fall of first grade, the greater amount of active instruction teachers reported giving that student in the spring. In doing so, however, only the less-experienced teacher adapted their teaching style to assist the student in the mathematical group. Several researchers have suggested that student academic performance contributes to how teachers deal with them (Babad, 1990; Pressley et al., 1996). Nurmi et al. (2012) showed that the actual academic performance of an individual student predicts the ways in which teachers deal with them later. Other research has found similar findings to Nurmi et al., such as studies suggesting that teachers show more positive affects towards high-expectancy students as compared to low-expectations students (Babad, 1990). Babad studied teachers who gave more praise, positive encouragement, and assistance to students with low expectations. Nurmi et al.’s (2012) study suggested that students with low academic performance can predict the amount of active instruction a teacher will provide them. Therefore, teachers can be more effective in guiding a student's learning by being more sensitive to their non-verbal cues (Rimm-Kaufman et al., 2003). Instruction that targeted students' performance level is the most effective way of strengthening their math skills (Curby et al., 2009). There is evidence that, when a teacher adapts and individualizes instruction, it is beneficial for a student's skill development (Connor et al., 2009; Nurmi et al., 2012).

Second graders who previously had difficulty with the concept of subtraction participated in a study. One group watched the teacher perform a math problem and then participated in an instructional activity, while the other group watched their peers solve math problems and then participated in the same instructional activity (Schunk & Hanson, 1989). Those second graders who observed their peers solve math problems scored higher on a post-test and reported an increase in their confidence levels in solving math problems. Schunk and Hanson hypothesized that watching peers solve math problems increased the student's self-efficacy and that this style of intervention could be used to improve students who have low self-efficacy. This strategy and intervention could be adapted to the classroom by having teachers' pair stronger students with struggling students to improve their self-efficacy.

An and Meaney (2015) studied the inclusive practices of general physical education (GPE) through the SCT lens. They found that Bandura’s (1986) triadic reciprocity was used to help facilitate the learning and active participation of teaching physical education to children with disabilities (An & Meaney, 2015). The GPE teachers had to actively pursue different venues (environment) and seek out engaging and motivating activities (personal factors) to teach the students (behavior). Modifications were done in a variety of ways including the setting/environment, instruction, activity, or equipment. Behavior, as Bandura (1986) highlighted, is a strong indicator of learning. Therefore, adapting equipment or instruction to new behaviors can indicate that new learning has taken place. This study viewed the inclusion practices of GPE teachers and discovered that their behaviors were greatly influenced by other team members, and these relationships helped them develop more appropriate educational plans for their students with disabilities (An & Meaney, 2015).

Since students with disabilities share many of the same characteristics as students with other disabilities, the generalization of these strategies would be effective for students with TBI. Exploring a teacher's experiences through the SCT lens allows them to understand how a teacher's personal factors interact with how a lesson is taught, and interventions provided to students with TBI. In Bandura's (1977) self-efficacy model, cognition plays a major role in determining behavior. It is anticipated that this research will extend the understanding of SCT as an important factor in a teacher's planning for preparing lessons and activities for students with a TBI, as well as deciding their interventions for each lesson.

Related Literature

Traumatic Brain Injury

TBI is a major cause of death and disability in the United States. TBI is an acquired brain injury that usually results from a bump, blow, or jolt to the head, or from an object that penetrates the head and disrupts the normal function of the brain (CDC, 2018; Davies, 2016; Kaur & Sharma, 2018). The Brain Injury Association of America further provides that a TBI is an external physical force causing an insult to the brain. This injury to the head may cause diminished or altered state of unconsciousness that results in cognitive, physical, behavioral, and emotional impairments. TBI is not a result of a degenerative or congenital nature (Harris et al., 2010). The Center for Disease Control and Prevention (CDC, 2018) reported that, in 2014 approximately 2.87 million emergency department (ED) visits, hospitalizations, and deaths in the US were due to TBI, with over 812,000 TBIs impacting children (Harvey et al., 2020). The number of TBI-related ED visits, hospitalizations, and deaths increased by 53% from 2006 to 2014. The number of children hospitalized due to TBI was approximately 23,000, with 2,529 children dying due to TBI in 2014 (CDC, 2018; Haarbauer-Krupa et al., 2018).

The numbers for children and adolescents with TBI are high. This indicates many children live with the associated effects of pediatric TBI (Ettel et al., 2016; Harvey et al., 2020; Kingery et al., 2017). Children returning to school with a TBI have a wide variety of symptoms that adversely affect learning (Anderson et al., 2021; Blankenship & Canto, 2018; Glang et al., 2008a; Keenan et al., 2019; Keyser-Marcus et al., 2002; Kingery et al., 2017; Yeates et al., 2000). The common deficits children and adolescents face following a TBI include cognitive, behavioral, and psychosocial (Anderson et al., 2021; Blankenship & Canto, 2018; Chono et al., 2018; Corti et al., 2019; Davies, 2016; Glang et al., 2008a; Harvey et al., 2020; Kingery et al., 2017). Research suggested that children with TBI require ongoing academic and social support for educational success (Anderson et al., 2021). When children leave the ED or doctor's office, they rarely return for a follow-up visit or return to school with information about their TBI and how to support them educationally (Glang et al., 2004). Unfortunately, children who returned to school with a TBI were not provided with the educational services they required, nor did they receive any formal school-based interventions to help them be successful (Haarbauer-Krupa et al., 2017; Moore et al., 2016; Van Heugten, 2017). Families and advocates suggested there are not enough services in the educational system to adequately support children with TBI (Glang et al., 2004).

TBI can be conceptualized as a primary event occurring at the moment of impact, followed by secondary damage due to swelling and elevated intracranial pressure (Agarwal et al., 2020). The initial symptoms of moderate to severe TBI in children are like those in adults. However, the ultimate functional impact in children who survive TBI tends to become more apparent as the child ages and faces increased challenges in information processing, reasoning, and judgment. In 2018, Fuentes et al. described the unmet service needs of children hospitalized for TBI during the first two years after injury in the following six domains: physical therapy, occupational therapy, speech therapy, mental health services, educational services, and physiatry. The authors concluded that children hospitalized for TBI have persistent dysfunction following acute care discharge, with unmet needs reported across many of these domains. Similarly, Serpa et al. (2021) reported that children with moderate to severe TBI show early neurobehavioral deficits that persist for years.

TBI can be classified as mild, moderate, or severe (Chono et al., 2018; Taylor et al., 2008). There is a more significant potential for adverse outcomes with moderate and severe TBI classifications than for mild TBI (Serpa et al., 2021; Taylor et al., 2008; Yeates et al., 2000). These deficits can negatively impact a student's alertness, intellectual functioning, language skills, nonverbal skills, attention, memory, motor skills, academic functioning, executive functioning, adaptive skills, and behavior (Blankenship & Canto, 2018; Glang et al., 2008a; Haarbauer-Krupa et al., 2018; Keenan et al., 2019; Keyser-Marcus et al., 2002; Kingery et al., 2017; Stalder et al., 2018; Yeates et al., 2000). The range of these deficits depends on the severity of the injury, the location of the injury in the brain, premorbid functioning, environmental, and socioeconomic factors (Blankenship & Canto, 2018; Bogdanov et al., 2020; Haarbauer-Krupa et al., 2018; Keenan et al., 2019; Yeates & Taylor, 2006). Every day, children return to school having sustained a TBI (Canto, 2018). Students can spend between four to six weeks in the hospital recovering, and additional time in an inpatient rehabilitation unit, where they receive ample time working with physical, occupational, and speech therapists daily (Semrud-Clikeman, 2001). A student's job during this time is to focus on recovery and building up strength so they can return to school (Canto, 2018). TBI causes changes in the brain that cause severe disruption to their learning. (Jantz et al., 2014; Kingery et al., 2017; Prasad et al., 2017).

Since the 1990 Amendments of Public Law, 101-476 was renamed, the Individuals with Disabilities Act (IDEA), mandated that schools provide special education services to children with TBI (Wehman, 2013). Some children's hospitals have hired school liaisons who contact the school before students are discharged to inform them of their return and coordinate continuity of care (Jantz et al., 2014; Prasad et al., 2017). It is essential to implement a best practices model where comprehensive and meaningful communication is shared between home, school, and medical team (Anderson et al., 2021; Davies, 2016; Jantz et al., 2014; Prasad et al., 2017).

Types of TBI

There are two main types of TBI: open and closed. The difference between an open and a closed injury depends on whether the skull is open; if the skull is broken, it is classified as an open head injury (Martin et al., 2017). Penetrating head injuries are less common in children who suffer from TBI and generally result from a violent incident resulting from a blow to the head from a knife, gunshot wound, brick, or scissors (Jantz et al., 2014; Morrison, 2010; Rotto, 1998). Penetrating injuries break through the skull and wound the brain (Najem et al., 2018). Depending on the wound location, damage could be focal, meaning they occur in a specific location (Jantz et al., 2014; Rotto, 1998). Open head injuries are easier to identify than closed head injuries. Closed head injuries have more diffuse damage, occurring over a widespread area, with more complex symptoms (Jantz et al., 2014; Morrison, 2010; Najem et al., 2018; Rotto, 1998).

There are two subtypes of closed head injuries, which comprise approximately 90% of all head injuries and can be described as either contact force or initial force acceleration/ deceleration (IF) (Jantz et al., 2014; Wang et al., 2018). A child sitting in the stands of a hockey game and struck in the forehead by a hockey puck would be an example of a contact force injury (Jantz et al., 2014; Rotto, 1998; Yeates et al., 2000). An IF injury occurs when a child's moving head (acceleration) encounters a nonmoving object (deceleration) (Jantz et al., 2014; Rotto, 1998). A child falling from a second-story window (acceleration) with their head striking the pavement (deceleration) is an example of an IF injury (*Brainline.org* 2021; Jantz et al., 2014). If head injuries are subject to coup-countre-coup damage, the head makes forcible contact with a stationary object. The point of contact causes initial damage to the brain (coup), then causes the brain to move or rotate to the opposite side (countercoup) of the brain, causing further damage (Jantz et al., 2014; Pavlovic et al., 2019; Rotto, 1998; Yeates et al., 2000). This type of injury is common in individuals following a car accident when the forehead strikes against the windshield (Jantz et al., 2014; Rotto, 1998; Yeates et al., 2000).

The most damaging injuries happen when the brain moves rapidly and violently back and forth inside the skull (Pavlovic et al., 2019). The outside of the skull is a smooth surface, however, the inside of the skull where the brain contains protruding spikes and boney hooks. When the brain is quickly moved in one direction and then another, these spikes and hooks catch onto the brain, causing damage. This type of injury is known as a diffuse axonal injury, when lesions are scattered within the brain's white matter tracts and grey matter, causing difficulty with thinking, learning, and judgment (Mesfin et al., 2020).

Injury Severity: Medical Setting

Knowing the severity of a TBI is crucial as it helps predict the child's outcome regarding school-based education (Prasad et al., 2017). TBI has three classifications: mild, moderate, and severe. The CDC (2018) classifies a mild TBI as a brief change in consciousness, which includes concussions; moderate is defined as a brief period of unconsciousness; and severe TBI is defined as an extended period of unconsciousness post-injury. Medical personnel utilize the Glasgow Coma Scale (GCS) to determine which TBI category a child should be placed. This is done by assessing impaired consciousness, post-traumatic amnesia score, and the duration of unconsciousness/coma (Dennis et al., 2012; Jantz et al., 2014; Keenan et al., 2020; Pavlovic et al., 2019; Rotto, 1998; Semrud-Clikeman et al., 2005). The GCS is a tool used to assess eye-opening, verbal, and motor responses that generates a score to help medical professionals assess levels of consciousness (Blankenship & Canto, 2018; Pavlovic et al., 2019). A GCS score of 13-15 is classified as mild TBI; 9-12 is classified as moderate TBI, and scores of 3-8 are classified as severe TBI (Blankenship & Canto, 2018; Najem et al., 2018; Pavlovic et al., 2019). Post traumatic amnesia is a state of temporary amnesia caused by impairments in attention and concentration that help store new memories immediately following a TBI (*brainline.org*, 2021). Length of post-traumatic amnesia is measured when the patient is no longer in a coma and is oriented to time and place. Loss of consciousness is the length of time between the injury and awakening from an unconscious state (*brainline.org*, 2021). Time-of-command is the patient's ability to follow simple commands from the time of injury and is measured either from the time commands are followed or from the time of injury (Niedzwecki et al., 2018). Measuring both times-of-commands and post traumatic amnesia indicates when a patient can make new memories from the time of injury.

TBI Sequelae

Following a moderate to severe TBI, many children demonstrate ongoing complications. These complications include deficits in cognitive and communicative skills, social and behavioral skills, and sensory-motor skills, all of which negatively impact a child's school performance (Cermak et al., 2019; Harris et al., 2010; Jantz et al., 2014; Keenan et al., 2019; Pavlovic et al., 2019; Savage et al., 2001). Fay et al. (1994) stated that the severity of impairment can directly relate to the severity of the injury and can even predict the need for special education services within the first two years of injury. Severe TBIs increase the likelihood of experiencing long-term deficits in neuropsychological, behavioral, academic, and adaptive domains (Blankenship & Canto, 2018; Davies, 2016; Nagele et al., 2019; Pavlovic et al., 2019). Identifying these deficits in children following a TBI helps teachers understand how to serve students better when they reintegrate into the classroom (Cermak et al., 2019; Davies, 2016; Harris et al., 2010; Keyser-Marcus et al., 2002). Typically, within the first weeks and months following injury, children with a TBI dramatically increase learning, followed by a plateau (Blankenship & Canto, 2018; Buckeridge et al., 2020; Keenan et al., 2019; Kingery et al., 2017). Researchers suggest that, since the sequelae for TBI recovery is unpredictable, classroom teachers must know TBI symptoms and intervene as necessary. Unfortunately, many scholars have suggested that educators are under-informed about TBI and unable to do so (Nagele et al., 2019). This lack of understanding can lead to students with TBI receiving inappropriate services needed to meet their individual needs.

