2012

Traumatic Brain Injury Knowledge and Perceived Competence among Practicing School Psychologists

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TRAUMATIC BRAIN INJURY KNOWLEDGE AND PERCEIVED COMPETENCE AMONG PRACTICING SCHOOL PSYCHOLOGISTS

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Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Psychology

June 2012

PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE
DEPARTMENT OF PSYCHOLOGY

Dissertation Approval

This is to certify that the thesis presented to us by Melissa Santaguida DeLuca on the 16 day of April, 2012, in partial fulfillment of the requirements for the degree of Doctor of Psychology, has been examined and is acceptable in both scholarship and literary quality.

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Acknowledgments

It is with deep gratitude and sincere appreciation that I thank a number of people who have provided continual support throughout the dissertation process. First and foremost, I would like to acknowledge and express much thanks to Dr. Lisa Hain, my Committee Chair, whose expert guidance and dedication throughout this endeavor have allowed me to successfully complete this research. Her tireless vigor, encouragement, and enthusiasm not only roused an interest in brain injuries but also invigorated me to sustain effort and motivation throughout this process. Dr. Lisa Hain provided both intellectual and emotional support, as her knowledge in neuropsychology and statistics and her infectious mirth and humor were invaluable assets throughout this journey; so too were her swift response time and feedback. Her diligence and thirst for knowledge are inspiring.

I would like to extend my sincere gratitude to Dr. Terri Erbacher, my Second Chair, for her insightful comments and queries throughout the dissertation proposal and process. She provoked thoughtful discussions and offered sound advice that supported my focus; further, her dedication to suicide research expanded my current study. Special gratitude is extended to my Third Chair, Dr. Barbara Williams, whose patience, pragmatism, and encouragement were felt throughout. I thank her for believing in me and what I am capable of accomplishing. To each of my committee members, thank you for sharing a passion to help those with disabilities; I have learned from each of you, and I am appreciative of your support and guidance.

Lastly, I wish to take the time to thank my family and friends. My parents, Teddy and Michele Santaguida, whom I love and respect, have always championed and

encouraged my efforts to follow my dreams and desires. When I informed them of my plan to return to graduate school to earn my doctorate, even if only to make dinner reservations by the name of "Dr. Santaguida," they unwaveringly stood behind me; I owe them more than I could ever give. As for my friends who have remained at my side and understood my distance and primary focus, I am extremely thankful. They are faithful friends, and I am fortunate to have them in my life. Most significantly my deepest and most passionate gratitude is reserved for my husband, Joseph. He has been sympathetic enough to remain second to my schooling throughout the past three years and especially during the dissertation process. He has provided me with unconditional love, support, reassurance, encouragement, and patience. Without question or debate, he stepped in to complete what I could not when my focus was elsewhere. I am truly indebted to him for his understanding and fortitude; I cannot begin to thank him enough for all of his sacrifices and compromises made throughout this time. To all, this journey's end is a success for each of us.

Abstract

Traumatic brain injuries (TBI) are a common occurrence in school-aged children. The epidemic of TBI is the leading cause of death and disability among children and young adults (Harris, Mishkin, & Ross, 2010). Children who suffer head injuries frequently experience behavioral, adaptive, and educational deficits (Taylor et al., 2002). As child study team members, under the provisions set forth by the Individuals with Disabilities Education Act (IDEA), school psychologists are responsible for the identification, classification, assessment, and implementation of proper school-based treatment for children who sustain a TBI. This study sought to determine New Jersey school psychologists' endorsement of common myths and misconceptions regarding brain injuries and compare those beliefs to past research. As well, it proposed to assess New Jersey school psychologists' knowledge and self-perceived competence in the areas of TBI identification, assessment, and school-based intervention strategies. This study evaluated the results of a survey made available in of two formats (paper-and-pencil and e-mail); the first portion of the study, a true-false format, was a partial replication of the Gouvier, Prestholdt, and Warner (1988) study and the second portion was a Likert-scale developed by this study's investigator. Surveys were disseminated via paper-and-pencil format to the principal investigators current school district and email addresses to other school psychologists within the state of New Jersey. A total of 229 school psychologists responded. When comparing current responses to past research, results reveal overall enhancement in knowledge of mild TBI and concussions, as well as of the impact of serial brain injuries, with fewer endorsements of misconceptions and myths in these

areas. However, inaccurate beliefs were espoused equally by current practicing school psychologists as those of past research in areas of TBI recovery, amnesia, and brain damage, thus suggesting school professionals require further awareness of TBI sequelae and recovery consequences, especially with regard to more severe head injuries. Further, this study revealed a difference in the knowledge base in identifying TBI when comparing master's-level to education specialist degreed school psychologists, indicating greater knowledge in identification among those with an education specialist degree. While not statistically significant, a similar trend was noted when comparing master's and education specialist degree school psychologists in their knowledge of TBI assessment procedures. Moreover, while most practicing school psychologists felt competent in providing intervention strategies for children with head injuries, they did not necessarily possess accurate knowledge of TBI. As such, results implicate an ongoing need for further training and graduate-degree-program enhancement in the area of TBI, especially at the master's degree level.

Table of Contents

List of Tables

Chapter One

Introduction

In 1959, Wilder Penfield and Lamar Roberts beseeched, "My plea to educators and parents is that they should give some thought to the nature of the brain of a child, for the brain is a living mechanism, not a machine" (Penfield & Roberts, 1959). This idea resonates in modern-day education and is a notion that should be capitalized on; the brain of a child is an individualized, live, active, malleable structure, available to learning and ongoing development. Schools are a domain where children engage in learning, socialization, physical activity, and maturational growth, all aspects associated with brain-based behaviors. What happens, then, when a child's brain is damaged or exposed to some injury, and learning, socialization, development, and activity are impeded? How should educators and school specialists, namely school psychologists, manage these children and the difficulties they experience in a school setting?

In the United States, brain injuries are considered a "silent epidemic" as a result of two primary factors: the overwhelmingly high annual incidence of unreported occurrences and the normal appearance of most individuals who suffer a brain injury with no physical signs of said injury (Harris, Mishkin, & Ross, 2010). An estimated 1.7 million people sustain a traumatic brain injury (TBI) each year in the United States; of those, approximately 75% are considered mild TBI or concussions (Centers for Disease Control [CDC], 2010a). Further, children from birth to age 4 years and adolescents aged 15 through 19 years are considered individuals with the highest risk for sustaining a TBI; moreover, children aged 14 years and younger account for almost half a million

(473,947) emergency room visits annually as a result of a traumatic brain injury (CDC, 2010b). Despite these enormously high TBI statistics in the pediatric population, they are considered an underestimate, as the CDC accounts only for those children who die, are hospitalized, or receive treatment in emergency rooms. These reports do not account for those individuals treated by private physicians or children who receive *no* medical care; thus indicating a gross underestimation of the frequency of TBI, specifically the mild TBI occurrences (Bruns & Hauser, 2003; CDC, 2010b). When incorporating mild TBI cases within the overall statistic, it is estimated that close to 1 million children each year suffer a TBI, with the majority of those cases (80-90%) being mild TBI (Yeates & Taylor, 2005).

The staggering prevalence rate of head injuries in children should alert school psychologists and other school professionals to their frequency as well as to the value of understanding TBI consequences and of developing effective interventions and accommodations for children with said injuries. Yet, formal knowledge of the full scope of the consequences of brain injury is lacking for many (Fletcher- Janzen & Kade, 1997; Gouvier, Prestholdt, & Warner, 1988). As the healthy functioning brain is essential for learning, performance of daily activities, and overall development, brain injuries are an educational concern, especially when the high pediatric prevalence rate is considered. However, since many children experience only mild or moderate TBIs, do not always receive medical attention, and often return to school with no physical anomalies, school personnel are not always aware of the brain injury or of the special needs of the child (Harris et al., 2010). Therefore, proper identification of children who suffer from head

injuries is apparently lacking, as too are the consequential assessment and effective intervention.

Statement of the Problem

TBIs are common occurrences in school-aged children. The epidemic of TBIs is the leading cause of death and disability among children and young adults (Harris et al., 2010). Head injuries frequently results in behavioral, adaptive, and educational deficits in the children who sustain said insult (Taylor et al., 2002). Although full recovery following TBI occurs in some instances, it is more common that school-based academic (Dykeman, 2001; Semrud-Clikeman, 2001), social (Dykeman, 2003), and behavioral (Taylor et al., 2002) support is required to assist children when they return to school. Often, however, children are released from a physician's care, or are never seen by a doctor, and return to school without prescribed supports.