TBI Under IDEA

In 1975, lawmakers passed the Education for All Handicapped Children Act, which included children with TBI under the category of Other Health Impaired (Haarbauer-Krupa et al., 2017). In the past, students with a TBI were often placed in special education as students with a learning disability or a behavioral disturbance (Harvey et al., 2020; Nagele et al., 2019). In 1990, legislators amended IDEA to include the specific category of Traumatic Brain Injury (US Department of Education, 1990). Since then, students with TBI have been eligible to receive special education services under Traumatic Brain Injury under IDEA (Savage, 2005). TBI is defined as:

> an acquired injury to the brain caused by an external force, resulting in total or partial functional disability or psychosocial impairments, or both, that adversely affects a child's educational performance. The term applies to open or closed head injuries resulting in impairments in one or more areas, such as cognition; language; memory; attention; reasoning; abstract thinking; judgment; problem-solving; sensory, perceptual, and motor abilities; psychosocial behavior; physical functions; information processing; and speech. The term does not apply to injuries that are congenital or degenerative or brain induced by birth trauma (34 CFR 300.7 (c) (12) (US Department of Education, 1990).

The amended law brought new awareness to TBI and allowed students to be placed under the correct special education category. To receive special education services, most states require medical documentation of the TBI, it must adversely affect the student's educational performance from their pre-injury and post-injury performance, and there must be a need for specialized services (Nagele et al., 2019). These specialized services may include physical, occupational, speech-language therapies, or individually designed instruction (Wehman, 2013).

Students with a TBI have different needs than other students with disabilities. As a result of these injuries, a student's short- or long-term cognitive abilities may be affected following a TBI (Beauchamp & Anderson, 2010; Davies, 2016). They will often experience learning and processing difficulties of new information, deficits with integrating new and previously learned information, difficulty retrieving previously learned information, psychomotor skills, and executive functioning skills that can impact all academic areas (Kramer & Davies, 2016). Cognitive abilities can impact how the student organizes material, logically reasons, remembers things, or recalls words. Furthermore, students experience emotional, social, and behavioral difficulties following a TBI (Myers et al., 2018). Students may experience depression, anxiety, aggressiveness, and irritability, along with other behavioral consequences following a TBI (Pavlovic et al., 2019). Because these difficulties appear suddenly, the needs of students with a TBI are significantly different from those with other disabilities. A TBI can significantly impact a student's ability to learn in the classroom (Kramer & Davies, 2016). Even if students with TBI are identified under the correct special education category, the support services available in schools to support their needs may be inadequate (Blankenship & Canto, 2018; Davies, 2016; Jantz et al., 2014). In addition, because the TBI category of special education is still perceived as a low-incidence disability, school-based professionals lack the training necessary to determine the student's needs (Jantz et al., 2014; Myers et al., 2018).

Impact of TBI on School Performance

Neurological Consequences

TBI impacts many neurological areas. Following a TBI, it is common for a child to have headaches (Harris et al., 2010; Kramer & Davies, 2016). Babikian et al. (2015) considered headaches more of a global reaction to head trauma with widespread pain within the brain.

Another common neurological side effect of a TBI can be dizziness (Babikian et al., 2015; Harris et al., 2010; Mc Grath & Eloi, 2019; Pavlovic et al., 2019; Yeates et al., 2017). Following the initial insult, seizures can be another issue that occurs after a TBI injury (Harris et al., 2010; Kramer & Davies, 2016). Post-traumatic seizure is the most common complication following a pediatric TBI. It is mainly associated with adverse outcomes with independent risk factors for post traumatic seizures, including children younger than five years old and prolonged loss of consciousness. However, patients who had surgical interventions are less likely to develop post traumatic seizures (Rumalla et al., 2018).

Increased fatigue can be another effect children experience, along with post-concussion syndrome (Babikian et al., 2015; Harris et al., 2010; Yeates et al., 2017). Post-concussion syndrome describes the symptoms that follow a TBI, which include cognitive, physical, behavioral, and emotional impacts. Symptoms of post-concussion syndrome can include fatigue, concentration difficulties, vision disturbances, balance issues, insomnia, and dizziness (Permenter et al., 2021). Fatigue will directly impact students who are expected to return to school and attend a full day; therefore, they must receive an abundance of cognitive rest (Harris et al., 2010; Keyser-Marcus et al., 2002; Kramer & Davies, 2016; Van Heugten, 2017). In addition, students who suffer brain injuries may have sleep disturbances, as their symptoms of fatigue increase (Pavlovic et al., 2019; Rotto, 1998). Thus, when children with TBI return to school, these neurological deficits impede their ability to learn and function successfully.

Sensory-Motor Consequences

There are a variety of sensory-motor deficits that can appear following a TBI. Sensory-motor skills include vision, hearing, balance, motor function, hand coordination, and speech endurance (Savage et al., 2001). Nerve damage can cause visual impairments, field cuts, or diplopia (Harris et al., 2010). Additionally, nerve damage can lead to reduced auditory acuity, middle and inner ear damage, and conductive and sensory-neural or mixed hearing loss (Callahan & Lim, 2018; Harris et al., 2010). Babikian et al. (2015) reported photophobia, hypersensitivity to light, and hyperacoutism, hypersensitivity to sound, smell or taste and impairments of other sensory deficits. Damage to the temporal lobe affects the input of auditory stimuli, while occipital lobe damage will cause visual impairments (Callahan & Lim, 2018).

Research suggested that sensory deficits following a TBI may increase cognitive deterioration (Callahan & Lim, 2018). Educationally, sensory-sensitive students may miss essential information, have difficulty multitasking, and experience reduced processing speed due to their inability to attend to their environment. Students with decreased sensory sensitivity have a lower production rate and increased social isolation because of their inability to perform these academic tasks independently. Even if it is mild, hearing loss can put a child at risk of developing impaired speech-language skills. Injured nerves in parts of the brain associated with smell or taste can cause a decrease or increase in appetite, leading to eating problems. Impaired ability to smell or taste may result in a decrease or increase in appetite and an inability to smell body odor, which can lead to eating problems or difficulties keeping peer relationships for an adolescent with TBI.

Motor deficits related to TBI range from minor difficulties to paralysis and must be closely monitored by school personnel. These deficits impact the student's ability to be independent, requiring additional support and interventions to assist them in activities of daily living (Prasad et al., 2017; Rassovsky et al., 2015). Students may need a wheelchair or a walker to navigate their surroundings due to paralysis affecting one side of the body, called hemiplegia, or hemiparesis, a weakness affecting one side.

A secondary effect of TBI is apraxia, which is the inability to plan and execute coordinated movements despite having the ability to do them. Another secondary effect of TBI is ataxia, the inability to coordinate voluntary muscle movements that can make a student rely on 1:1 support in the classroom and rely on assisted devices for communication (Peri et al., 2019). Depending on which part of the brain is damaged, a student can have dysarthria, which cannot speak clearly and causes a student to speak too fast, too slow, too loud, or too soft (Rotto, 1998). Unintelligible speech problems happen when issues with apraxia and poor motor planning are the result of a TBI (Savage, 2005). Speech unintelligibility is characterized by slurred and slowed speech, drooling, and difficulty swallowing. These motor problems can cause coordination, reaction time, gait, and speech disturbances following a TBI (Rotto, 1998).

Cognitive Consequences

Cognitive deficits are characterized by impaired attention, memory, and executive function (Kahn et al., 2018; Pavlovic et al., 2019). Potential academic outcomes from cognitive deficits include inconsistent learning, knowledge gaps, and lower educational attainment (CDC, 2018; Glang et al., 2008b). Difficulty concentrating, learning, conceptual thinking, problem-solving, repeating questions, and an inability to maintain continued focus are a few of the cognitive symptoms a child can experience following a TBI (Kramer & Davies, 2016). Children with moderate TBI's have known deficits in intellectual functioning and processing speed and will struggle with tasks that require memory and attention (Glang et al., 2008a; Keyser-Marcus et al., 2002; Kramer & Davies, 2016; Taylor et al., 2008). These same children did not show adequate recovery two years post injury to regain deficits equal to those of their non-injured peers (Babikian & Asarnow, 2009; Treble-Berna et al., 2017; Wade et al., 2016). Children with severe brain injuries show significant impairments in intellectual functioning, executive functioning, working memory, processing speed, attention, and problem-solving persisting years after recovery (Chono et al., 2018; Glang et al., 2008a; Keyser-Marcus et al., 2002; Kingery et al., 2017; Kramer & Davies, 2016; Yeates & Taylor, 2006). For students with severe TBI, researchers identified long-term deficits in the development of future skills and academic skills (Babikian et al., 2015; Ewing-Cobbs et al., 2006; Kingery et al., 2017; Kramer & Davies, 2016) These children continue to fall behind academically and fail to catch up with their non-injured same age peers (Kingery et al., 2017; Kramer & Davies, 2016; Noakes et al., 2019; Yeates & Taylor, 2006). It has been found that after a brain injury, previously learned academic skills are often left mainly intact (Nagele et al., 2019; Noakes et al., 2019). Younger children, however, are unable to rely on previously mastered skills that would allow them to compensate for their brain injury (Noakes et al., 2019).

For students who have moderate to severe TBI, memory deficits can be the most debilitating for students when they return to the classroom (Blankenship & Canto, 2018; Kramer & Davies, 2016). Harris et al. (2010) noted that even students with a documented mild TBI will have short-term memory deficits. Known memory deficits manifest themselves in the classroom as difficulties with learning and retaining new information (Chono et al., 2018; DeMaster et al., 2017; Keyser-Marcus et al., 2002; Kramer & Davies, 2016; Morrison, 2010; Noakes et al., 2019; Pavlovic et al., 2019). Cognitive deficits can impact memory, including the input of new information, holding onto information, manipulating, and recalling information (Glang et al., 2008b; Keyser-Marcus et al., 2002; Kramer & Davies, 2016; Martin & Pilarski, 2015). Memory deficits are one of the most common problems associated with pediatric TBI (Chono et al., 2018; DeMaster et al., 2017; Harris et al., 2010; Keyser-Marcus et al., 2002; Pavlovic et al., 2019). Difficulty learning new information has a negative impact on a student's overall classroom performance (Chono et al., 2018; Kramer & Davies, 2016; Nagele et al., 2019; Noakes et al., 2019; Pavlovic et al., 2019).

Executive functions are controlled by the frontal lobes of the brain and are located behind the forehead, being vulnerable to injury. Damage to the frontal lobes can impact executive functioning, causing deficits in attention, planning, and goal setting (Glang et al., 2008a; Salley et al., 2021). As children get older, the academic demands increase, and students are expected to comprehend more complex information, which exposes these deficits (Kramer & Davies, 2016). Since the frontal lobes are the last to develop and are responsible for executive control, younger children may not show signs of executive functioning deficits until later in their development (Morrison, 2010). In the school setting, executive function can manifest itself as disorganization, poor planning, or slowed processing (Glang et al., 2008a; Kramer & Davies, 2016). A teacher might view a student struggling with starting or staying on task or organizing assignments (Glang et al., 2012; Harris et al., 2010; Kramer & Davies, 2016; Rotto, 1998; Salley et al., 2021). Students may also struggle with shifting focus from one task to another causing diminished problem-solving skills. Students may also have the inability to control their impulses or restrain themselves because of their disinhibition affected by their impaired executive control, thus students with TBI may have trouble controlling their behavior (Keenan et al., 2018; Rotto, 1998). Executive control deficits may directly impact their school performance (Salley et al., 2021). Frontal lobe damage that results in executive functioning deficits may be the cause of behavioral impairments in young children 6 months after sustaining a TBI (Ganesalingam et al., 2011). Behavioral impairments that young children struggle with are in the areas of self-regulation, metacognition, and effortful control (Keenan et al., 2018).

Psychosocial Consequences

Ryan et al. (2016) stated that difficulties with psychosocial functioning are more debilitating and more challenging outcomes of pediatric TBI (Morrison, 2010; Yeates & Taylor, 2006). Psychosocial difficulties lead to a significant decline in academic outcomes (Ewing-Cobbs et al., 2004; Kahn et al., 2018), being long-lasting, persisting through adulthood, and may even increase with time (Kramer & Davies, 2016; Noggle & Pierson, 2010; Watson et al., 2001; Wearne et al., 2020). Keenan et al. (2018) noted that children need to be reassessed often in their recovery. As new learning and behaviors emerge, schools need to assess new problems (Noggle & Pierson, 2010). The most common psychosocial symptoms following a TBI are disinhibition, apathy, inattention, behavioral immaturity, irritability, increased anger and aggression, impulsivity, social awkwardness and withdrawal, hyperactivity, anxiety, and depression (Blankenship & Canto, 2018; Noggle & Pierson, 2010; Pavlovic et al., 2019; Ylvisaker et al., 2007). These symptoms have been linked to poor academic performance and social competency (Noggle & Pierson, 2010). Social, physical, and mental factors are the psychosocial component of how children interact with and relate to the environment they encounter (Wearne et al., 2020).

Social Consequence

Unlike adults with brain injuries, children who sustain brain injuries experience disruption in the development of their social skills (Anderson et al., 2017; Kramer & Davies, 2016; Sirois et al., 2019). TBI injuries during childhood can significantly impact a child's ability to control their behavior in social situations (Anderson et al., 2017; Wearne et al., 2020). The earlier a child sustains a TBI, the more difficult it is to learn appropriate social cues (Anderson et al., 2017; Genova et al., 2019; Rassovsky et al., 2015; Williams et al., 2018). Younger children do not have the cognitive capacity to understand social cues following a TBI as compared to their non-injured peers and may socially withdraw or self-isolate (Bosco et al., 2018; Genova et al., 2019; Harris et al., 2010; Sirois et al., 2019; Williams et al., 2018). Social dysfunction is the most debilitating consequence of a TBI because it affects a student's social life and quality of life (Anderson et al., 2017; Glang et al., 2012; Kramer & Davies, 2016; Nagele et al., 2019; Sirois et al., 2019). Disruptive behaviors cause problems with forming peer relationships in the classroom resulting in academic difficulties (CDC, 2018; Ewing-Cobbs et al., 2021; Salley et al., 2021; Wade et al., 2020). Often these social deficits are not noticeable until years after the injury, when these skills are developmentally appropriate to manifest (Kramer & Davies, 2016; Wearne et al., 2020). Social skills play a crucial role in developing peer relationships and developing critical relationships with teachers and school personnel (Kramer & Davies, 2016; Nagele et al., 2019; Noggle & Pierson, 2010). Students with TBI may struggle with peer integration because of their inability to socially problem solve (Kramer & Davies, 2016; Noggle & Pierson, 2010). Key relationships impact a student with a TBI's school success, and the potential difficulties with these skills should not be underestimated (Kramer & Davies, 2016; Noggle & Pierson, 2010).

A TBI can result in personality changes that cause diminished ability to read social cues (Anderson et al., 2017; Rotto, 1998). The earlier a child is impacted by a TBI can make learning social skills more difficult (Ewing-Cobbs et al., 2000; Kramer & Davies, 2016; Rassovsky et al., 2015). Young children with TBI may not have the cognitive capacity to identify social cues as their non-injured peers after they have sustained a brain injury, causing children with TBIs to self-isolate and socially withdraw (Harris et al., 2010). Milders et al. (2003) found that children with a TBI had antisocial behaviors due to their inaccurate perception of social cues from their peers. Proper identification of children with TBI upon school reentry is important so that they receive social-skills training to reduce the impact of long-term negative social outcomes (Anderson et al., 2017; Milders, et al., 2003). Addressing social deficits is crucial to a student's school functioning, as it impacts their academic and cognitive skills (Anderson et al., 2017; Glang et al., 2012; Noggle & Pierson, 2010; Salley et al., 2021).

Students who have behavioral and emotional problems related to TBI will often have social issues (Jantz et al., 2014; Kramer & Davies, 2016). These social issues can cause students to be teased, bullied, or isolated from their peers by not directly associating their emotional and behavioral difficulties with their TBI (Jantz et al., 2014). In addition, if the student does not have outward physical signs of a brain injury, it can often go unnoticed that their actions result from a TBI (Martin et al., 2017). This may cause their actions to be punished instead of receiving the appropriate help. Early identification of these students with TBI under IDEA in the school setting is imperative so they receive appropriate social and adaptive skills training and intervention needed to reduce the negative impact on their quality of life (Genova et al., 2019; Milders et al., 2003; Noggle & Pierson, 2020).

Emotional/Behavioral Consequences

Emotional difficulties appear early after a student sustains a TBI (Ewing-Cobbs et al., 2021; Jantz et al., 2014). Depression is associated with injury to the brain and changes in friendships, inability to participate in sports, and family relationships. Post-TBI depression has the same symptoms as non-TBI induced depression and includes depressed mood, irritability, sadness, fatigue, loss of interest in pleasurable activities, difficulties with attention, and decision making.

Behavioral issues can manifest as a primary or secondary symptom in pediatric populations following a TBI, thus harming their educational progress (Blankenship & Canto, 2018; Ewing-Cobbs et al., 2012; Kahn et al., 2018; Nagele et al., 2019; Noggle & Pierson, 2010; Prasad et al., 2016). A child's self-concept in school shapes their experiences in the classroom, and with diminished academic performance may lead to negative change in how they view themselves (Nagele et al., 2019). With lower social participation leading to fewer friendships, TBI has been linked to increased behavioral problems in the academic setting (Blankenship & Canto, 2018; Salley et al., 2021; Wade et al., 2020; Yeates et al., 2000; Yeates & Taylor, 2006). Students with TBI have a self-awareness of their cognitive and/or physical deficits, which may manifest themselves as depression or low self-esteem. Agitation, irritability, impulsivity, apathy, and emotional lability are a few of the common behavior problems associated with pediatric TBI (Noggle & Pierson, 2010).

There are a wide variety of symptoms within the pediatric population when discussing emotional and behavioral challenges following TBI. The most common unwanted emotional and behavioral symptoms, which decrease academic and cognitive recovery, include disinhibition, perseveration, apathy, inattention, behavioral immaturity, irritability, increased anger and aggression, impulsivity, social awkwardness and withdrawal, verbal outbursts, hyperactivity, anxiety, and depression (Noggle & Pierson, 2010; Savage, 2005). In addition, TBI injury before two years of age has been linked to increased behavior problems (Blankenship & Canto, 2018; Salley et al., 2021). Students may have conduct problems and disruptive behaviors when they are older.

Teacher Knowledge of TBI

Glang et al. (2010) reported that 92% of classroom teachers working with students with TBI had no training in how to educate them. Research shows that teachers do not have a broad understanding of TBI and how it affects students (Bate et al., 2021; Blankenship & Canto, 2018; Glang & Todis, 1993; Nagele et al., 2019). Blankenship and Canto (2018) reported that classroom teachers felt unprepared to teach students because they do not have the knowledge needed to support students with TBI's.

Research suggested an overall lack of formal education about TBI for educators and how to work with students in the school setting (Blankenship & Canto, 2018; Davies, 2016; Glang et al., 2018; Howe & Ball, 2017; Kahn et al., 2018; Myers et al., 2018; Nagele et al., 2019). In addition, research stated that even when educators had an opportunity to take TBI courses in college, few chose to take them, thus supporting that classroom teachers have very little knowledge about TBI (Davies, 2016; Hux et al., 2013). When students are discharged from the hospital and return to school, it is not unusual for them to still be regaining functional skills (Bate et al., 2021). Schools, therefore, become another place of active, ongoing rehabilitation for students recovering from a TBI. Teachers play a critical role in a student's daily cognitive and functional ongoing recovery, requiring the knowledge to support students as they return to the classroom (Bate et al., 2021; Nagele et al., 2019).

Chapman (2000) surveyed rural general and special education teachers, finding that 70% of general and 50% of special education teachers reported a lack of supervised experience with the TBI population. In addition, 80% of the special education teachers reported a lack of knowledge about the diverse educational needs of students with TBI, and 58% of the general education teachers reported a lack of knowledge for teaming and collaboration for TBI . One plausible reason for this is that school personnel do not have adequate knowledge of TBI (Davies, 2016; Glang & Todis, 1993; Myers et al., 2018; Nagele et al., 2019). This lack of awareness among classroom teachers in TBI can only lead to the under-identification of students in special education (Davies, 2016).

School Reintegration

School re-entry following a traumatic brain injury (TBI) is a complicated process because no two brain injuries are the same (Blankenship & Canto, 2018; Wehman, 2013). Since each brain injury is unique, it is difficult to standardize a process for reentry because each student's plan needs to be individualized to their specific needs (Harvey et al., 2020; Nagele et al., 2019). However, what can be done is to create a process that can be implemented for all TBI students. Four main parts are essential to a positive school re-entry: assessment, multidisciplinary team, facilitation of peer interactions, and planning to support withdrawal of support (Bate et al., 2021; Jantz et al., 2014).

Public Law No. 101-476, or the IDEA, stated schools must provide special education services to children with TBI (Clark, 1997). This has been the most beneficial step taken to support student's school re-entry (Gioia, 2016). However, there are no guidelines or initiatives, nor funding allocated to train teachers to assess students' educational needs (OCED, 2017). Additionally, students may be functioning at the pre-injury status and need only accommodations under the Section 504 plan, which is part of the Rehabilitation Act of 1973 (Blankenship & Canto, 2018). A 504 Section plan is based on civil rights legislation that protects students from discrimination and ensures any student with a disability is able to participate alongside their non-disabled peers in school (Wehman, 2013; Williams et al., 2018). Section 504 accommodates students who have physical or mental impairments, have a record of a disability, or are treated as having a disability that substantially limits one or more major life activities (Wehman, 2013). This law requires schools to remove barriers that prevent students from fully participating in the general curriculum (Prasad et al., 2017; Wehman, 2013).

Students who have sustained a severe TBI are at risk of needing substantial support when reintegrating into the education setting (Blankenship & Canto, 2018; Cermak et al., 2019; Davies, 2016; Haarbauer-Krupra, 2017; Harvey et al., 2020; Jantz et al., 2014; Lundine et al., 2021; Wehman, 2013). The school personnel's role is to help determine which accommodations and modifications a student with a TBI will need within the guidelines of IDEA and Section 504 to be successful in the classroom (Davies, 2016; Lundine et al., 2021; Myers et al., 2018; Wehman, 2013). TBI injuries are different from other disabilities because of the suddenness with which they occur. There may be alterations to the student's physical abilities, such as coordination, ambulation, vision, and auditory deficits that require accommodation in the classroom environment (Harvey et al., 2020; Lundine et al., 2021). A student's cognition may also be affected and cause deficits in memory, logic, and organization (Bullock et al., 2005; Glang et al., 2008a; Harvey et al., 2020). Social, emotional, and behavioral changes may manifest as anxiety, depression, disinhibition, aggression, hyperactivity, or irritability following a TBI (Bullock et al., 2005).

Social, emotional, and behavioral difficulties affect how students learn and occur suddenly following a TBI. When beginning the steps to create a 504 plan or an Individualized Educational Plan (IEP) for any student with a TBI, the academic needs may be significantly different for a student with a TBI than they are for one who has had a disability their entire life. (Blankenship & Canto, 2018; Davies, 2016; DeMatteo et al., 2015; Eftaxas & Canto, 2020; Lundine et al., 2021). Once a student is found eligible for special education services, an IEP is developed (Harvey et al., 2020; Wehman, 2013). The IEP includes the type of services the student will receive, for how long, where the student will be educated, what accommodation and/or modifications the student will receive, and the related services needed for the student to be educationally successful (Harvey et al., 2020). Related services for students with TBI can include speech-language, occupational and/or physical therapy, adaptive physical education, or wheelchair-assisted transportation (Haarbauer-Krupa et al., 2017; Harvey et al., 2020; Lundine et al., 2021; Wehman, 2013). Due to the frequency of change with a TBI, the IEP will need to be reviewed more often than a typical IEP is required by law (Harvey et al., 2020). Therefore, it is advised that the IEP be reviewed every 3-4 months for students with a TBI (Glang et al., 2012). In research conducted by Nagele et al. (2019), state directors reported that 60% of the students with TBI were receiving services under alternative disability categories. This information is important because, even though students with TBI might be receiving services under different IDEA eligibility, they are not receiving the appropriately designed instruction that meets the student's specific needs (Blankenship & Canto, 2018; Gioia, 2016; Nagele et al., 2019). Due to the long term needs of students with TBI, delay in deficits, and decreased awareness of teachers, up to 80% of students with a TBI have academic needs that are not being met (Haarbauer-Krupa et al., 2017; Kingery et al., 2017).

One of the most significant difficulties teachers face in recognizing a student with a TBI is understanding that the symptoms may not be physical and assuming the student is fully recovered (Blankenship & Canto, 2018; Martin et al., 2017). They do not make the connection because the student looks physically normal on the outside (Jantz et al., 2014). If the student with a TBI does not have visual or physical impairments, often the assumption is they must not be impaired (Jantz et al., 2014). This further supports the need for additional training for general and special education classroom teachers in TBI. In a recent study in Ontario, Canada, Stevens et al. (2021) sought to understand the needs of teachers in supporting students with acquired brain injury in the classroom. Educators reported they wanted to be more involved in the transition between hospital and school but that the resources available were inadequate. Secondly, educators stated that the lack of resources made them feel unprepared to transition students with TBI to the classroom. Teachers also said there were not enough resources available to support them in the classroom. Lastly, the study found that teachers believed families were unable to cope, teachers believed, in transitioning their child to the classroom, and this resulted in a knowledge gap.

Under Identification

There are substantial inconsistencies between the medical and educational fields in the reported number of TBI victims within the pediatric population. The epidemiological reports from the medical profession show a high incidence rate of childhood TBI, while the reports from the educational community show a low prevalence rate of TBI in pediatric populations who receive special education services (Haarbauer-Krupa et al., 2017; Nagele et al., 2019). There is a discrepancy between the special education census data and the incidence of students with TBI for special services. According to the CDC, approximately 837,000 children were reported to the ED in 2014. However, the US Department of Education reports that only 26,000 children received services under special education for TBI that same year. When comparing these numbers, it appears that many students with TBI are not receiving special education services under the TBI category (Nagele et al., 2019). Some students may have received services under other categories, such as Other Health Impaired, Specific Learning Disability, or Emotional Disturbance (Ettel et al., 2016; Greene et al., 2018). Misclassification of students with TBI can cause their behaviors to be misunderstood by teachers. A student with TBI experiencing behavior problems may be misclassified as having a behavior disability. This student would have their cognitive deficits overlooked by teachers causing further disruptive behavior (Davies, 2016). While some students who have sustained a TBI may be receiving services through Section 504, this would not account for the disparity in the identified population. This misidentification could be a result of how a particular state defines TBI or the confusion between acquired brain injury and TBI (Harvey et al., 2020). Since TBI became a special category in 1990, most states have used a medical diagnosis of a TBI to receive a TBI classification in the educational setting. This can be a barrier because this perceived need to have a medical diagnosis is limiting the number of students identified with a TBI. Most children do not go to an ED when they have a TBI, so there is no medical record history documented. This prevents many students from a free and appropriate education as provided to them under the federal guidelines (Greene et al., 2018).