With the signing of the Individual with Disabilities Education Act (IDEA) P.L. 101-476 in 1990 and subsequent reauthorizations in 1997 and most recently in 2004 (P.L. 108-446), the U.S. Department of Education included in its list of eligibility categories for special education services the classification of TBI (Individuals with Disabilities Education Act, 2004). TBI is defined by IDEA as:

> Traumatic brain injury is an acquired injury to the brain caused by an external force, resulting in total or partial functional disability or psychosocial impairment, 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 brain injuries that are congenital or degenerative, or brain injuries induced by birth trauma. (IDEA; Section 300.5)

Subsequently, as a member of a child study team under the provisions set forth by the IDEA, a school psychologist is responsible for the identification, classification, assessment, and implementation of proper school-based treatment for children who sustain a TBI and require special supports in school. Yet, children often do not receive the proper identification, classification, or educational provisions and academic support they require. Cantor et al. (2004) provided indicators contributing to this problem, such as school personnel who lack the awareness that an injury occurred, an insufficient transition service between the hospital and school upon a child's release, unapparent physical appearance of an injury, and the occasional lag of symptom presentation pursuant to a TBI (as cited in Hibbard, Martin, Cantor, & Moran, 2006). Additional factors contributing to the lack of appropriate school-based care is the school psychologists' lack of knowledge and appropriate training in TBI and its ensuing complications (Hooper, 2006; Walker, Boling, & Cobb, 1999).

Purpose of the Study

The purpose of this study is to examine school psychologists' knowledge of and perceived competence level in the area of TBI. Further, this study seeks to determine the degree to which practicing school psychologists endorse common misconceptions regarding TBI. Knowledge in the areas of symptomatology, identification, assessment,

and follow-up school-based treatment for children who sustain a TBI is an integral component of school psychologists' occupational requirements. A sound foundational knowledge in these areas empowers school psychologists to provide the most effective programs and treatment for children who suffer head injuries. School psychologists should have an awareness of the cognitive, behavioral, and socioemotional manifestations following TBI and mTBI injuries in children to ensure appropriate school reentry provisions as well as ongoing interventions and assessment procedures. As such, school psychologists should have a fundamental knowledge of the consequences of TBI, appropriate assessment considerations, and school-based interventions that are essential for the child's success in school. This study aims to determine the school psychologists' endorsement of common misconceptions as well as their knowledge base and perceived competence level when working with children who have suffered a brain injury to establish whether a need exists for school psychologists to receive further training in the areas of TBI identification, assessment, and intervention strategies.

Research Questions

1. As past research among the general public suggests, do practicing school psychologists within the state of New Jersey endorse common misconceptions regarding TBI?
2. Is there a relationship between the level of education and school psychologists' knowledge and perceived competence level in the area of TBI with regard to identification, assessment, and intervention/educational provisions?

3. Is there a relationship between the number of years in practice as a school psychologist and the knowledge base and perceived competence level in the area of TBI with regard to identification, assessment, and intervention/educational provisions?

Chapter Two

Review of the Literature

Traumatic Brain Injury

The CDC identifies a traumatic brain injury (TBI) as a result from "a bump, blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain" (CDC, 2010a). The Brain Injury Association of America (BIAA) further provides defining features:

> Traumatic Brain Injury is an insult to the brain, not of a degenerative or congenital nature, which is caused by an external physical force that may produce a diminished or altered state of consciousness, and which results in an impairment of cognitive abilities or physical functioning. It can also result in the disturbance of behavioral or emotional functioning. (Harris et al., 2010, p. 3)

TBI is considered a type of acquired brain damage that is classified in two categories: open- and closed-head injuries (Morrison, 2010). Rotto (1998) described:

> open head injuries as injuries which involve a fracture or penetration of the skull whereas closed head injuries result from a direct impact to the brain from a jar, shock or actual blow to the head without penetration of the skull. (p. 653)

School psychologists' knowledge of brain injury categories and aftereffects provides for enhanced school-based treatment and proper execution of supports upon school reentry. Therefore, an understanding of both open- and closed-head injuries should be considered.

Open-head injuries. Open-head injuries typically occur as the result of violence (e.g., penetration of gunshot, knives, scissors, or rocks) and are considered less common injuries among children who suffer TBI (Morrison, 2010; Rotto, 1998). When these injuries occur, however, they are typically considered localized, and the resultant damage to the brain usually surrounds the penetration point. Presentation of cognitive and behavioral symptoms following open-head injuries is focal in nature and depends on the location of the wound (Rotto, 1998). Head injuries of this type are identified more easily than are closed-head injuries. Converse to these localized injuries, closed-head injuries tend to result in a more complex presentation of symptoms, and the damage following the insult is more pervasive and diffuse.

Closed-head injuries. Pediatric populations more commonly experience closed-head injuries, which are further identified as either the acceleration or the deceleration type. An acceleration injury occurs when a static child is hit forcibly in the head by a moving object, for instance, being struck in the head with a baseball bat (Rotto, 1998). A deceleration head injury is identified as a consequence of the opposite action: a child's movement results in his being struck in the head by a stationary object. This result is customary from a car accident, a fall, or being thrown from something (Morrison, 2010; Rotto, 1998). Deceleration closed-head injuries are highly susceptible to coup-contrecoup damages in which the moving head makes forcible contact with an object, thereby causing damage to the point of contact (coup), and then the brain moves and rotates, leading to further contrecoup damage on the opposite side of the brain (Hale & Fiorello, 2004; Rotto, 1998). An example of this phenomenon is noted in individuals

who suffer visual deficits, such as diplopia (double vision), following a car accident during which they struck their forehead against the windshield (Gazzaniga, Ivry, & Mangun, 2009). Further, in the event of child abuse, as in shaken baby syndrome among very young children, although there is no impact with an object, the child's brain is jostled in the skull, which can result in a closed-head injury, especially of the coup-contrecoup type (Rotto, 1998). This coup-contrecoup damage results in more pervasive and diffuse injury to the brain. The harm that results often has both immediate and delayed effects.

Individuals who experience brain injuries are susceptible to primary and secondary complications (Morrison, 2010; Semrud-Clikeman, 2001). Closed-head injuries produce three primary injury types, which occur at the time of the insult or immediately following. These three injuries include skull fractures, concussions, and contusions. Rotto (1998) defined a skull fracture as a crack in the cranium, which may be as minor as a small linear fracture or as severe as a depressed bone fracture where a broken piece of the cranium extends into the brain tissue; a concussion as a temporary loss of consciousness; and a contusion as more severe damage resulting in bruising of the brain and rupturing of blood vessels within the brain tissue (p. 653-654). Focal injuries are commonly the result of a fracture or contusion, and damage resides at the area of impact or the rebound point (Semrud-Clikeman, 2001). Diffuse axonal injuries follow when the aforementioned rotation of the brain occurs, resulting in shearing and tearing of brain tissue, the white and gray matter, within the skull (Hale et al., 2011; Semrud-Clikeman, 2001). Damage of this type often is seen in the frontal and temporal lobes of

the brain, thus resulting in alterations in behavior, emotion, memory, and attention (Semrud-Clikeman, 2001).

Secondary damages following a TBI may manifest sometime after the injury. In fact, secondary injuries may not become evident until days or even weeks following the TBI and are often the result of autoregulation difficulties and metabolic changes occurring within the brain (Leddy, Kozlowski, Fung, Pendergast, & Willer, 2007). These aftereffects are often indirect consequences of the initial head trauma (Semrud-Clikeman, Kutz, & Strassner, 2005). Secondary injuries may include edema (brain swelling); intracranial pressure; intracerebral, subdural, or epidural hemorrhage; hypoxia (reduction of oxygen); brain ischemia (reduced blood flow); and infection (Morrison, 2010; Semrud-Clikeman et al., 2005). Rotto (1998) further addressed secondary metabolic changes, including hyperthermia, electrolyte imbalance, damage to the pituitary or hypothalamus, and hyperventilation, which may occur following a TBI. Among other symptoms, these metabolic changes may present as high fever, dehydration, and altered blood pressure. These brain alterations influence the impending cognitive and behavioral manifestation following the injury. Ongoing cognitive and behavioral changes in children often are seen in schools upon a child's reentry; therefore, medical identification of these complications is paramount, as is the dissemination of information to the schools about the damages because these aftereffects will impact the recovery of the individual and contribute to identification of subsequent symptomatology and, therefore, the severity of the injury.

Severity of TBI from a medical perspective. From a medical perspective, traumatic brain injuries are classified into categories according to the level of severity: mild, moderate, and severe. Identification of the severity often is determined via examination of three separate factors: the child's score on the Glasgow Coma Scale (GCS), the level of posttraumatic amnesia (PTA) and the duration of unconsciousness/coma, and the neurological examination assessing physical deficits (Morrison, 2010; Rotto, 1998; Semrud-Clikeman et al., 2005). The GCS is a measurement tool used to assess individuals across three behavioral categories to determine their level of consciousness: eye opening, motor response, and verbal response. Eye opening is interpreted as the brain-stem-arousal mechanism, while motor responses are believed to reflect gross central nervous system functioning and verbal responses are considered an integration response (Semrud-Clikeman et al., 2005). The GCS is a 15-point scale that culminates in an overall composite score; the higher the score, the less severe the injury (Teasdale & Jennett, 1974). In 1984, as a response to criticisms of the GCS in determining scores in the pediatric population, Raimondi and Hirschauer developed the Children's Coma Scale, which offers an alternative to the language-based verbal scale of the GCS to accommodate younger children with less developed verbal skills. Scores on this scale, however, are not compatible with scores on the original GCS scale (Rotto, 1998; Semrud-Clikeman et al., 2005). Therefore, the Children's Coma Scale should be used with caution.

A second indicator of the severity of the brain injury is the assessment of the length of PTA. PTA, a form of anterograde amnesia, is defined as the length of time

subsequent to the injury when neither new memories are stored nor new learning occurs (Youse, Le, Cannizzaro & Coelho, 2002). The GCS and PTA assessments, in conjunction with the duration of coma and neuroimaging results, are used to determine the severity of the TBI. Level of severity presents as follows: a severe TBI results in GCS scores of 3-8, length of coma longer than 6 hours, and PTA longer than 24 hours; moderate TBI has GCS scores ranging between 9-12, coma length of fewer than 6 hours, and PTA symptoms anywhere from 1 to 24 hours; and, lastly, mild TBI is determined by GCS scores of 13-15, 20 minutes or less of a coma length, and 60 minutes or fewer of PTA symptomatology (Youse et al., 2002). Though the more severe the TBI, the greater the negative consequences, even mild TBI cases, which are most common, often result in potential sequelae, or aftereffects of the injury (Taylor et al., 2010), even if only temporarily.

Severity of TBI is relevant, as it influences the degree of aftereffects. For instance, postconcussion symptoms (PCS) are a constellation of indicators that often arise following a TBI. Symptoms are comprised of a variety of physical, cognitive, and socioemotional characteristics, including headache, dizziness, irritability, memory problems, difficulty concentrating, fatigue, sensitivity to light and noise, visual disturbance, reasoning and judgment problems, depression, and anxiety (Gouvier, Uddo-Crane, & Brown, 1988; Ryan & Warden, 2003; Stevens, 1982). A multitude of sequelae can occur post TBI, beyond the PCS symptoms just noted. A sound knowledge base of TBI sequelae provides school psychologists with a foundation for understanding the

resultant brain-based cognitive, behavioral and social conversions that often occur in children who suffer TBI insults.

TBI Sequelae

Many children who experience a TBI also exhibit ongoing aftereffects following the injury. Complications from the injury include physical, cognitive, and psychosocial alterations, all of which can impact negatively a child's school performance (Harris et al., 2010). Examining and identifying these changes in children will better enable school psychologists to provide special services and accommodations to children who experience postconcussion symptoms and aftereffects of TBI.

Physical functioning. Physical symptoms can present as sensory, motor and neurological deficits in children who suffer TBI injuries. For those children hospitalized, these deficiencies frequently are noted during their hospitalization or during a period of rehabilitation. However, for those children who are not seen by a medical doctor or who experience a latent symptom onset, these difficulties may not be observed until a child returns to school (Harris et al., 2010). Some of the frequent indicators should be identified easily by school psychologists, as the symptoms may have psychoeducational implications.

Sensory symptoms. A number of sensory deficits can arise following a TBI. Visual impairment caused by nerve damage, field cuts, or diplopia can occur, as can reduced auditory acuity resulting from nerve damage, middle and inner ear damage, and conductive and sensory-neural or mixed hearing loss (Harris et al., 2010). Stevens (1982) reported that hypersensitivity to light (photophobia) and sound (hyperacoutism) can

develop, as can an impaired ability to smell or taste. With regard to these physical symptoms, the neuroanatomical areas affected by the insult impact the functioning of these sensory systems. Among other aftereffects, temporal lobe damage affects the input of auditory stimuli while occipital lobe damage results in visual impairments (Semrud-Clikeman et al., 2005). Perception of sensory input may not be the only consequence of TBI damage; motor difficulty output also may be evident.

Motor symptoms. TBI-related motor deficits are varied and can result in very minor difficulties to severe paralysis. A number of motor deficiencies have been identified by Begali (1992) and Savage and Wolcott 1994; as cited in Rotto, 1998); these functional deficits include paralysis affecting one side of the body (hemiplegia) or bilateral paralysis, (hemiparesis) weaknesses affecting one side of the body or bilateral paresis, low muscle tone in the extremities or trunk (hypotonicity), resistance to movement in any range (rigidity), inappropriate sustained contraction of muscles (spasticity), tremors, dysarthria or difficulty in chewing, swallowing and pronouncing words, inability to plan and execute coordinated movements (apraxia), and inability to coordinate voluntary muscle movements of the body (ataxia).

These weaknesses can produce deficits from fine motor difficulties to a complete loss of function. Motor deficiencies can present as coordination problems, balance instability, reduced motor speed and reaction time, and speech disturbances (Rotto, 1998). In schools, these inefficiencies may impact tasks requiring written expression, oral expression, and handedness, as well as activities of daily living and physical-education requirements. Monitoring these functions with regard to a child's

independence may need to be considered following brain injury trauma; in addition supports and interventions may be required to assist in these areas. Sensorimotor deficits are not the only functional areas of injury resulting from a TBI; children also may suffer from ongoing neurological complications, which may impact performance upon return to school.

Neurological symptoms. The Brain Injury Association of New Jersey indicated headaches as a common aftereffect in patients with TBI for up to 1 year following a brain insult (Harris et al., 2010). Headaches are considered a further global reaction to trauma, with widespread pain within the head (Stevens, 1982). Additionally, dizziness or positional vertigo is another common neurological side effect of TBI (Harris et al., 2010; Stevens, 1982). Seizures also may result after a TBI, but often they occur only just following the initial injury (Harris et al., 2010). Adding to these difficulties, perseveration may ensue and bowel-bladder control may be impacted according to Begali, 1992 and Savage & Wilcott 1994 (as cited in Rotto, 1998). Although children do not return to school while experiencing these more severe medical difficulties, school psychologists should have knowledge of these sequelae, as they provide for perception and insight into a child's behavioral and cognitive manifestations post TBI insult.

Moreover, increased fatigue, a postconcussion syndrome symptom, also is a typical experience of children who suffer a TBI (Harris et al., 2010; Stevens, 1982). This complication may impact children who return to school and are expected to attend a full day (Harris et al., 2010). As symptoms of fatigue increase, so also may sleep disturbances among children who suffer a brain injury (Rotto, 1998). These neurological

deficits can impede a child's ability to function adequately when returning to school. Further implications experienced at school can be the outcome of cognitive changes resulting from the TBI insult.

Cognitive changes. Changes in cognition lead to alterations in a child's thought process. Cognitive changes resulting from a head injury can be various; as such, these variations may affect a student's performance in school. Ewing-Cobb and Bloom (1999) identified cognitive sequelae to include any possibility of broad intelligence reduction to more localized difficulties with attention and concentration, memory, speed of processing, language processing, and visual-perceptual difficulties. Additional concerns regarding organizational skills, executive control, and reasoning and judgment also are indicated by Begali (as cited in Rotto, 1998; Harris et al., 2010). Furthermore, the demands of school may lead to an increase or exacerbation of these various cognitive symptoms.