Assessment

A comprehensive evaluation should be considered for school re-entry for all students who have experienced TBI (Clark et al., 1999). It is crucial to gather school records consisting of pre-injury academic functioning skills so the student's baseline strengths and weaknesses can be analyzed to assess recovery skills and assist with educational planning for school reintegration (Blankenship & Canto, 2018; Jantz et al., 2014; Keyser-Marcus et al., 2002; Nagele et al., 2019). School re-entry assessment includes both standardized and informal measures to obtain an overall perspective on the student's current level of functioning (Jantz et al., 2014; Keyser-Marcus et al., 2002). Psychoeducational assessment alone is an ineffective measure in assessing the academic functioning of the impact of a brain injury of a student post-TBI (Jantz et al., 2014; Keenan et al., 2019). One reason is that standardized measures of academic achievement may show a student's skills are commensurate with same age peers, however classroom performance is diminished (Davies, 2016). Difficulties will appear in executive function, inability to shift focus, impulsivity, and difficulty manipulating information in working memory (Keenan et al., 2019). The appropriate time to evaluate functional outcomes of a student with a TBI and determine educational placement and classroom intervention is close to discharge from the hospital and before returning to school (Hale et al., 2011; Jantz et al., 2014; Keyser-Marcus et al., 2002). Evaluating prior to discharge allows the student to gain the most neurocognitive functioning while participating in inpatient rehabilitation. Neuropsychological testing is completed before the student returns to school and provides baseline functioning information for the educational team (Chono et al., 2018; Jantz et al., 2014). A student with a TBI may retain higher level functioning skills while having impairments in lower functioning skills. What makes a student with a TBI challenging over a student with other disabilities is that these deficits may improve or worsen over time (Davies, 2016). Another challenge evaluators encounter is that these effects vary based on age of injury, severity of injury, and age at time of injury. Neuropsychological evaluation measures are necessary for school success and include cognitive, behavioral, and/or emotional domains that are often impacted by TBI injuries (Jantz et al., 2014; Keyser-Marcus et al., 2002). The neuropsychological evaluation consists of tests, observations, interviews, and records that will provide recommendations and conclusions for school interventions (Jantz et al., 2014; McGrath & Eloi, 2019). Since students with a TBI are tested regularly as their brains heal, various assessments are used to determine different levels of functioning (Jantz et al., 2014).

For assessment, it is essential to look at the student's prior level of functioning to see any deficits before the injury that may hinder their learning of new knowledge (Blankenship & Canto, 2018; Chesire et al., 2015; Jantz et al., 2014; Keyser-Marcus et al., 2002; McGrath & Eloi, 2019; Nagele et al., 2019). Students returning to school with a TBI are monitored by the school psychologist. The school psychologist's role becomes important in assessing the student's needs, interventions, and monitoring progress. Most students will have established a baseline of prior academic performance that can be used to compare post injury evaluations (Chesire et al., 2015). The assessment will inform the educators of the areas in which the student is most apt to have difficulties learning (McGrath & Eloi, 2019). Neuropsychological evaluations assess the following domains: attention/concentration, disinhibition, memory, mood regulation, social functioning, coping/adjustment, and physical/medical (Cheshire et al., 2015). Surveys are a common part of neuropsychological assessment and provide additional information to the cognitive results. Computerized neurological testing now offers forms to help with repeated testing (McGrath & Eloi, 2019). Students with a TBI tend to have a dramatic increase in recovery over the first weeks to months post-injury and then the recovery levels off and plateaus (Cheshire et al., 2015). Therefore, assessments need to be completed often to receive feedback on how the student is progressing. Frequent evaluations are completed because the initial support provided may not need to be in place for long as the brain continues to heal (Ciccia, 2018; Jantz et al., 2014). It is also important to have a plan to withdraw support as the brain heals (Jantz et al., 2014). Next, it is important to assemble a multidisciplinary team consisting of the general education teacher, special education teacher, nurse, school psychologist, speech/language, physical and occupational therapist, administrator, and family (Ciccia, 2018; Jantz et al., 2014; Keyser-Marcus et al., 2002; Madigan et al., 1997; Martin et al., 2017). This team will provide necessary support and information as the student returns to school (Ciccia, 2018). The team members are the front line who interact with the students each day. Bate et al. (2021) recommended that educators and health care providers collaborate for long-term integrational support of students with TBI.

Academic Based Interventions

It is imperative to provide early interventions for pre-school children who sustain a TBI because of their high vulnerability to academic deficits in the years following a TBI (Ylvisaker et al., 2007). To help transition children with TBI back to the classroom, targeted research-based interventions provide support for their specific needs. Interventions can be academically based, or they can be provided for social adjustment and positive behavior utilizing a reinforcement schedule for socially appropriate behavior (Ciccia, 2018; Lundine et al., 2021). Bandura (1977) identified self-efficacy as a means of supporting and reinforcing new behaviors.

When determining interventions for students with TBI, it is essential to remember that, while the interventions may be similar to other students who are receiving special education services, a key component to providing appropriate strategies is the understanding that these students present with a multitude of cognitive, physical, emotional and social or behavioral, functioning that may interfere with their productivity at school (Chono et al., 2018; Keyser-Marcus et al., 2002; Lundine et al., 2021; Martin & Pilarski, 2015; Martin et al., 2017). Interventions can be academically based or supported social adjustment and positive behavior utilizing a reinforcement schedule for socially appropriate behavior (Martin et al., 2017). To help children with TBI transition to the classroom, targeted research-based interventions must be provided support for their specific needs that address both the student's strengths and weaknesses (Stalder et al., 2018).

Determining a student's educational placement is one of the primary goals when developing a school re-entry plan. For students returning to school with a TBI, placement options range from the least restrictive environment where accommodations are provided in the general education setting to the most restrictive environment where students receive individualized instruction in the homebound setting (Martin et al., 2017). Once the student returns to school, it is important to reduce the demands expected of them. When students with a TBI return to school, some accommodations and modifications can help them adjust and be successful in the classroom (Kramer & Davies, 2016; McGrath & Eloi, 2019). Placement determinations are dependent on how the student is functioning at the time of school re-entry and TBI severity. Length of the school day and student ability to tolerate cognitive demands are considered when making recommendations for students' ability to attend half or full days when returning to school from hospital (McGrath & Eloi, 2019). As the student returns to school, providing flexibility on re-entry is essential (Martin et al., 2017; Stalder et al., 2018). It has been suggested that students schedule more difficult courses earlier in the day when students are more alert. Therefore, it would be advantageous for the learner if more rigorous coursework is scheduled in the first half of the day (Clark, 1997; Haarbauer-Krupra, 2017; Jantz et al., 2014). Ciccia (2018) suggested other classroom supports for students with a TBI might include preferential seating, frequent breaks in a quiet room, and a predictable homework schedule to help a student be successful managing their school re-entry.

After a TBI, students often have problems with attention that harm a student's education (Haarbauer-Krupra, 2017; Keyser-Marcus et al., 2002). With attention and memory deficits, a student with a TBI will benefit from organizational interventions and strategies as they reintegrate back to school (Martin et al., 2017). Organization is essential for students and is an area of struggle for most students with a TBI returning to school (Haarbauer-Krupra, 2017; Jantz et al., 2014; Keyser-Marcus et al., 2002; Martin et al., 2017; Savage, 2005). Haarbauer-Krupra (2017) stated that such interventions are used for students who have deficits in attention after sustaining a TBI. These interventions may include reducing distractions, providing outlines, testing in a quiet area, and small group instruction (Martin et al., 2017; McGrath & Eloi, 2019).

External organizers, such as calendars, planners, or handheld computer devices, can be helpful for organization support for memory deficits as students transition back to school (Chono et al., 2018; Martin et al., 2017; Yeates et al., 2017). Accordion folders or color coordinating supplies are other strategies to help organize a student with a TBI (Keyser-Marcus et al., 2002). Students can use a planner, or 'back and forth' notebook, to use as a check-in/check-out system (Keyser-Marcus et al., 2002; Martin et al., 2017). It is essential to understand and identify which interventions are necessary so the school can develop appropriate educational supports.

When taking notes, teachers can provide a note-taking template, guided notes, graphic organizers, or focused notes that include main points. When copying notes from the board, a student with a TBI may have difficulty visually transitioning from viewing the board to writing on paper. Additionally, a student may cognitively have difficulty listening to the lecture while simultaneously taking notes. These difficulties could be attributed to reduced processing speed (McGrath & Eloi, 2019). Teachers need to provide choices on examinations instead of open-ended questions. Teachers should demonstrate what they want the student to do while pairing visuals with verbal examples—providing students with positive and negative example models of what is expected and what is not expected of them. It is crucial to use consistent language when grading their work and using a rubric is the best way to layout expectations and provide positive corrective feedback (Glang et al., 2008b).

While some students with a brain injury can handle the increasing demands of returning to school full time, others may need to change their routine. As the brain heals and sometimes experiences rapid recovery, flexibility is prioritized as the student with TBI returns to school (Martin et al., 2017; Savage, 2005). Monitoring a student's behavioral and physical needs to determine which activities they should participate in is imperative (Haarbauer-Krupra, 2017;

Jantz et al., 2014; Martin et al., 2017; Savage, 2005). A brain injury may produce a wide variety of physical difficulties that need to be addressed in school, including dizziness, fatigue, headaches, sensory, hearing, and vision problems (Jantz et al., 2014; McGrath & Eloi, 2019; Yeates et al., 2017).

Uncoordinated Healthcare and Educational Systems

Haarbauer-Krupa et al. (2017) concluded that children have an increased risk of poor outcomes due to uncoordinated healthcare and educational systems. Wehman (2013) found many barriers in helping students transition back to school following a TBI. The main challenges included communication issues about the injury to school personnel and a lack of knowledge and training among school personnel (Myers et al., 2018; Wehman, 2013; Yeates et al., 2017). Ettel et al. (2016) stated that lack of classroom teacher training in TBI might also increase the misidentification of students in special education in alternate eligibility categories. Identifying children with a TBI and providing them with the proper educational support they require is often not done by schools. Cantor et al. (2004) provided indicators contributing to this problem: (1) school personnel who lack the insight that an injury has occurred, (2) poor communication between hospital and school regarding diagnosis upon discharge, (3) student show no outward signs of physical injury, and (4) TBI symptoms may not appear until later in education development (Lundine et al., 2021). The National Trauma Registry tracked TBI patients between the ages of 5-10 discharged home after being hospitalized with a TBI between April 1994 and January 1999 (Discala et al., 1997). At the time of discharge, 13.2% of this group had cognitive impairments resulting from the TBI. Less than 1% of this group was reported to the school by medical personnel for special education referral (Discala et al., 1997). Even though a TBI does not guarantee placement in special education, without clear communication between the hospital staff and educational personnel, the likelihood of obtaining any support services decreases (Glang et al., 2008a; Todis et al., 2018).

In addition to these concerns, there are issues with the lack of resources to assist students when they return to school following a TBI (Bate et al., 2021; CDC, 2018; Gioia et al., 2016; Lundine et al., 2021). Another concern about students returning to school following a TBI was the lack of perceived importance of TBI by school personnel because most students with a TBI return to school with only an injury to their brain (Gioia, 2016; Lundine et al., 2021). Many staff lacked awareness of TBI and limited understanding of students' particular needs (Lundine et al., 2021; Mealings et al., 2017). This highlights the importance of communication between the medical staff and school before discharge and a clear discharge and school reintegration plan (Canto, 2014; Gioia, 2016; Lundine et al., 2021; Myers et al., 2018; Todis et al., 2018). Most children hospitalized with a TBI are discharged home (Kahn et al., 2018; Nagele et al., 2019) therefore, the school is typically not notified that the student has sustained a TBI (Kahn et al., 2018; Lundine et al., 2021; Nagele et al., 2019; Todis et al., 2018). This can be avoided by coordinated communication between the medical and school staff (Harvey et al., 2020; Myers et al., 2018). The educational needs of students often go unmet as more time passes from the time they were injured (Kingery et al., 2017; Lundine et al., 2021; Nagele et al., 2019; Prasad et al., 2017).

Summary

Multiple studies examine pediatric TBI, but few researchers focus on the lack of knowledge that educators have around TBI and the need for additional training in this area. It is essential for teachers to know and understand how a TBI impacts learning so they can effectively support students with a TBI as they reintegrate into school. Traumatic brain injuries are a common occurrence among school-age children. Educators and healthcare workers must collaborate to create a safe discharge plan to ensure a smooth transition back to school. The theoretical framework of this study is grounded on Albert Bandura's (1986) SCT. This theory is based on the acquisition that learning can be directly related by observing others. Researchers have recommended that the more severe a TBI student experiences, the more that student may benefit from a school reintegration plan that involves school personnel, special education placement, and teacher training. Without educational support, researchers have noted that students returning to school with TBI struggle in many aspects of learning. Students returning to school with a TBI will need a strong academic team in order to be successful. There currently is a gap in the literature around classroom teachers' lack of knowledge of TBI. By using the CM-TBI Survey to evaluate teachers' knowledge of TBI, school administrators can identify gaps in learning and provide training to support students returning to school with TBI.

CHAPTER THREE METHODS

Overview

The purpose of this quantitative, predictive correlational study was to determine if there was a need for classroom teachers to have additional training around traumatic brain injury (TBI) based on the number of hours of TBI training teachers have received and their years of teaching experience. This chapter begins by introducing the design of the study, including full definitions of all variables. The research questions and null hypotheses follow. The participants and setting, instrumentation, procedures, and data analysis plans are presented.

Design

This study involves a quantitative, predictive correlational design to see how accurately classroom teacher's overall knowledge of traumatic brain injury can be predicted from the linear combination of number of hours of TBI training teachers have received and their years of teaching experience. This study was seeking to examine the predictive relationship between variables and will use descriptive and inferential statistics to examine specific research questions. As outlined by Creswell (2014), a quantitative approach was appropriate when a researcher seeks to understand relationships between variables. A correlational study was appropriate for this study because it has a continuous criterion (dependent) variable and more than one predictor variable (Creswell, 2014). The predictor variables were the number of hours of TBI training teachers have received and their years of teaching experience. TBI training was defined as any training a teacher has received in undergraduate school, graduate school, in-service, workshops, conferences, or online training. The continuous criterion variable was the classroom teacher's overall knowledge of TBI.

Survey research allows a researcher to study certain populations using self-reporting instruments. Babbie (1990) stated that online surveys provide a quick turnaround in data collection and are beneficial for gathering information for study. In this study, the need for additional training of classroom teachers was a variable used in relation to their knowledge of TBI which was evaluated. The online survey was utilized to access a sample population of teachers, providing knowledge into the number of hours of training they have received on traumatic brain injury that could help assist in creating a system for yearly training for teachers to help with school reintegration of students with TBI.