While global intellectual deficits may be evident, there is also research by Begali suggesting the ability to solve novel problems may be more at risk from damage following a TBI than overall global functioning (as cited in Semrud-Clikeman et al., 2005). Begali (1992) recognized a reduction in Performance IQ rather than Verbal IQ scores for children, which was attributed to the Verbal domain reflecting already learned and routinized skills, while nonverbal tasks tap novel problem solving (as cited in Farmer & Peterson, 1995). This evidence suggests that while previously learned skills remain intact, the learning of new information is impacted negatively following a head injury. Further, Hoffman, Donders, and Thompson (2000) revealed that performance of

processing speed is more susceptible to TBI effects. These intellectual deficits were noted to be more common in individuals with severe TBI when compared to those with a moderate or mild TBI condition (Bigler, Johnson, & Blatter, 1999; Yeates & Taylor, 2006). Similar findings were reported by Yeates et al. (2002), suggesting that moderate to severe TBI injuries result in deficits in cognitive skills requiring speed of performance and memory of new information.

Newly published research confirmed that severe brain injuries in young children result in persisting functional deficits 10 years post injury (Anderson, Godfrey, Rosenfeld, & Catroppa, 2012). Anderson et al. (2012) identified long-standing detrimental effects, with the greatest deficit in the area of cognition. Not surprisingly and supporting the aforementioned research, the greatest area of long-term improvement was noted in verbal abilities. Additionally, Crowe, Catroppa, Babl, and Anderson (2012) recently discovered that moderate and severe TBI when occurring in early childhood results in depressed Verbal IQ, Performance IQ, and Full Scale IQ, when compared to uninjured peers, while mild TBI did not appear to affect facets of an individual's intelligence. However, all head injuries, be they mild, moderate or severe, have been associated with cognitive changes, thus placing the child at risk for behavioral deficits (Crowe et al., 2012).

For instance, cognitive deficiencies may be illustrated in a child's reduced attention and concentration skills. Vigilance, or sustained attention, the ability to maintain attention over an extended period of time, is compromised commonly in children who sustain a TBI (Harris et al., 2010). Trouble with attentional control in

regard to focused/selective attention, divided, and shifting attention as necessary, may also be impacted (Rotto, 1998; Semrud-Clikeman et al. 2005). Adding to these newly acquired deficits, premorbid conditions only intensify the symptoms. For those children who evidenced these difficulties prior to the injury, the problems become exacerbated by the head trauma and create greater problems when the child is expected to perform in school (Harris et al., 2010; Yeates & Taylor, 2006).

In a review of research, Vakil (2005) denoted memory impairments as one of the most significant effects of TBI, with the most debilitating memory deficits documented among those with moderate and severe TBI. Yet, even mild brain injuries can produce short-term memory problems (Harris et al., 2010). If memory difficulties are present upon a student's return to school, he or she may encounter trouble learning new material as well as retaining and recalling information; remembering complex or large amounts of information may present as a challenge for children experiencing these deficits (Morrison, 2010; Semrud-Clikeman et al., 2005). Over time, difficulty learning and retaining new information resolves in a decline in overall academic performance (Farmer & Peterson, 1995). Anther memory domain, working memory, a task that requires executive control, also may be impacted negatively subsequent to a TBI (Proctor, Wilson, Sanchez, & Wesley, 2000). Moreover, other areas of executive functioning suffer when TBI occur in children.

Executive dysfunction presents with a multitude of problems across a diverse range of time. The frontal lobes are involved in motor function, language, problem solving, judgment, impulse control, and overall execution of goal-directed behaviors

(Hale & Fiorello, 2004). Because of their location in the front of the head and their vicinity to bony structures within the skull, the frontal lobes are often vulnerable to injury (McAllister, Sparling, Flashman, & Saykin, 2001). Moreover, as the frontal lobes are responsible for executive control and are the last to develop of all the cerebral lobes, these executive deficits may not present at the time of injury for younger children but instead may develop later in the child's maturational development (Morrison, 2010). Poor planning and organizational difficulties are often consequences of executive dysfunction and are detected succeeding TBI insults (Semrud-Clikeman et al., 2005); problem-solving weaknesses as well as impaired reasoning also are indicated for children who suffer a TBI (Harris et al., 2010; Rotto, 1998). Furthermore, dysinhibition, or the inability to restrain oneself or control one's impulses, also is affected by executive control deficits; thus, students may have difficulty controlling their behaviors (Rotto, 1998). These executive control deficits may directly impact a student's performance in school. Gioia and Isquith (2004) subscribed to the need for a multitiered ecological approach to measuring executive dysfunction among students with TBI in the classroom. Research suggests that incorporating teacher ratings of real-world correlates, coupled with environmental demands and formal assessment, provides for a prolific constellation of executive dysfunction, thereby leading to more appropriate classroom-based interventions (Gioia & Isquith, 2004).

Executive dysfunction and its resulting dysregulation have a more pervasive effect than merely influencing the cognitive development and growth of the child; in fact, these deficits also can impact behavioral and socioemotional development (Morrison,

2010). Indeed, the frontal lobes are considered the emotional control center of the brain and are closely tied to an individual's personality. Consequently, damage to the prefrontal regions of the brain also may result in personality changes in a child (Hale & Fiorello, 2004). Furthermore, these complications can be long standing. In effect, Ganesalingam et al. (2011) explored executive dysfunction 6 months following a TBI in young children and revealed that deficits in executive functioning resulting from damage to the frontal lobes may be the underlying factors in behavioral impairment, specifically in areas of self-regulation, metacognition, and effortful control. These long-term behavioral impairments manifest in a number of psychosocial difficulties.

Psychosocial difficulties. The Brain Injury Association of New Jersey suggests that students may experience psychosocial issues for a number of reasons, including emotional dysregulation resulting from damage to localized areas of the brain, fear and resentment regarding the injury, and personal insecurities resulting from peer differences (Harris et al., 2010). These issues may present as behavioral, emotional, and social difficulties. Identification of these difficulties is beneficial, as frequently teachers (Yeates & Taylor, 2006) and parents and families (Morrison, 2010) report these problems and find them to be the most debilitating and more of a challenge to manage than the cognitive changes. By understanding the nature of TBI and the multifaceted aftereffects that follow, school psychologists are in a better position to execute interventions not only for cognitive deficits but also for the psychosocial difficulties that may present.

Behavioral and emotional deficits. As documented with executive dysfunction, behavioral problems in the classroom result in disruption as well as in academic

difficulties for the student experiencing the behavioral issues. Yeates and Taylor (2006) exhibited that teacher reports of behavioral and emotional problems for students with severe TBI were significantly greater than behavioral problems for children with orthopedic injuries only. Further, the behavioral problems persisted for years following the injury, and they were valid indicators of academic underachievement and need for classroom-based interventions (Yeates & Taylor, 2006). Typical behavioral difficulties include impulsivity, aggression, hyperactivity, agitation and frustration, opposition, dependency, and motivational problems, such as apathy (Rotto, 1998). As detailed with premorbid cognitive and executive control deficits, pre-existing psychological difficulties in these areas only exacerbate the symptoms following a TBI (Harris et al., 2010; Semrud-Clikeman, 2001).

Many of the behavioral difficulties noted coincide with negative social and emotional complications. In fact, Oquendo et al. (2004) determined that aggression prior to the TBI incident increases the likelihood of suicidal behavior post TBI. The study concluded that often the aggression was noted in childhood and the TBI occurred during adolescence. This suggests, then, that TBI increases the predisposition to suicidal acts and exacerbates the aggression as a result of damage to brain regions involved in executive control and specifically behavioral inhibition (Oquendo et al., 2004). Oquendo et al. demonstrated that depressed patients with TBI were significantly more aggressive and hostile than depressed patients without TBI, resulting in a higher proclivity to suicidal acts in the former population. Consideration of behavioral and emotional complications, as well as acts of aggression, should be considered when working with

children with TBI to ensure their safety. In effect, awareness of the potential for suicidality among individuals with TBI is paramount for professionals working with this population (Wasserman et al., 2008). Wasserman et al. (2008) recommended that various scales for suicide risk assessment be conducted at varying times because of the long-standing difficulties following TBI and the ongoing risk of suicide when these individuals are both aggressive and depressed.