Results from the survey provided data that will either support or not support evidence of correlations between the numbers of hours of training that teachers have received on TBI, their accurate knowledge of TBI, the number of years teaching, and their knowledge of TBI as measured by the CM-TBI survey. Descriptive statistics were reported from a convenience sample of general and special education classroom teachers in schools across Texas. Since this study has one or more variables, a multiple linear regression was conducted.

Research Questions

RQ: How accurately can classroom teachers' overall knowledge of traumatic brain injury be predicted from the linear combination of number of hours of TBI training teachers have received and their years of teaching experience?

Hypothesis

The null hypothesis for this study was:

H_0: There will be no significant predictive relationship between the criterion variable (classroom teacher's overall knowledge of traumatic brain injury) and the linear combination of predictor variables (number of hours of TBI training teachers have received and their years of teaching experience).

Participants and Setting

For this study, a voluntary response convenience sampling of classroom teachers located in Texas was taken during the spring of 2022. The participants in this study were from schools in Texas. General and special education classroom teachers from elementary, middle, and high school were drawn for a convenience sample. A convenience sample was used in this study because it has a targeted audience and focuses on a nonrandom sample. Gall et al., (2007) defined convenience sampling as, "A group of cases that are selected simply because they are available and easy to access" (p. 636). They also stated that convenience sampling was used when it was convenient and suits the purpose of the study (Gall et al., 2007). Convenience sampling is one of the most common sampling methods that targets nonrandom members (Farrokhi & Mahmoudi-Hamidabad, 2012). Nonrandom members are based on a specific criterion, such as willingness to volunteer, accessibility, availability, and geographical vicinity when it comes to convenience sampling.

The number of participants for the study was 74, which exceeded the required minimum of 66 for a multiple linear regression when assuming a medium effect size with statistical power of .7 and alpha level, $\alpha = 0.05$ (Gall et al., 2007). The sample came from different elementary schools, junior highs, high schools, and alternative discipline schools. The minimum sample size for a correlation consists of 66 participants, consisting of 11 males and 63 females. Fifty taught general education, 7 taught special education, and 16 held both certifications (one person did not report their certification). Thirty-one teachers had experience with teaching a student with TBI, while 43 teachers had never taught a student with TBI. Forty-three teachers had known someone with a TBI, while 31 did not. Fifty teachers had not had any training in TBI, while 24 had some TBI training. See Table 1 for sample population demographics.

Table 1

Sample Population Demographics

Variables	*N*	%
Gender		
Female	63	85.1
Male	11	14.9
Certification		
General	50	67.6
Special	7	9.5
Both	16	21.6
Not reported	1	1.4
Teaching Location		
Secondary (9-12)	12	16.2
Junior High (6-8)	46	62.2
Primary (K-5)	16	21.6
Known Someone with TBI		
Yes	43	58.1
No	31	41.9
Taught Someone with TBI		
Yes	31	41.9
No	43	58.1
Training in TBI		
Yes	24	32.4
No	50	67.6
Type of TBI Training		
Undergraduate	4	5.4
Graduate	5	6.8
In-Service	18	24.3
Workshop	12	16.2
Conference	3	4.1
Online	4	5.4
Other		
No training	37	50.0
Information from Special education Teacher/counselor	2	2.7
Hospital training	1	1.4
Faculty meeting	1	1.4

N = 74

Instrumentation

The instrument that was used for this survey was the Common Misconceptions about Traumatic Brain Injury (CM-TBI) Survey. The purpose of this instrument was to measure the common misconceptions the general and special education classroom teachers have about TBI. The survey was originally created by Gouvier and colleagues (1988), later revised by Springer and his associates (1997). Springer et al. (1997) chose 24 of the 40 least ambiguous items and modified the wording to improve the clarity. These same items were presented to a sample of rehabilitation professionals of which most specialized in TBI (Farmer & Johnson-Gerard, 1997). Many of these items still had a high rate of misconceptions even after revision for clarity. CM-TBI was used in numerous studies (Buck & McKinlay, 2020; Ernst et al., 2016; Hooper, 2006; Linden et al., 2013; Springer, et al., 1997). The instrument was reviewed by twelve secondary and tertiary participants who were employed as educators. Their suggestions were provided regarding the phrasing of some of the questions and scoring. The participants who reviewed the instrument suggested there should be an option for respondents to show a lack of understanding, so the original scale was changed from ‘True’ and ‘False’ to ‘strongly agree’, ‘agree’, ‘don’t know’, ‘disagree’, ‘strongly disagree’. See Appendix A for the instrument. The CM-TBI instrument used to assess TBI misconceptions in several studies including the public, nursing students, and rehabilitation staff (Buck & McKinlay, 2020; Farmer & Johnson-Gerard, 1997; Hux et al., 2013). The 40 question CM-TBI instrument used for this study was recently updated by Linden and coauthors (2013) for educators. The analysis of variance between the educational professionals who knew someone with a brain injury and those who did not show statistical difference between the two groups with $p < 0.0005$ (Linden et al., 2013). When analyzing teachers who had taught a child with a brain injury, and those who had not, there was a significant statistical difference ($p < 0.0005$). Therefore, the instrument was valid for this analysis as it measures the dependent variable of this study. Based on review of the instrument, there are no sub-scales, but only a single score Cronbach's alpha ranging from .75 to .88.

The CM-TBI Survey consists of 40 questions that assess TBI knowledge in the areas of seat belt/prevention (4 items), brain damage (4 items), brain injury sequelae (9 items), unconsciousness (3 items), amnesia (4 items), recovery (13 items), and rehabilitation (3 items). There are (n=23) items that are false and (n=17) that are true, so reverse scoring was utilized (Linden et al., 2013). The instrument uses a five-point Likert-type scale that ranges from Strongly Agree to Strongly Disagree. Responses were as follows: Strongly Agree=5, Agree=4, Don't Know=3, Disagree=2, and Strongly Disagree=1. Strongly agree or agree were correct responses indicated by participants, and strongly disagree or disagree were items indicated false by participants on the CM-TBI. Incorrect responses, or misconceptions, were indicated by participants selecting strongly agree or agree for an item that was false or disagree or strongly disagree for an item that was true. The CM-TBI scores range from 40 to 200. A score of 40 indicated a low level of knowledge and a score of 200 indicated a high level of TBI knowledge.

Regarding reliability, Cronbach's alpha of .88 was completed on the CM-TBI Survey by Ernst et al. (2016), which indicated a good internal consistency, and Pappadis et al. (2017) study had an internal consistency of .84 with a test reliability of .82. Linden et al. (2013) had comparable results to the Cronbach's alpha of .75 found in his previous study of educators in Northern Ireland. The 40-item CM-TBI Survey was chosen to use in the current study for the overall comprehensiveness of the questions, and the survey was reported to have good reliability, having an internal consistency with a Cronbach's alpha ranging from .75 to .88. The survey has a strong face validity. In the Linden et al. (2013) study, a pilot study was conducted on the survey to improve the validity of the response scale. It was determined that the addition of 'don't know' would provide respondents a chance to express their lack of knowledge on a topic.

There were additional questions asked about (a) demographics, (b) number of years taught, (c) type of school taught in, (d) knowledge of someone with TBI, (e) experience teaching a child with TBI, (f) any training on TBI, (g) what type of training on TBI they participated in (h) and how many hours of TBI training. The online survey took about 15-20 minutes to complete. Scoring of the instrument was completed through REDCap and analyzed by the researcher. Therefore, this suggests that, for measuring knowledge of TBI in educators, the CM-TBI Survey may be a useful instrument. Permission to use the instrument can be found in Appendix G.

Table 2

CM-TBI Survey Results

CM-TBI Survey	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree	% Correct
1. You don't need to wear a car seatbelt as long as you can brace yourself before a crash (F)	0	0	0	2	72	100.0%
2. It is more important to use seatbelts on long trips than when you are driving around town (F)	4	3	3	9	55	86.5%
3. In a car accident it is safer to be trapped inside a wreck than to be thrown clear (T)	14	22	22	5	11	48.6%
4. Wearing seatbelts causes as many injuries as it prevents (F)	0	3	12	27	32	79.7%

5. A head injury can cause brain damage even if the child is not knocked unconscious (T)	40	30	3	0	1	94.6%
6. A little brain damage doesn't matter much, since children only use a part of their brains anyway (F)	3	0	0	14	57	95.9%
7. It is obvious when a child has brain damage because they look different from children who don't have brain damage (F)	2	1	2	21	48	93.2%
8. Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head (T)	30	25	16	3	0	74.3%
9. It is common for children with brain injuries to be easily angered (T)	12	32	27	3	0	59.5%
10. It is common for a child's personality to change after a brain injury (T)	18	43	12	1	0	82.4%
11. Problems with speech, coordination, and walking can be caused by brain damage (T)	36	37	1	0	0	98.6%
12. Problems with irritability and difficulties controlling anger are common in children who have had a brain injury (T)	24	34	15	1	0	78.4%
13. Most children with brain damage are not fully aware of its effect on their behavior (T)	17	40	13	4	0	77.0%
14. Children who have survived a brain injury usually show a good understanding of their problems because they experience them every day (F)	0	7	26	31	10	55.4%
15. Brain injuries often cause a child to feel depressed, sad, and hopeless (T)	11	35	28	0	0	62.2%
16. Drinking alcohol usually affects a young person differently after a brain injury (T)	8	30	34	2	0	51.4%

17. It is common for children to experience changes in behavior after a brain injury (T)	22	42	10	0	0	86.5%
18. When children are knocked unconscious, most wake up quickly with no lasting effects (F)	0	11	29	26	8	45.9%
19. Children in a coma are usually not aware of what is happening around them (T)	4	13	37	16	4	23.0%
20. Even after several weeks in a coma, when children wake up, most recognize and speak to others right away (F)	0	4	40	20	10	40.5%
21. Children usually have more trouble remembering things that happen after an injury than remembering things from before (T)	5	34	28	7	0	52.7%
22. Sometimes a second blow to the head can help a child remember things that were forgotten (F)	0	2	19	32	21	71.6%
23. Children who have survived brain injury may have trouble remembering events that happened before the injury, but usually do not have trouble remembering new things (F)	2	16	29	19	8	36.5%
24. Children who have survived a brain injury can forget who they are and not recognize others, but be normal in every other way (F)	2	34	32	5	1	8.1%
25. Recovery from a brain injury usually is complete in about five months (F)	0	0	32	24	18	56.8%
26. Complete recovery from a severe brain injury is not possible, no matter how badly the child wants to recover (T)	4	15	30	23	2	25.7%
27. Once a child is able to walk again, his/her brain is almost fully recovered (F)	0	3	17	42	12	73.0%

28. Slow recovery often continues up to one year after the injury (T)	5	35	32	1	1	54.1%
29. Children who have had one brain injury are more likely to have a second one (T)	2	12	39	19	2	18.9%
30. It is necessary for a child to go through a lot of physical pain in order to recover from a brain injury (F)	0	7	30	30	7	50.0%
31. Once a child with a brain injury realizes their degree of impairment, they will always be aware of this (F)	0	13	31	26	4	40.5%
32. A child who has recovered from a brain injury is less able to withstand a second blow to the head (T)	7	41	17	6	3	64.9%
33. A child who has a brain injury will be "just like new" in several months (F)	0	1	11	38	24	83.8%
34. Asking children who have survived a brain injury about their progress is the most accurate, informative way to find out how they have progressed (F)	0	5	12	45	12	77.0%
35. It is good advice to remain completely inactive during recovery from a brain injury (F)	0	5	19	37	13	67.6%
36. Once a child recovering from a brain injury feels "back to normal," the recovery process is complete (F)	0	2	10	39	23	83.8%
37. How quickly a child recovers depends mainly on how hard they work at recovering (F)	0	8	11	43	12	74.3%
38. "Cognitive" refers to thinking processes, such as memory, attention, and learning (T)	30	42	2	0	0	97.3%
39. "Cognitive" refers to the ability to move your body (F)	1	8	7	38	20	78.4%

40. The most important goal of brain injury rehabilitation is to increase physical abilities, such as walking (F)	0	14	18	34	8	56.8%

Procedures

After reviewing the literature and instruments available for use, the CM-TBI was chosen because it most closely matched the focus of this study. An online survey was created through REDCap. After the survey was created in REDCap, this document was presented for the proposal defense, and upon completion and permission from the Dissertation Chair, it was submitted for committee approval. Once the committee approved the proposal, this document was submitted to the Liberty University Institutional Review Board (LUIRB), along with its application and supplemental documents. Documentation submitted to the LUIRB included the application, consent form, instrument to be used in the study, permission requests and responses, and a signed signature page. See Appendix B for IRB (Institutional Review Board) approval.

An email was sent to superintendents across the state of Texas, which included a description of the study, participant's eligibility, and an invitation for general and special education teachers to participate in the study (survey) (Appendix A). Once the superintendent of each school district gave permission for the researcher to contact participants for the study, an additional email was sent to the teachers (Appendix D). This letter stated how to access the online survey, how long it would take to complete, and since the survey was not coded, there was no way of tracing the individual responses back to the respondents. A web-based survey was included as a link in the email sent to the teachers to assess their knowledge and misconceptions on TBI. Informed consent was the first question on the survey, and by submitting to start the survey, participants were acknowledging and providing their informed consent. Once the participants completed the online survey, there was no other involvement needed. The online survey took about 15-20 minutes to complete. Two weeks after the initial invitation email, a follow-up email was sent to teachers (Appendix E).

However, if the respondents wanted a copy of the results, they were informed to send an email to the study investigator or the dissertation chair. Contact information was also included in case participants had any additional questions for the study investigator or the dissertation chair. The online survey was anonymous and had no identifying information collected of names or teaching location. The survey link remained valid for six weeks, allowing the participants to have an opportunity to complete the survey during various times that were convenient for them. No accommodation was provided for the participants and there were no time limits placed on them to complete the survey. The information in the introduction email gave a brief overview of the study, which was used to gather information about the teacher's knowledge of TBI, and that the study would be conducted as a partial fulfillment of a doctoral degree.