While all children who sustain an injury may not be prone to suicidal acts, other psychological difficulties may be evident. Emotional difficulties may manifest in psychological maladjustment. Students who suffer a TBI may experience depression, anger, withdrawal, anxiety, and emotional lability (Rotto, 1998). Interestingly, Savage and Wolcott (1994) reported that children and adolescents who experience TBI may undergo a form of maturational stagnation, during which their ability to develop emotionally, psychologically, and socially diminishes following the insult (as cited in Morrison, 2010). Often the emotional reactions experienced by children with brain injury are in response to the injury itself as well as to the awareness of their newly acquired deficits and limitations (Rotto, 1998). Semrud-Clikeman (2001) indicated psychosocial factors of depression and low self-esteem in children resulting from the awareness of the injury. Furthermore, Fordyce, Roueche, and Prigatano (1983) found that the awareness of newly acquired disabilities among youths with TBI leads to weakened social-skills development (as cited in Semrud-Clikeman et al., 2005).

Social issues. Alterations in a student's behavior and emotionality following a TBI can result in personality changes; these vicissitudes can lead to diminished social-

functioning capacity. Begali (1992) indicated that social functioning encompasses various aspects, including social interactions and reading social cues (as cited in Rotto, 1998). Social skills acquisition, in younger children may be impacted by a TBI (Ewing-Cobbs, Landry, Steubing, Prasad & Leal, 2000 as cited in Semrud-Clikeman, 2001). These younger children with TBI may not have the cognitive wherewithal to learn necessary social skills as easily as their noninjured peers, thereby making acquisition of social skill a challenge. Furthermore, some children experience social withdrawal and opt to isolate themselves from their peers after an injury of brain damage (Harris et al. 2010). Additionally, impaired social judgment may result from TBI. Deficits in social-problem-solving skills may occur post TBI, and socialization issues may arise as a result of these deficits independent of the cognitive and pragmatic skill deficits these children also may encounter (Yeates et al., 2004). In fact, Milders, Fuchs, and Crawford (2003) found that inaccurate perception of social cues may lead to and maintain the poor social skills and antisocial behaviors noted in children with head injuries. Problems with social interactions may have long-term negative outcomes for these children, which indicates a need for social-skill training and reiterates the importance of proper identification of TBI in childhood. As such, recognizing not only the social but also the varying cognitive, behavioral, and emotional ramifications pursuant to a TBI necessitates an appropriate school reentry procedure and ongoing service program for these children.

School Reentry

A child's manifestation of the various neuropsychological sequelae will depend on many factors. Contributing to a child's success upon his or her return to school

following a TBI includes the nature and severity of the brain injury and its impact on school performance, the age of the child at the time of the injury, and the child's premorbid condition. Further, contextual influences, including the school environment and the family's coping skills in response to the trauma, contribute to the child's outcome (Farmer & Peterson, 1995). All of these influences need to be considered by the school psychologist upon a child's return to school after a brain trauma. These influences should be examined by the school within the context of providing appropriate identification, assessment, and intervention strategies.

Identification. By and large, substantial inconsistencies exist between the medical field and the educational profession with regard to the reported size of the identified pediatric population with TBI. While the medical profession's epidemiological reports indicate a high incidence rate in childhood with TBI (Ylvisaker et al., 2001), the educational community reports a conversely low prevalence rate of TBI in pediatric populations who receive services (Savage, 1991). In fact, while the CDC reports close to half a million pediatric cases of TBI annually (CDC, 2010b) and further reports between 80,000-90,000 new cases of TBI-related disabilities annually in the United States (CDC, 1999) the U. S. Department of Education (2010) reveals only approximately 26,000 children aged 3-21 years served under the TBI identification receiving special education and related services. This number suggests that only 18% of the children medically identified as suffering a TBI are identified properly and receiving special education services in the school setting. While some students who have sustained a TBI may receive services through a Section 504 plan or under a different eligibility category, these

alternate service provisions do not appear to account for the disparity between the medically and educationally identified populations. In fact, a study conducted in 2003 revealed that fewer than half of the children with severe TBI in special education were eligible for services under the TBI educational classification (Taylor et al., 2003). As such, children who have suffered head injuries are not being adequately recognized within schools. Moreover, the estimated ratio of the total special education population to TBI is 500:1 while specific learning disability and TBI statistics rank 250:1, thereby qualifying TBI as a low-incidence disability (Ylvisaker et al., 2001), which is in stark contrast to the number of medically identified children with TBI. A discrepancy thereby exists between the number of injuries and the identification of childhood TBI in schools. A continued lack of proper TBI identification in the schools can result in detrimental academic performance, socialization difficulties and behavioral problems for children who suffer brain injuries as the students may be misidentified or unidentified, resulting in inappropriate, insufficient, or, worse yet, no interventions at all.

As a part of improving the identification process, Ylvisaker et al. (2001) has been recommended that special education and kindergarten screening protocols incorporate questions regarding head trauma, injury, and diseases of the brain. Further, for those students returning to school after a TBI, early identification has been identified as a key factor to school success. In fact, an initial plan for school reentry should begin on the admission day at the rehabilitation facility (Ylvisaker, Hartwick, & Stevens, 1991). Savage (1991) suggested frequent contact between school personnel and hospital professionals for successful school reentry. Research also recommended that a primary

contact person be identified at the school so that appropriate prior records can be shared and so that medical updates and prognosis can be transmitted most effectively (Farmer & Peterson, 1995). While students are more likely to be identified and to receive services when hospital-to-school transitions occur, a parental report of the TBI also has been found to secure services for children (Glang et al., 2008). Parents who actively sought services within their child's school were more likely to receive supports. However, this parental advocacy often does not occur. Beyond the ongoing communication among medical professionals, school personnel, and parents, the following transition procedures also should be incorporated as appropriate: homebound instruction, training for school staff, orientation of classmates, case management provisions, planning for educational and social supports, placement decisions, and monitoring progress during the first few months of reentry (Ylvisaker et al., 2001). Prior to implementing many of these supports, however, an accurate assessment of the child's functioning should be considered so that interventions can be structured from an individualized, needs-based perspective.

Assessment. A comprehensive evaluation should be considered for children who have suffered a TBI. Assessment should commence prior to the child's return to school (Clark, Russman, & Orme, 1999). Semrud-Clikeman (2001) necessitates the gathering of preinjury information so that the child's strengths and weaknesses preTBI can be examined to assess recovery of skills as well as to assist with educational planning for the future. Reentry assessment should consist of both standardized and informal measures to establish a global perspective of functioning. Research determined that psychoeducational assessment alone is ineffective in measuring the functioning of a child

post TBI. Tests that measure only IQ and academic achievement are insufficient measures of the impact of brain injury and the assessment of long-term recovery from brain injury (Farmer & Peterson, 1995). As such, the typical cognitive progression of recovery of preinjury knowledge following a TBI coupled with deficits in novel learning cannot be determined by these psychoeducational measures alone (Semrud-Clikeman, 2001; Ylvisaker et al., 2001). Hale et al. (2011) promoted the incorporation of a neuropsychological assessment to assess functional outcome, and determine placement and consequential intervention strategies, all of which are considered appropriate after stabilization of the child (close to hospitalization discharge just prior to school reintegration) and the initial information gathering/dissemination period has occurred. Furthermore, Farmer and Peterson (1995) included four essential components to a thorough assessment process: neuropsychological evaluations, multidisciplinary approaches to assessment, ongoing monitoring and frequent reassessments, and inclusion of an ecological approach comprising contextual information.

Neuropsychological assessments often are completed outside of school settings prior to reentry and may produce baseline functioning for the student returning from injury (Hibbard et al., 2006). Ylvisaker et al. (2001) recommended a referral for a private neuropsychological evaluation or appropriate training of school psychologists in neuropsychological assessments, if an evaluation was not completed prior to reentry. These neuropsychological assessments measure cognitive and behavioral domains that often are impacted by TBI insult and are necessary for school success. The domains include aspects of attention, memory, visual-motor integration, psychomotor speed,

perceptual reasoning, problem-solving, language, adaptive functioning, motor skills, and abstract reasoning (Ewing-Cobbs, Fletcher, Levin, Iovino, & Miner, 1998; Farmer & Peterson, 1995). Fluctuations of performance from baseline skills may result as a child remains in school, however, and further extensive assessment may be necessary.

The multidisciplinary team approach toward assessment utilizes a number of school personnel and outside professionals, as needed, to consult and establish appropriate interventions for the student returning after a TBI insult. Research has recommended that not only the school psychologist but also the general and special education teachers, school administrators, social worker, school nurse, speech-language pathologists, occupational therapists, and physical therapists, as necessary, provide educational strategies based on the needs of the child (Farmer & Peterson, 1995). Educational assessments, as necessary, also may need to be conducted by the school if ongoing academic problems are noted. If warranted, consultation with outside agencies or professionals may occur to address vocational or ongoing medical needs (Ylvisaker et al., 2001). These vast resources provide for a more accurate assessment and help ensure the student's success. Since the needs of the child returning after a TBI are varied and rather individualized, a team approach to assess the needs of the student is essential to school reentry.

The diversity of cognitive strengths and weaknesses observed in children following a TBI and the possibility of delayed onset of deficits suggest that ongoing monitoring and frequent assessment are necessary. Rasquin et al. (2011) recently developed a screening tool, the Brain Injury Alert (BI Alert), as a means for identifying

cognitive, emotional, and social consequences post TBI in childhood. It may be a useful follow-up measure for the purposes of providing the more frequent and routine assessments necessary for this population; promisingly it has been found to be sensitive to the mild as well as to the more severe TBI cases (Rasquin et al., 2011). Moreover, the employment of computerized measures may be effective for assessing the occurrence of a concussion related to sports injuries. ImPACT, Headminders, and Cogsport are examples of such computer-based software programs. They provide norms, as well as clinical cut-off scores, for normal, suspicious, and impaired functioning (Lewandowski & Rieger, 2009). Regardless of the means used, school psychologists must realize the need for identification and ongoing monitoring since the students' needs change as deficits are noted, recovery continues, maturation and development occur, and the demands of school change and increase.

Lastly, qualitative, contextual assessments may be warranted to understand the scope of the child's deficits following the TBI insult. These informal assessments should examine family functioning, classroom environment, and peer relationships (Farmer & Peterson, 1995). These ecological assessments can be completed in the form of an interview, rating scales, and classroom-based dynamic assessments (Ylvisaker et al., 2001). Ewing-Cobbs et al. (1998) recommended classroom observation under varying conditions as well as work samples and teacher evaluations. These types of environmentally bound assessments provide for more predictive validity since they are measured through real-world experiences. Once a thorough assessment has been

conducted and necessary information has been gathered, provision of the appropriate educational interventions becomes paramount so that academic success can be achieved.

Intervention. While many of the educational interventions for students with TBI are similar to those provided to children eligible for special education, an essential component to providing appropriate strategies is the understanding that these children present with a multitude of cognitive, behavioral, social, and academic difficulties that may interfere with their productivity in school. Intervention strategies for students with TBI must be based on an idiographic process; selection and implementation ought to reflect the individual child's needs so that school success can be attained. Since children with TBI require approaches to learning different from those required by typical students, the development of an appropriate plan is requisite; with the goals of the plan highlighting both the child's strengths and weaknesses (Semrud-Clikeman, 2001).

One of the most essential determinations upon a child's school reentry is the educational placement. Farmer and Peterson (1995) recommended a placement decision as the primary goal when developing an appropriate program for these students. Placement decisions can range from the most restrictive individual instruction, be it at home or in a school setting, to the least restrictive arena of accommodations and modification in the general education program (Feeney & Ylvisaker, 2003). This determination depends wholly on the functioning of the child and the severity of the disability post TBI. Furthermore, the length of instruction and school day must be considered since, as previously mentioned, students often return with symptoms of fatigue and cannot endure a full day initially. While Semrud-Clikeman (2001)

recommended the inclusion of a nap or periodic breaks from classroom stimulation, Farmer and Peterson have endorsed a shortened school day, as needed, at the initial reentry to offset fatigue that is common among recovering children. Often, however, this phenomenon is short-lived, and the child can return to a full-length day rather quickly. Moreover, Clark (1996) suggested that more difficult classes and related services, such as speech therapy and occupational therapy, be scheduled earlier in the day, as many children who have suffered a TBI experience fatigue later in the day.

Once placement decisions have been established and length of school day is determined, interventions and accommodations can be instituted. The behavioral and academic-based interventions and modifications must be included explicitly in the student's Individualized Education Program (IEP) developed by the multidisciplinary team (Hale et al., 2011). The interventions need to be varied and dependent upon the identification and assessment of the TBI and the child's presentation of symptoms post injury. Prior to the implementation of specific academic, cognitive, or behavioral interventions, a recommended task analysis of skills should be executed to examine the skills that remain intact for the child verses the abilities that were once there but are now absent (Farmer & Peterson, 1995; Semrud-Clikeman, 2001).

The task analysis permits the teacher to understand how a child approaches a problem rather than merely to observe what the child is able to achieve. Examining the child's process of learning and problem solving may provide for appropriate teaching strategies when working with the student in the classroom. Further, Cohen reported utilization of task analysis informs teachers of the lost skills that may require reteaching

or new compensatory strategies (as cited in Semrud-Clikeman, 2001). As such, Hale et al. (2011) differentiated remediation from compensatory strategies based on a decision model analyzing both the age of the child and the severity of injury. The identification of lost skills is rather exclusive to children who experience a TBI; this distinction sets them apart from other children eligible for special education services under, for example, a learning disabled (LD) or emotionally disturbed (ED) classification (Semrud-Clikeman, 2001). Accordingly, task analysis upon a student's return should act as a precursor to identifying individualized interventions. This analysis often is referred to as cognitive rehabilitation (CogRehab). CogRehab strategies are effective for training the individual to improve auditory and visual attention, verbal memory, and reading comprehension (Dykeman, 2001; Semrud-Clikeman, 2001). This mode of training, in addition to task analysis, provides for incorporation of the task into class assignments to improve generalization skills and the training of self-management and self-monitoring techniques (Clark et al., 1999; Dykeman, 2001).

Once a child's individual needs have been examined and specific areas of deficit have been identified, provision of educational strategies can be instituted. Often, as aforementioned, students who have suffered a TBI insult experience difficulty with various cognitive abilities, such as attention, memory, organization, processing speed, and problem-solving, as well as behavioral and emotional deficits and personality changes that may interfere with their learning. Examining interventions for each of these areas should be considered when working with childhood TBI populations.

Attention is a necessary component to learning and educational achievement; therefore, deficits in attention can impact learning in the classroom negatively. Sustained and divided attention may be hampered for children with TBI such that they present with distractibility and difficulty focusing and concentrating (Dykeman, 2001; Harris et al., 2010; Rotto, 1998; Semrud-Clikeman et al., 2005). Intervention strategies to address these concerns are consistent with those used to address other disorders leading to distractibility, such as Attention Deficit Hyperactive Disorder (ADHD). As such, environmental interventions may include study carrels or quiet corners, seating away from distractions, seating in close vicinity to the teacher, reducing extraneous distractors from the environment, soliciting eye contact and/or providing a physical prompt prior to instruction or directions, and the employment of white-noise machines or soft, rhythmic instrumental music in the background of the class (Dykeman, 2001; Semrud-Clikeman, 2001). Also suggested are instructional provisions, including prompts or props, visual and verbal cues, private signals to cue the student to attend or respond, work segmented into smaller units, outlines or new vocabulary provided prior to the lesson, a request to the student to orally paraphrase important information, and the use of multisensory presentation of material; all interventions that may improve overall attention (DePompei & Blosser, 1987; Dykeman, 2001; Savage, DePompei, Tyler, & Lash, 2005; Semrud-Clikeman, 2001). While children with TBI are idiosyncratic in their symptomatology, many of the mentioned strategies are used for children diagnosed with ADHD and they also have proved effective for children who have suffered a TBI (Semrud-Clikeman, 2001).