Of the 958 emails sent, a total of 97 individuals responded, resulting in a 9.9% response rate. Of the 97 responses, 23 were not able to be used due to incomplete or missing information, resulting in a final sample size of 74 participants. The minimum sample size required for a study using correlational statistics was 66 participants. Data was downloaded to an Excel spreadsheet, outliers were identified and removed, as well as any incomplete data, before analyzing the data in SPSS (Statistical Package for the Social Sciences) 25.0.

Data Analysis

A multiple linear regression analysis was appropriate for this study because it has a continuous criterion (dependent) variable with more than one predictor variable (Creswell, 2014). The researcher was interested in determining if there was a predictive relationship between the combination of the predictor/independent variables and the criterion/dependent variable. The dependent variable was a continuous variable, and there are two or more independent variables. Descriptive statistics of mean and standard deviation was provided for all continuous variables. Descriptive and inferential statistics were reported.

Data was visually screened for missing and inaccurate entries and inconsistencies for each variable. Preliminary screenings were conducted on scatterplots, descriptive statistics, and the VIF to determine normal distribution and violations (Warner, 2013). There were three assumptions tested and met prior to conducting the multiple linear regression analysis. The assumptions tested were the assumptions of bivariate outliers, multivariate normal distribution, and non-multicollinearity. When testing for assumptions, there needs to be no multicollinearity, which means that no two or more independent variables are highly correlated. The assumption of bivariate outliers was tested using a scatter plot. The scatter plot was used to determine any extreme outliers between the predictor variable and criterion variable. See Figure 1 for the matrix scatter plot. The predictor variable was the number of years a teacher had taught, as well as the number of hours of training they had received in TBI. TBI training was defined as any training a teacher had received in undergraduate school, graduate school, in-service, workshops, conferences, online training, or other. The criterion variable was knowledge of TBI. Next, extreme bivariate outliers were identified. Assumption of Linearity was tested, and a scatter plot was used between the predictor variables and criterion variable to analyze the data gathered. Assumption of Bivariate Normal Distribution used a scatter plot between the predictor variables and criterion variable, looking for the classic "cigar shape." The data was analyzed using SPSS software.

For the Test of Significance, a two tailed test of significance was chosen because there was not an assumption of positive or negative correlation between the two variables (Warner, 2013). Results presented allow the researcher to make decisions to either reject or fail to reject the null hypothesis as to whether there was a relationship between teacher's years of experience and their accurate knowledge of TBI. The null hypothesis was rejected at the 95% confidence level with $\alpha = .05$.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this quantitative, predictive correlational study was to determine if there was a need for classroom teachers to have additional training around traumatic brain injury (TBI) based on the number of hours of TBI training teachers have received and their years of teaching experience. The criterion variable was the classroom teacher's overall knowledge of TBI. A multiple linear regression was used to test the hypothesis. The Results section includes the research question, null hypothesis, data screening, descriptive statistics, assumption testing, and results.

Research Questions

RQ1: How accurately can classroom teacher's overall knowledge of traumatic brain injury be predicted from the linear combination of number of hours of TBI training teachers have received and their years of teaching experience?

Null Hypotheses

$H_0$1: There will be no significant predictive relationship between the criterion variable (classroom teacher's overall knowledge of traumatic brain injury) and the linear combination of predictor variables (number of hours of TBI training teachers have received and their years of teaching experience.

Data Screening

The researcher sorted the data and scanned for inconsistencies on each variable. Data errors or inconsistencies were identified and removed. To conduct a multiple linear regression analysis, the data must meet the following eight assumptions: 1) one continuous criterion variable, 2) two or more predictor variables, which must be continuous or categorical, 3) independence of observations, 4) linear relationship between the criterion variable and each of the predictor variables, 5) homoscedasticity of residuals, 6) no or little multicollinearity, 7) no multivariate outliers, high leverage points, or high influence points and 8) residuals are approximately normally distributed to conduct a multiple linear regression analysis (Laerd Statistics, 2020).

A matrix scatter plot was used to detect bivariate outliers between the predictor variables and the criterion variable. Bivariate outliers were identified. See Figure 1 for the matrix scatter plots. Figure 2 and Figure 3 show the scatterplots between each predictor and the outcome measure. There was no evidence of a curvilinear relationship.

A boxplot was used to independently examine each variable for outliers. See Figure 4 for the boxplot.

Figure 1

Matrix Scatter Plot

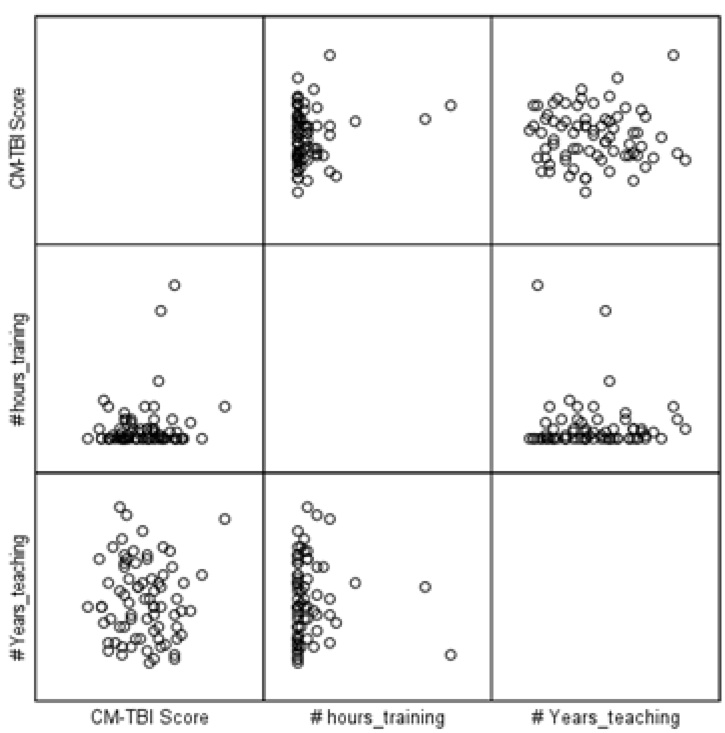


Figure 2

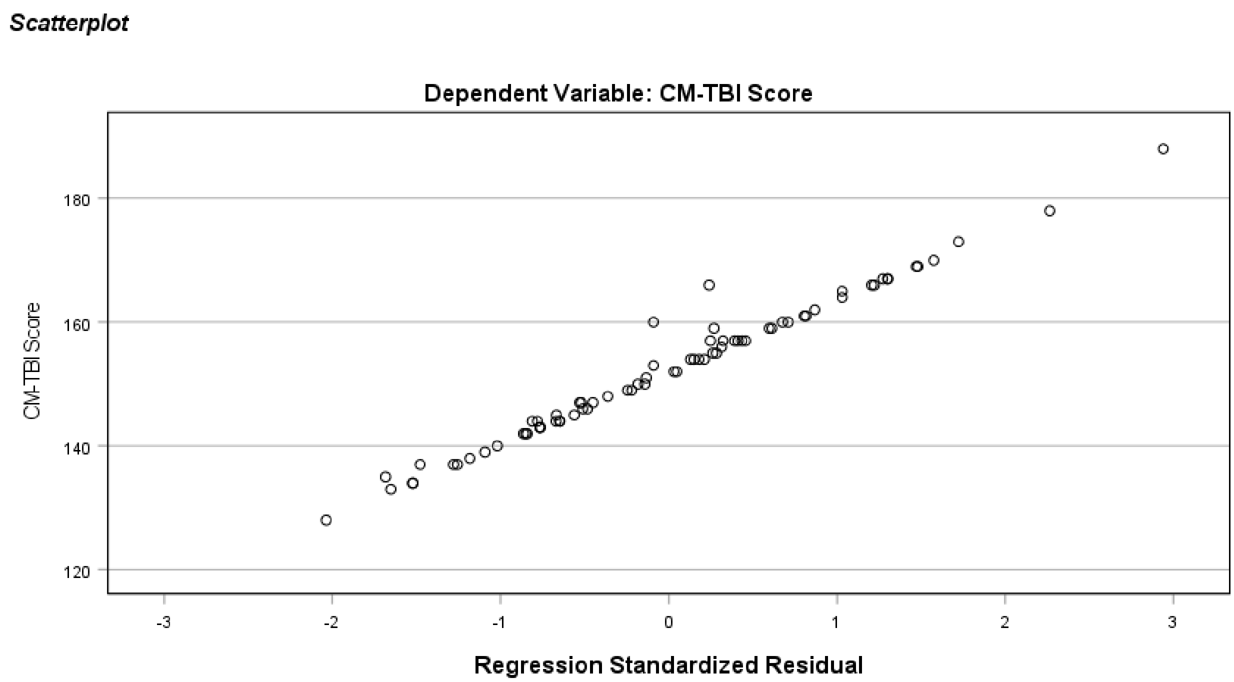

Scatterplot
Dependent Variable: CM-TBI Score
180
160
140
120
CM-TBI Score
-3
-2
-1
0
1
2
3
Regression Standardized Residual

Figure 3

Scatterplot

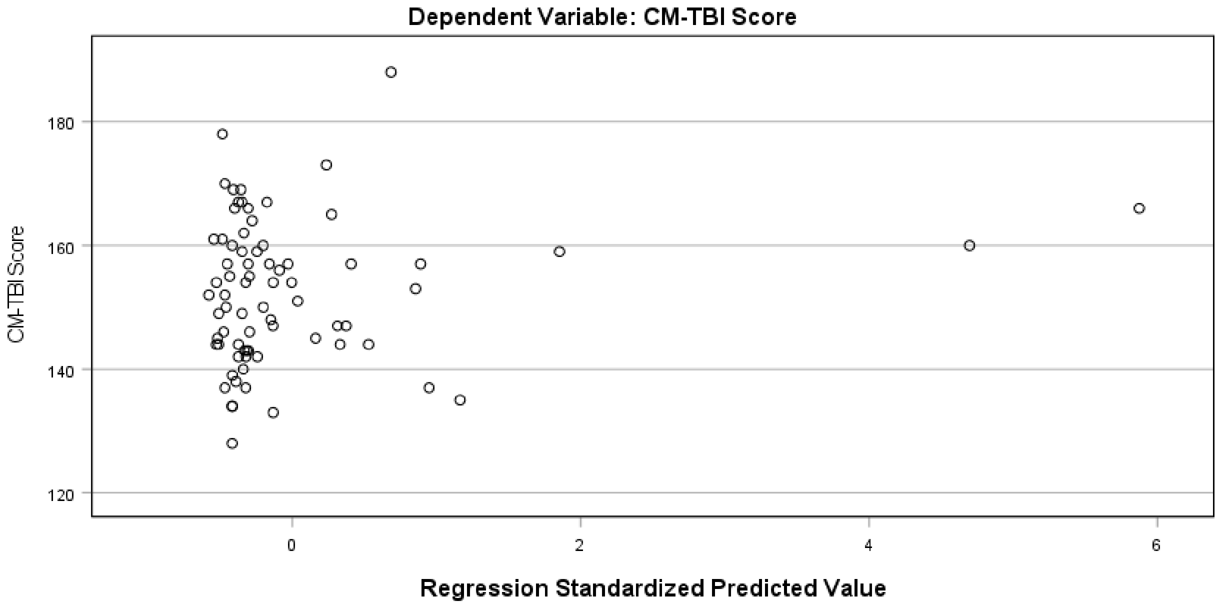
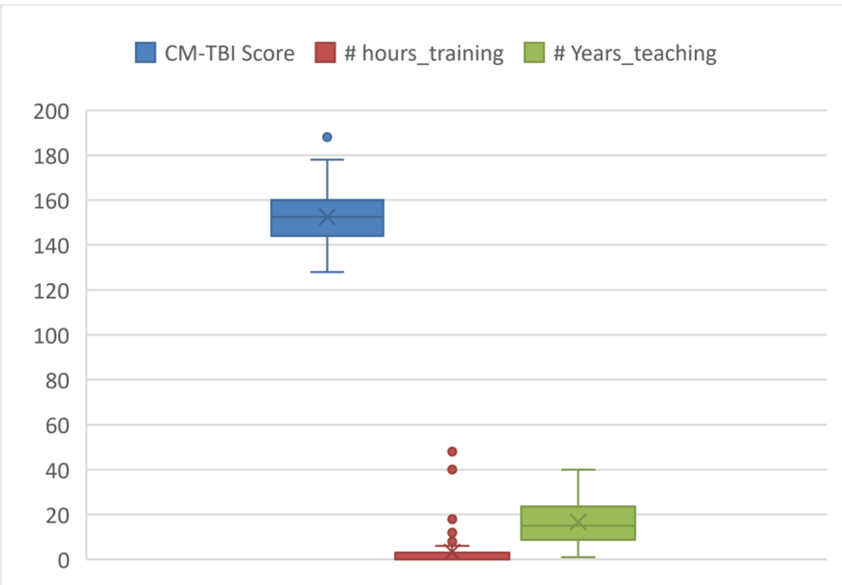


Figure 4

Boxplot



The boxplot for CM-TBI shows one high end outlier with a CM-TBI score =188; this was not extreme. For number of hours of training, there were numerous outliers which equated to 8, 10, 10, and 10 hours of TBI training but not identified as extreme outliers. Hours of training equaling 18, 40, and 48 hours were identified as extremely high outliers. The researcher chose not to remove any of the outliers.

The researcher sought to determine if there was a statistically significant predictive relationship between a classroom teachers' years of service and the number of hours of TBI training received as measured by the CM-TBI survey. Each predictor variable (years taught and number of training hours) was screened in order to identify inconsistencies. Of the 99 survey submissions, 25 were removed due to the non-completion of all questions. The resulting sample was 74, which exceeds the required minimum of 66, assuming a medium effect size with statistical power of 0.7 at the 0.05 alpha level (Gall et al., 2007).

Table 3

Descriptive Statistics

	N	Minimum	Maximum	*M*	*SD*
# Hours training	74	0	48	3.3	7.71
# Years teaching	74	1	40	16.7	9.61
CM-TBI Score	74	128	188	152.5	11.64
Valid N (listwise)	74				

Assumption Tests

One Continuous Criterion Variable

The first assumption test measured that the criterion variable was continuous. The criterion variable was the classroom teacher's overall knowledge of TBI. The variable measures at a continuous level since it can be any value between the range of 40 and 200 for the CM-TBI survey.

Two or More Predictor Variables

The second assumption test measured that the two predictor variables are continuous. The predictor variables are the number of hours of TBI training teachers have received and their years of teaching experience. The variables are continuous, since they can be any value within the range of 0-60.

Independence of Observations

A Durbin-Watson test was used to ensure residuals were independent or uncorrelated. The test for the Durbin-Watson statistic is shown in Table 4.

Table 4

Durbin-Watson test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.157[a]	.025	-.003	11.653	1.882

a. Predictors: (Constant), # years_teaching, # hours_training
b. Dependent Variable: CM-TBI Score

Table 4 shows that the Durbin-Watson value is 1.882. The Durbin-Watson statistic can range from 0-4. A value of 1.882 indicates no correlation (non-autocorrelation) between residuals. The researcher ignored the Durbin-Watson test, since it showed that the participants were not related.

Linearity

Multiple regression requires the assumption of linearity be met. Linearity was examined using a scatter plot. A visual inspection of the scatter plots showed an unusually high distribution of points in one area. This was related to the high number of teachers who did not receive any training in TBI. A visual inspection of the scatterplot used to represent the years of teaching experience showed an even distribution. The assumption of linearity was met. See Figure 1 for the matrix scatter plot.

Multicollinearity

A Variance Inflation Factor (VIF) test was conducted to ensure the absence of multicollinearity. This analysis was conducted to determine if the Variance VIF was too high (greater than 10), then multi-collinearity was present. Acceptable values are between 1 and 5. The absence of multi-collinearity was met between the variables in this study. Table 5 provides the collinearity statistics.

Table 5

Collinearity Statistics

Coefficients[a]

		Collinearity Statistics	
Model		Tolerance	VIF
1	# hours_training	.999	1.001
	# years_teaching	.999	1.001

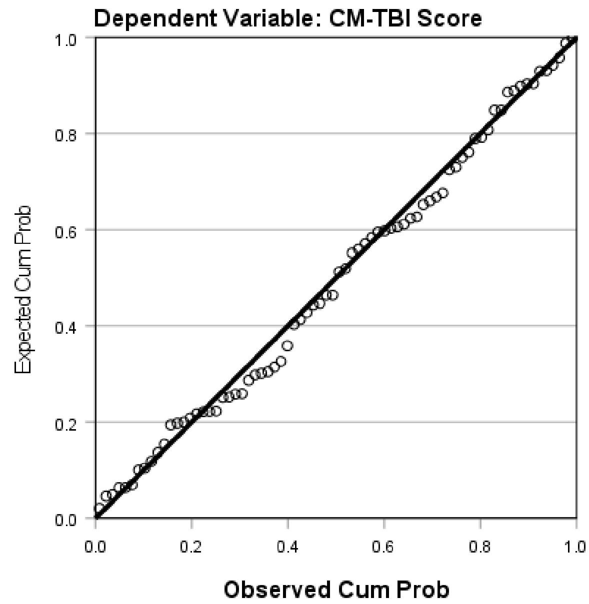
a. Dependent Variable: CM-TBI Score

Assumption of Bivariate Normal Distribution

Multiple linear regression requires that the assumption of bivariate normal distribution be met. The assumption of bivariate normal distribution was examined using a scatter plot. The assumption of bivariate normal distribution was met. Figure 1 provides the matrix scatter plot. A normal P-P scatterplot was used to examine the normality assumption. The data closely followed the normality trend line, indicating that the assumption was supported (see Figure 5).

Figure 5

Normal P-P Plot of Regression Standardized Residual



Homoscedasticity

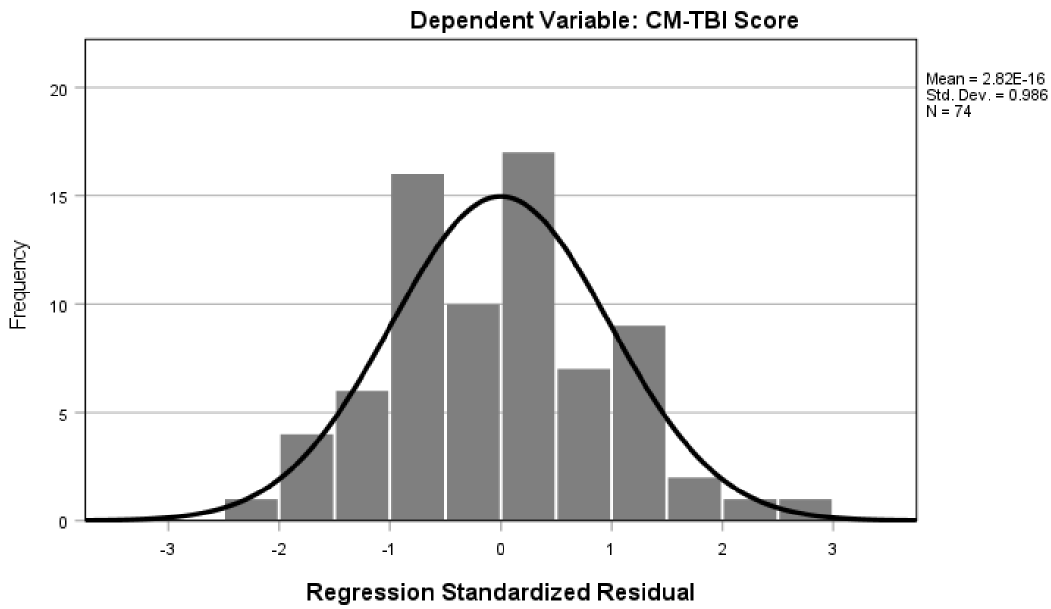
Homoscedasticity was tested with a residuals scatter plot. Homoscedasticity refers to the variance of the residuals being the same for all combinations of the independent variable (Ernst et al., 2016). The scatterplot showed the data points along the line of best fit remained similar along the line, therefore indicating that the data were homoscedastic (see Figure 1). Therefore, the assumption for homoscedasticity was supported.

Normality

The researcher examined the normality of the residuals of the data. Residuals are the difference between the observed and predicted values (Laerd Statistics, 2020). To test this assumption, a histogram (Figure 6) was run for the Y variables (number years teaching and number hours training) and compared to the CM-TBI. A histogram allows the researcher to check for a normal distribution. The histogram indicated a nearly normal distribution. (Figure 6).

Figure 6

Histogram of Regression Residuals



Descriptive Statistics

Descriptive statistics were obtained on the dependent variables, number hours of TBI training, and number of years teaching. The sample consisted of 74 participants. Scores on the CM-TBI survey ranged from 128 to 188. A high score of 200 was a perfect score on the CM-TBI survey and indicated that the teacher had complete understanding of TBI, whereas a low score meant that the teacher had limited understanding of TBI. Understanding of TBI was measured using the Common Misconceptions-Traumatic Brain Injury survey. Table 1 provides the demographic statistics for each variable. Table 6 provides the descriptive statistics for the number of hours of TBI training teachers reported. As demonstrated in the table, teachers had a mean score of 3.3 with a standard deviation of 7.71 in the number of hours of training in TBI. Regarding the number of years teaching, the mean was 16.7 with a standard deviation of 9.61.

Table 6

Descriptive Statistics

	N	Minimum	Maximum	*M*	*SD*
# Hours training	74	0	48	3.3	7.71
# Years teaching	74	1	40	16.7	9.61
CM-TBI Score	74	128	188	152.5	11.64
Valid N (listwise)	74				

Results

A multiple linear regression was conducted to see how accurately classroom teacher's overall knowledge of traumatic brain injury could be predicted from the linear combination of number of hours of TBI training teachers have received and their years of teaching experience. The predictor variables were the number of hours of TBI training teachers received and their years of teaching experience. TBI training was defined as any training a teacher had received in undergraduate school, graduate school, in-service, workshops, conferences, or online training. The continuous criterion variable was the classroom teacher's overall knowledge of TBI.

The model's effect size was small where $R = .157$. Furthermore, $R^2 = .025$, indicating that approximately 2.5% of the variance of criterion variable could be explained by the linear combination of the predictor variables (number of hours of TBI training and years of teaching). Table 7 provides a summary of the model.

Table 7

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.157[a]	.025	-.003	11.653

a. Predictors: (Constant), # years_teaching, # hours_training
b. Dependent Variable: CM-TBI Score

The researcher failed to reject the null hypothesis at the 95% confidence level where $F(2, 71) = .893$, $p = .414$. There was not a significant relationship between the predictor variables (number of hours of TBI training and years of teaching) and the criterion variable (CM-TBI scores). Table 8 provides the regression model results.

Table 8

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	242.535	2	121.268	.893	.414[b]
	Residual	9641.951	71	135.802		
	Total	9884.486	73			

a. Dependent Variable: CM-TBI Score
b. Predictors: (Constant), # years_teaching, # hours_training

CHAPTER FIVE CONCLUSIONS

Overview

Chapter Five will discuss the findings of this quantitative, predictive correlation study. Each research question and the results will be discussed as it relates to the current literature. The implications of the findings will be examined, the study's limitations explored, and will conclude with recommendations for future research.

Discussion

The purpose of this quantitative, predictive correlational study was to investigate how well a classroom teacher's overall knowledge of TBI could be predicted by the linear combination of number of hours of TBI training teachers have received and their years of teaching experience. The study examined the relationships through Bandura's self-efficacy theory. It is important for teachers to be able to provide students with the ability to think and learn. Teachers need to be able to do more than teach, they must have the ability to communicate conceptual frameworks verbally and symbolically so that a student with a TBI can understand what is taught. Additional training in the areas of TBI could be beneficial for teachers to understand how students learn best.

Research Question

RQ: How accurately can classroom teacher's overall knowledge of traumatic brain injury be predicted from the linear combination of number of hours of TBI training teachers have received and their years of teaching experience?

Null Hypothesis

The null hypothesis stated there would be no significant predictive relationship between the linear combination of number of hours of TBI training teachers received, their years of teaching experience in the classroom, and their overall knowledge of traumatic brain injury, as measured by the CM-TBI survey. Number of hours of TBI training and number of years teaching did not demonstrate a statistically significant ability to predict teachers' CM-TBI scores. The researcher failed to reject the null hypothesis.

Despite this, the present study adds to the body of literature by presenting empirical data that supports a gap exists around a classroom teacher's lack of knowledge of TBI. Previous research has shown that teachers do not have a broad understanding of TBI or how it affects students in the classroom (Bate et al., 2021; Blankenship & Canto, 2018; Glang & Todis, 1993; Nagele et al., 2019). Glang et al., (2010) reported that 92% of classroom teachers working with students with TBI had no training in how to educate them. Because of this, teachers felt unprepared to teach students due to the lack of knowledge needed to adequately support students with TBI reintegrating into school (Blankenship & Canto, 2018). The current research found that 67% of teachers received no training in how to educate students with a TBI. The finding of this study further supports the need for additional training of teachers about TBI and the cognitive and behavioral effects that student exhibit in the classroom. Special education teachers may be inadequately prepared to address the unique needs of a student with a TBI, thus contributing to the low number of students identified under TBI classification category of IDEA. Furthermore, 42% of the teachers reported that they had taught a student who had returned to school with a TBI.

Research stated that there is a lack of formal education for teachers about TBI and how to work with students in the classroom setting (Blankenship & Canto, 2018; Davies, 2016; Glang et al., 2018; Howe & Ball, 2017; Kahn et al., 2018; Myers et al., 2018; Nagele et al., 2019). This study revealed that the number of hours of training teachers have received is low (M = 3.34, SD

= 7.71), further supporting previous research. Even when educators had the opportunity to take TBI courses in college, research shows that few educators chose to take them, therefore, adding to the body of literature that classroom teachers have very little knowledge about TBI (Davies, 2016; Hux et al., 2013). Out of 74 participants, only 9 (12%) endorsed obtaining their TBI training in either an undergraduate or graduate program, further supporting previous research. When students are discharged from the hospital and return to school, it is typical for them to still be regaining functional skills (Bate et al., 2021). Teachers play a crucial role in a student's daily cognitive and functional ongoing recovery and require the knowledge to support students as they return to the classroom (Bate et al., 2021; Nagele et al., 2019). This study also adds to the body of literature by reporting that 32% of all teachers had received some form of training in TBI. These findings suggest that teachers may be unable to recognize behavioral and cognitive difficulties exhibited by a student with a TBI (Buck & McKinlay, 2020).

Teachers were asked, "Children who have survived brain injury may have trouble remembering events that happened before the injury, but usually do not have trouble remembering new things," 37% answered correctly, while 39% did not know the answer. This question was particularly difficult for most teachers to answer. For educators, it is extremely crucial to understand that children returning to the classroom following a TBI may not have trouble remembering information learned prior to the TBI but struggle to learn new information. The most significant difficulties teachers face in recognizing a student with a TBI is understanding that the symptoms may not be physical and assuming the student was fully recovered (Blankenship & Canto, 2018; Martin et al., 2017). Teachers may not make the connection because the student looks physically normal on the outside (Jantz et al., 2014). If the student with a TBI does not have visual or physical impairments, often the assumption was they must not be impaired. This further supports the need for additional training for general and special education classroom teachers in TBI. In the survey, 93.2% of educators recognized this statement correctly, “It is obvious when a child has brain damage because they look different from children who don't have brain damage.” indicating that while they know that TBI may not be physically observable, they still lack the knowledge of how to connect the effects of a TBI in the classroom.