Similarly to children with ADHD, children with TBI also may experience memory deficits. Semrud-Clikeman (2001) recommended a combination of internal and external memory aids. Internal strategies suggested include the use of chunking information into smaller, more manageable parts; mnemonic strategies; rehearsal of information; and the use of associative learning. Outlines and having the student state "I must remember this" to assist with recall also have been strategies recommended to improve memory (Semrud-Clikeman, 2001). External memory tactics may include computer devices, such as smartphones and PalmPilots, as well as organizers, calendars, and planners. When working on assignments or tests, memory aides, such as multiple-choice questions, true-false questions, or word banks, may be used to assist children in the retrieval of stored information (Butler, 2006; Semrud-Clikeman, 2001). To improve overall memory skills, Dykeman (2001) suggested memory-training exercises during which a student repeats a series of information through chunking to improve immediate auditory memory or participation in the retelling of stories to improve verbal recall as well as auditory comprehension skills. Lastly, Dykeman recommended scheduled day-to-day discussions of events with adults to improve the student's episodic memory skills.

Many of the strategies indicated for memory and attention deficits also can be used to assist with a student's organizational weaknesses following a head injury. External organizers, such as planners, calendars, and computer devices, have been found effective not only for memory deficits but also as useful compensatory strategies for organizational limitations (Hibbard et al., 2006). Instruction in metacognitive strategie for learning new material also has been found effective. Dykeman (2001) provided the

example of the SQ3R strategy of survey, question, read, recite, and review to help students organize information when reading. Also suggested is the utilization of task analysis with school activities so that a large task can be broken down into components for better understanding and follow through (Hibbard et al., 2006; Savage et al., 2005). Further suggestions include a daily preview of the day's schedule and at the day's close, a daily review to provide a framework for organization; reminders prior to and during transition times; provision of a study buddy, assignment sheets and agenda books; and the use of tape recorders (DePompei & Blosser, 1987; Dykeman, 2001). Further, DePompei and Blosser (1987) recommended the monitoring, by teacher or classroom aide, of agenda books, planners, or daily logs to ensure that all information is included and accurate.

Deficits in processing speed often are noted among individuals with TBI; therefore, teaching strategies sensitive to this limitation are paramount. Instructors, as well as students, need to slow their pace. Tasks that are challenging should be broken into more manageable steps, and extra time should be offered to students to process information and formulate responses. Pauses should be incorporated into instructional lessons for information processing (Cohen, 1991; DePompei & Blosser, 1987). Additional time or extended time lines may need to be offered to students when completing classwork and homework assignments (DePompei & Blosser, 1987).

Another cognitive weakness often exhibited by pediatric populations with TBI is problem-solving deficits. Cohen (1991) recommended the use of active learning environments, where students learn and demonstrate understanding through participation

and answering questions. This strategy is described as one that incorporates direct instruction, goal-setting, modeling, feedback, and support. Cohen cited reciprocal teaching (Palincsar & Brown, 1985) and directed reading and thinking (Reutzel & Cooter, 1992) as methods for improving problem-solving strategies when reading, as students learn to inquire and critique reading materials as well as others' responses. These models offer improvement in attention, self-control, problem-solving, and communication skills (Cohen, 1991). Open-ended questioning that fosters independent thinking and analysis is another strategy useful for improving problem-solving weaknesses (Semrud-Clikeman, 2001). Also, direct instruction in brainstorming procedures, such as identifying the problem, acquiring information about a problem, generating possible alternative solutions, selecting a solution, making a plan for the application of the solution, and evaluating the solution once carried out (Semrud-Clikeman, 2001), may be beneficial in improving problem-solving skills in children with TBI. Lastly, Cohen (1991) recommended teaching the process of an activity and learning about learning so that a better understanding and problem-solving strategies can be established. Many of the strategies recommended for cognitive deficits are employed in the hopes that these children ultimately will become self-sufficient learners, able to self-monitor and function independently; however, deficits may exist beyond learning difficulties.

While cognitive deficits are limiting for students with TBI, their effects can pervade beyond academic difficulty; deficits in attention, organization, processing, and memory also may lead to behavioral problems in the classroom. These behavioral

problems following TBI, show minimal if any improvement in adjustment over time, which suggests a persistence of behavioral difficulties that can last for years following a brain insult (Yeates & Taylor, 2006). Behavioral difficulties can interfere with the academic and social success of a student; therefore, the most effective strategies to reduce these behaviors must be employed (Kehle, Clark, & Jenson, 1996). As such, the provision of a functional behavioral assessment (FBA) may be required to understand the potential function(s) of the negative behavior and thus ensure appropriate interventions (Hale et al., 2011).

Aggression and noncompliance are the most common behavioral problems seen in children with TBI (Kehle et al., 1996). One strategy recommended to manage challenging behaviors is the use of antecedent-based interventions the practice of managing the behavior prior to its occurring (Kehle et al., 1996; Savage et al., 2005). They allow for the manipulation of the environment by offering; choices, reducing task demands, providing reminders of upcoming events, interspersing demands and social comments, and incorporating preferred topics or interests into school activities, with techniques designed to enhance the likelihood of simultaneously reducing unwanted behaviors and promoting preferred behaviors (Savage et al., 2005). Rhode, Jenson, and Reavis (1993) suggested the posting of classroom rules and classroom schedules, the structuring of classroom space, and the movement of the teacher around the room as antecedent-based strategies (as cited in Kehle et al., 1996).

Another form of intervention found useful for improving behaviors is consequence-based mediation. Consequence-based interventions in the classroom

include the use of teacher reprimands to improve noncompliance. Kehle et al. (1996) noted the effectiveness of reprimand when used infrequently and in combination with other strategies; reprimands using a "don't ask, tell" strategy that informs the student it is now time to do something are more effective, especially when provided in a firm, quiet tone lacking overt emotionality. Making the same demand to agreeable students seated in the vicinity of the noncompliant child prior to asking the noncompliant child also is noted to increase acquiescence. Also the teacher is encouraged to socially reinforce student compliance, and finally, a preplanned negative consequence that is consistently carried out, such as a time-out, may be helpful if the child is noncompliant (Kehle et al., 1996). Semrud-Clikeman (2001) indicated the use of praise accompanied with a reprimand as a means of improving noncompliance. Research suggests that praise statements decrease as a child progresses through school (Kehle et al., 1996), so increasing the use of praise when appropriate behaviors are displayed may improve overall compliance (Semrud-Clikeman, 2001). The use of modeling, be it via self-modeling through videotaping or modeling of positive behavior by peers, has been shown effective in improving positive behaviors, as has the use of overcorrection of behaviors (Kehle et al., 1996). Semrud-Clikeman (2001) supported the implementation of behavior management techniques that include positive reinforcement and consequences to reduce aggressive, noncompliant, and off-task behavior.

Other strategies have also been found effective. Savage et al. (2005) also recommended the use of visual schedules, reminders, and self-monitoring activities to improve and increase on-task behaviors and task completion. Dykeman (2003)

recommended the employment of planned ignoring and cueing to prompt more prosocial behaviors. Lastly, consideration should be given to the use of behavioral interventions in conjunction with pharmacological treatment (when behavior therapy alone is ineffective), as combined they have been shown to reduce negative behaviors in pediatric students with TBI (Kehle et al., 1996).

While externalizing behavioral difficulties are common and interruptive in the classroom setting, internalizing problems, such as irritability, anxiety, and depression, also may impact a child's performance. Allowing for a time-out or break to remove interruptive students from a stressful situation and to reduce irritability and ultimately problem behaviors is considered an effective strategy when working with children with head injuries (Dykeman, 2003). Individual counseling, in the cognitive-behavioral domain also has been shown to be effective in working with children suffering from internalizing behavioral difficulties (Butler, 2006; Hibbard et al., 2006; Semrud-Clikeman, 2001). The focus of therapy may include not only current feelings and behaviors but also the processing of the loss of function and prior skills the child may have to face (Dykeman, 2003). Cognitive-behavioral approaches, such as the use of positive reframing and reinforcement, may improve mood and increase self-concepts for these children (Butler, 2006). Anxiety management strategies that allow for the recognition and identification of sources of anxiety are useful, as are relaxation strategies, such as breathing and counting exercises in modulating the emotional and physiological effects of anxiety (Dykeman, 2003).