Adding to the current understanding of social cognitive theory, this study examined the relationship between a teacher’s own belief of their knowledge, which can have a direct impact on their performance (Bandura, 1997, 2012). According to Liaw and Huang (2015), as it relates to social cognitive theory, well designed teaching will impact students with TBI in positive ways.

Since students with disabilities share many of the same characteristics as students with other disabilities, the generalization of these strategies would be effective for students with TBI. Exploring a teacher’s experiences through the SCT lens furthers researchers’ understanding of how a teacher’s personal factors interact with how a lesson is taught, and interventions provided to students with TBI. In Bandura’s (1977) self-efficacy model, cognition plays a major role in determining behavior. This research extends the understanding of SCT as an important factor in a teacher’s planning for preparing lessons and activities for students with a TBI and deciding their interventions for each lesson.

Implications

The current study did not establish a definitive predictive relationship between the number of hours of training in TBI a teacher received and the number of years of teaching on their knowledge of TBI. However, the findings added to the body of literature through an examination of the answers provided to the questions on the CM-TBI survey. The study expanded the demographic of previous studies to include classroom teachers in primary, junior high, and secondary schools, as well as general and special education teachers. Finally, the study highlighted the importance of training teachers about TBI when they have a student in their classroom who has been impacted by one.

The implications of this study support the need for TBI training for educators as students reintegrate to school following a hospitalization. Of the teachers surveyed, 42% have taught students with a TBI and 32% received TBI training. Knowing the long-term impact that TBI has on children and how their learning is affected, it is important that teachers of all levels receive yearly training so they can effectively manage students who return to their classrooms after sustaining a TBI. Question 23, "Children who have survived brain injury may have trouble remembering events that happened before the injury, but usually do not have trouble remembering new things" on the CM-TBI survey was particularly difficult for most teachers to answer. On the question, 36% answered correctly, while 39% did not know the answer. For educators, this was extremely crucial to understand about students with TBI returning to the classroom. One of the most significant difficulties teachers faced in recognizing a student with a TBI was understanding that the symptoms may not be physical and assuming the student was fully recovered (Blankenship & Canto, 2018; Martin et al., 2017). Teachers were unable to recognize that, while a student may look physically healthy, there could be underlying neurological persisting deficits (Jantz et al., 2014). If the student with a TBI does not have visual or physical impairments, often the assumption was they must not be impaired (Jantz et al., 2014). The overall findings of this study support the need for additional training for general and special education classroom teachers in TBI.

Limitations

One of the limitations to this study was in the diversity of the participants. Only 50 teachers participated in the study with a general education certification, along with 7 teachers endorsing a special education certification and 16 teachers endorsing both degrees. The lack of diversity makes it difficult to generalize the findings to teachers with special education certification, including male teachers. An additional limiting factor was the online survey. Creswell and Guetterman (2019) stated that electronic surveys often generate low response rates, even though they are convenient for collecting data.

The second limitation was the sample population. The researcher used one geographic area, which may not generalize to teachers across other geographic locations across the United States of America. Additionally, the sample size of 74 participants met the minimum standard for this study's analysis (Warner, 2013). Including more participants in this study may yield different results. A larger sample size would also increase the number of participants within the population, thereby increasing the number of teachers with degrees in special education, including male teachers. The findings of this study do not indicate a cause-and-effect relationship and may lack internal/external validity (Gall et al., 2007).

A third limitation of the study is the limitations of correlational research (Gall et al., 2007). A major limitation to correlational research design is that conclusions cannot be drawn about the causal relationships among the measurable variables. Even though the design allows researchers to discover the strength and the direction of the relationships between the variables, it does not provide information about the cause and effect between the variables.

Recommendations for Future Research

1. The current study's finding does not reflect that the number of years a teacher has taught or the number of hours of training in TBI the teacher has received has an impact on a

teacher's knowledge of TBI. Future research could examine the predictive relationships between whether a teacher has taught someone with a TBI and the number of hours of training received.

2. Currently, the state of Texas does not offer any additional training when a teacher receives a student with a TBI. Future studies could examine the predictive relationship between those states that do offer TBI training for teachers of students who sustain a TBI and those that do not.
3. This study used a predictive correlational design. Future studies should consider a quasi-experimental design to examine differences in teacher knowledge between a treatment and a control group. Researchers could have participants take a pretest survey, provide information about TBI, and then conduct a post-test survey to assess information gained.

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APPENDICES

Appendix A

Common Misconceptions-Traumatic Brain Injury Survey

Consent Form

Yes - allows you to continue on with the survey
No – exits you from the survey

Section 1: Demographics

1. What is your gender?
Male
Female
2. What is your area of certification?
General education
Special education
3. How many years of teaching experience do you have?
4. What type of school do you currently teach in?
Early Childhood
Primary (K-5)
Junior High (6-8)
High School (9-12)
5. Have you known someone with a TBI?
Yes
No
6. Do you have experience teaching a child with a TBI?
Yes
No
7. Have you had any training in TBI?
Yes
No
8. What type of training in TBI have you had?
Undergraduate school
Graduate school
In-Services
Workshops
Conferences
Online
Other
9. How many hours of training in TBI have you had in all?

Please indicate whether you think the following statements are:
Strongly Agree, Agree, Don't Know, Disagree, Strongly Disagree

Section 2: CM-TBI Survey

1. You don't need to wear a car seatbelt as long as you can brace yourself before a crash (F)
2. It is more important to use seatbelts on long trips than when you are driving around town (F)
3. In a car accident it is safer to be trapped inside a wreck than to be thrown clear (T)
4. Wearing seatbelts causes as many injuries as it prevents (F)
5. A head injury can cause brain damage even if the child is not knocked unconscious (T)
6. A little brain damage doesn't matter much, since children only use a part of their brains anyway (F)
7. It is obvious when a child has brain damage because they look different from children who don't have brain damage (F)
8. Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head (T)
9. It is common for children with brain injuries to be easily angered (T)
10. It is common for a child's personality to change after a brain injury (T)
11. Problems with speech, coordination, and walking can be caused by brain damage (T)
12. Problems with irritability and difficulties controlling anger are common in children who have had a brain injury (T)
13. Most children with brain damage are not fully aware of its effect on their behavior (T)
14. Children who have survived a brain injury usually show a good understanding of their problems because they experience them every day (F)
15. Brain injuries often cause a child to feel depressed, sad, and hopeless (T)
16. Drinking alcohol usually affects a young person differently after a brain injury (T)
17. It is common for children to experience changes in behavior after a brain injury (T)
18. When children are knocked unconscious, most wake up quickly with no lasting effects (F)
19. Children in a coma are usually not aware of what is happening around them (T)
20. Even after several weeks in a coma, when children wake up, most recognize and speak to others right away (F)
21. Children usually have more trouble remembering things that happen after an injury than remembering things from before (T)
22. Sometimes a second blow to the head can help a child remember things that were forgotten (F)
23. Children who have survived brain injury may have trouble remembering events that happened before the injury, but usually do not have trouble remembering new things (F)
24. Children who have survived a brain injury can forget who they are and not recognize others, but be normal in every other way (F)
25. Recovery from a brain injury usually is complete in about five months (F)
26. Complete recovery from a severe brain injury is not possible, no matter how badly the child wants to recover (T)
27. Once a child is able to walk again, his/her brain is almost fully recovered (F)
28. Slow recovery often continues up to one year after the injury (T)
29. Children who have had one brain injury are more likely to have a second one (T)
30. It is necessary for a child to go through a lot of physical pain in order to recover from a brain injury (F)
31. Once a child with a brain injury realizes their degree of impairment, they will always be aware of this (F)

32. A child who has recovered from a brain injury is less able to withstand a second blow to the head (T)
33. A child who has a brain injury will be "just like new" in several months (F)
34. Asking children who have survived a brain injury about their progress is the most (F) accurate, informative way to find out how they have progressed (F)
35. It is good advice to remain completely inactive during recovery from a brain injury (F)
36. Once a child recovering from a brain injury feels "back to normal," the recovery process is complete (F)
37. How quickly a child recovers depends mainly on how hard they work at recovering (F)
38. "Cognitive" refers to thinking processes such as memory, attention, and learning (T)
39. "Cognitive" refers to the ability to move your body (F)
40. The most important goal of brain injury rehabilitation is to increase physical abilities such as walking (F)

Appendix B

IRB Approval

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

March 29, 2022

Alana Moser
Laura Mansfield

Re: IRB Exemption - IRB-FY21-22-402 Measuring Teachers' Knowledge of Pediatric Traumatic Brain Injury in the Classroom

Dear Alana Moser, Laura Mansfield,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:104(d):

Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

Your stamped consent form(s) and final versions of your study documents can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. Your stamped consent form(s) should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document(s) should be made available without alteration.

Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,
G. Michele Baker, MA,. CIP
Administrative Chair of Institutional Research
Research Ethics Office

Appendix C

Letter to Superintendent

May 4, 2021
[redacted]
Superintendent

[redacted]
As a graduate student in the School of Education, Special Education Department at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to evaluate the relationship between the numbers of training hours teachers have received in TBI and their overall knowledge of TBI and if there is a relationship between the number of years in practice as a teacher and their accurate knowledge of TBI?

I am writing today to obtain permission for educators in your district to participate in my study.

If teachers are willing to participate in the study, I would like to ask them to voluntarily complete a survey. The survey should take approximately 15 minutes to complete. Their participation will be completely anonymous, and no personal or identifying information will be collected.

To participate in the study, they will be asked to go to the following link:[redacted]

Teachers consent to participate in this study will be indicated by their submission of a completed survey. I would appreciate your support in encouraging the teachers in your district to participate in this research study.

Sincerely,
Alana Moser, M.Ed., LDT, CALT, CBIS
Doctoral Candidate

Appendix D

Participant Email Invitation Letter

Dear Teacher:

My name is Alana Moser, and I am a graduate student in the School of Education at Liberty University. I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to measure teachers' knowledge of pediatric TBI (traumatic brain injury), and I am writing to invite eligible participants to join my study.

Participants must hold a teacher certification in general and/or special education and be currently teaching. Participants, if willing, will be asked to complete a survey that should take approximately 15-20 minutes to complete. Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate, please click here: [redacted]

Contact me [redacted] for more information.

A consent document is attached to this email and provided as the first page of the survey. The consent document contains additional information about my research. Because participation is anonymous, you do not need to sign and return the consent document unless you would prefer to do so. After you have read the consent form, please click the button to proceed to the survey. Doing so will indicate that you have read the consent information and would like to take part in the survey.

Sincerely,

Alana Moser, M.Ed., LDT, CALT, CBIS
Liberty University Ph.D. Candidate
[redacted]

Appendix E

Follow Up Email to Participants

Dear Teacher:

My name is Alana Moser, and I am a graduate student in the School of Education at Liberty University. I am conducting research as part of the requirements for a Ph.D. degree. Two weeks ago, an email was sent to you inviting you to participate in a research study. This follow-up email is being sent to remind you to complete the survey if you would like to participate and have not already done so.

Participants, if willing, will be asked to complete a survey that should take approximately 15-20 minutes to complete. Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate, please click here: [redacted]

Contact me at [redacted] for more information.

A consent document is attached to this email and provided as the first page of the survey. The consent document contains additional information about my research. Because participation is anonymous, you do not need to sign and return the consent document unless you would prefer to do so. After you have read the consent form, please click the button to proceed to the survey. Doing so will indicate that you have read the consent information and would like to take part in the survey.

Sincerely,

Alana Moser, M.Ed., LDT, CALT, CBIS
Liberty University Ph.D. Candidate
[redacted]

Appendix F

Informed Consent

Consent

Title of the Project: Measuring Teachers' Knowledge of Pediatric Traumatic Brain Injury in the Classroom
Principal Investigator: Alana Moser, M.Ed., Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. In order to participate, you must be currently teaching as a general and/or special education teacher. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What is the study about and why is it being done?

The purpose of this study is to determine if there is a relationship between the number of years a general or special education teacher has taught and the number of hours in training he/she has received in traumatic brain injury and to assess his/her overall knowledge of traumatic brain injury through the Common Misconceptions-Traumatic Brain Injury Survey.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:

1. Complete an anonymous survey. The estimated time to complete the survey is between 15-20 minutes.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study.

Benefits to society include providing school leaders with information to address teacher needs regarding traumatic brain injury, and by addressing teacher needs, to improve services to students returning to school following a traumatic brain injury.

What risks might you experience from being in this study?

The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be anonymous.
- Data will be stored on a password-locked computer and may be used in future presentations. After three years, all electronic records will be deleted.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University or any school where you work. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Alana Moser. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at [redacted]. You may also contact the researcher's faculty sponsor, Dr. Laura Jeanne Mansfield at [redacted].

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at irb@liberty.edu.

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

Before agreeing to be part of the research, please be sure that you understand what the study is about. You will be given a copy of this document for your records/you can print a copy of the document for your records. If you have any questions about the study later, you can contact the researcher using the information provided above.

Appendix G

Common Misconceptions-Traumatic Brain Injury Survey Consent to Use

Mark Linden <m.linden@qub.ac.uk>
Mon 3/29/2021 12:32 PM
To: Moser, Alana Corley

[EXTERNAL EMAIL: Do not click any links or open attachments unless you know the sender and trust the content.]

Hi Alana ,
Thanks for your email. If you have read my paper you will know that the questions are contained in that. You don't need approval to use this. The questionnaire is not copyrighted.
Best of luck with your studies.
Mark

On 29 Mar 2021, at 18:27, Moser, Alana Corley [redacted]

This message is from an external sender. Please take care when responding, clicking links or opening attachments.

Thank you,

Alana Moser

...

Appendix H

Superintendent Permission to Conduct Research

[External] RE: Research Request in [redacted]

3

[redacted]

[redacted]

Wed 2/9/2022 8:23 AM

To: Moser, Alana Corley

[redacted]

Alana,

We have decided to allow you to conduct your research in [redacted] Our preference is for the emails to come from you, which will be consistent with similar requests in the past.

Thanks,

[redacted]