External and internal behavioral difficulties exhibited by children with children may lead to socialization deficits. Children and adolescents who experience a traumatic brain injury are at risk for withdrawal (Butler, 2006). Social-skills training may be beneficial in helping these students improve functioning and awareness on a social level (Clark et al., 1999; Dykeman, 2003). Often students with brain injuries have trouble reading social cues and understanding social contexts; therefore, the focus of skills training should be on cognitive strategies that allow the student to engage in active-reflective listening for purposes of identifying content, affect, and context of messages received by others (Dykeman, 2003). Emphasis should be placed on increasing awareness of social situations, the improvement of retrieval of social rules, perspective taking, initiating and maintaining conversations, and inappropriate behavior and verbal statements (Russman, 1997). Furthermore, to reduce isolation and withdrawal, the circle-of-friends approach to social-skills training has been noted to be effective in improving socialization and reducing peer rejection (Ylvisaker et al., 2001). Long-term effects, though, have not been so positive, Russman (1997) noted positive gains at the conclusion of social-skills training, but 1 year later, children were identified as having suicidal ideations, limited social contacts, and depression. This research suggests that further information is needed regarding effective treatment of social-skills deficits among the population with TBI. Savage et al. (2005) recommended the collection of data to analyze the effectiveness of implemented strategies based on a student's gains and to determine further interventions that may be needed.

While a multitude of strategies for providing support to children with TBI exists, awareness about the injury and identification of the student must first occur. As well, awareness about TBI in general and its consequences must be present in schools. Currently, this awareness and knowledge do not appear to be in the forefront. Findings from the Taylor et al. (2003) study suggested that although strategies were implemented for children with behavioral, cognitive, and achievement deficiencies, doubts were cast on the adequacy of identification procedures used for children with TBI. Shortcomings in service provisions were noted as a result of the lack of awareness and knowledge of the unique needs of these children. In fact, misconceptions are noted in numerous research findings, thus signifying that basic knowledge of TBI is lacking.

Misconceptions and Training Needs Regarding TBI

With the implementation of the Individuals with Disabilities Education Act (IDEA) in 1991 and the added classification of Traumatic Brain Injury as an eligibility category for receiving special education and related services, it was established that schools are responsible for identifying, assessing, and educating children who require special services as a result of a TBI. Yet ongoing research suggests that despite the significant number of children who experience TBI, school-based programs designed specifically to educate and accommodate this population are minimal and inconsistent (Arroyos-Jurado, Paulsen, Merrell, Lindgren, & Max, 2000). This dearth of appropriate programming, coupled with the underidentification, suggests that services for these children are insufficient at this time.

Insufficient services and the lack of quality programming may be the result of many factors. Past research has suggested a number of misconceptions regarding TBI as well as scarce training of school professionals in the area of TBI, both of which may contribute to the service scarcity. Misconceptions regarding TBI abound in many populations, from the general public, to medical professionals, to school personnel. Gouvier, Presthold, and Warner (1988) surveyed individuals in a large Louisiana shopping mall to assess their knowledge and understanding of head injuries, as well as their sources of said knowledge and their personal experience with head injury. Results of their study revealed that while most individuals were well informed regarding seatbelt safety and the causes of brain injuries, the general public held gross misconceptions with regard to unconsciousness, amnesia, and recovery. Surprisingly, individuals who personally experienced an injury or who had a family member with a head injury endorsed the same misconceptions as those without such experiences. Further, when determining the source of knowledge, respondents revealed medical professionals and television talk shows equally as the two most common sources of information on head injury. The Gouvier et al. study suggests a need for improving education and public awareness in the area of head injury. This need exists for general populations as well as for individuals directly affected.

In 1993, a partial replication of the Gouvier et al. (1988) study was conducted by Willer, Johnson, Rempel, and Linn at a county fair in western New York and in two shopping malls in Ontario, Canada. Results of the Willer et al. study revealed misconceptions consistent with the earlier Gouvier et al. survey results, suggesting that

misinformation regarding TBI among the general public exists and transcends regional localities. These two studies reveal a far-reaching dearth of awareness surrounding TBI and its consequences. A follow-up study conducted by Guilmette and Paglia (2004) surveyed individuals at a motor vehicle office just outside of Providence, Rhode Island, the largest city in the state. Guilmette and Paglia sought to assess if TBI knowledge had proliferated since the earlier studies 8 and 13 years prior, particularly in a more urban region of the country, as well as to investigate further if misconceptions exist with regard to TBI and personal-injury litigation. Results of the study indicated no notable increase in the level of knowledge with regard to moderate and severe TBI as compared to prior studies and no considerable geographic differences with regards to misconceptions among the general public. Further, results suggested existing misconceptions could bias personal-injury trials. Though results were consistent with prior studies surrounding moderate and severe head injuries, one optimistic development was noted: the general public demonstrated an increased knowledge regarding the dangers of mild head injuries. Overall results of the Guilmette and Paglia study, however, reveal few changes in knowledge base among the general public and a continued need for public education about brain injuries.

While the demand for education appears to be established for the general population, because of common misconceptions, a need also exists for educating health care professionals who are not experts in the field of brain injury. After interviewing brain-injured individuals, caregivers, and social-rehabilitation professionals, Swift and Wilson (2001) discovered extensive misconceptions regarding TBI among medical

professionals. Though the health professionals interviewed in the study were aware that a patient had a history of head trauma, they, like the layperson, espoused many misconceptions regarding the traits of the brain-injured individual. In particular, medical professionals working in a rehabilitation setting revealed inaccuracies regarding the length and extent of recovery, the ability to return to work following injury, behavioral indicators and their relationship to the brain injury, physiological symptoms mistaken as psychological, misidentification of motivational difficulties as laziness, and the tendency to minimize symptoms and their effect (Swift & Wilson, 2001). Findings suggest then, that health professionals who do not specialize in head trauma espouse misconceptions similar to those of the general public.

While this research suggests a need for ongoing education for the general public and those in medical professional settings, caregivers and rehabilitation center employees are not the only individuals expected to interact and work with individuals affected with TBI. In fact, school reentry is often the first integration young patients with TBI experience as they resume daily activities. School professionals, therefore, must have a sensitivity to and understanding of the nature of TBI in order to address the needs of the children affected. However, research has suggested the contrary; knowledge among these professionals is lacking, and in fact, corresponding misconceptions are prevalent among teachers. Farmer and Johnson-Gerard (1997) adapted earlier utilized surveys (Gouvier et al., 1988; Springer, Farmer, & Bouman, 1997; Willer et al., 1993) to assess teacher knowledge and misconceptions regarding TBI in pediatric populations. Additionally, Farmer and Johnson-Gerard (1997) conducted a comparative study with

rehabilitation employees with the assumption that educators would possess less knowledge of TBI than that of rehabilitation staff. As predicted, results of the study revealed that rehabilitation staff and school-based professionals differ in their knowledge about TBI among pediatric populations. Educators trivialized the consequences of head injury on skills related to school success, including memory, learning new tasks, emotional control, and long-term development (Farmer & Johnson-Gerard, 1997). This study suggests that greater preparation for teachers and educational professionals is necessary in order for them to work effectively with children with TBI. Rehabilitation professionals, who are experts in the field of head injury, may be a resource to help educational professionals dispel common misconceptions and to inform and train school staff about TBI.

Subsequently, Hux, Walker, and Sanger (1996) conducted a school-based survey to determine speech-language pathologists' knowledge and their readiness to provide services for children with TBI. Consistent with prior studies, findings revealed common misconceptions among speech-language pathologists. While the results of this study suggest a greater comfort level among some trained speech-language therapists, many, even after training, revealed an uncertainty about providing services to populations with TBI. Therefore, the need for training to increase comfort levels exists among school-based speech-language pathologists (Hux, et al., 1996). Hooper (2006) conducted a study to examine if school psychologists, individuals who are required to work with the population with TBI, need and desire the same training found to be necessary for the school-based speech-language pathologists. Additionally, he sought to establish if school

psychologists endorsed the same myths and misconceptions regarding TBI as those endorsed by the general public and school teachers. Hopper surveyed 304 school psychologists working in schools in the state of North Carolina who were participating in a 42-hour didactic training in TBI sponsored by the North Carolina Department of Public Instruction. Findings revealed that school psychologists overall endorse fewer misconceptions than those endorsed by the general public, suggesting a slightly better knowledge than that of the general public, but inaccuracies regarding mechanisms of TBI and recovery did exist among this population. Moreover, school psychologists were more likely than the general public to endorse the idea that individuals needed to lose consciousness before brain injury could be considered. Not surprisingly, school psychologists, like speech-language pathologists, favored the need for more training in the area of TBI (Hooper, 2006).

While the aforementioned studies reveal that misconceptions abound regarding TBI, so too do they further establish an ongoing need for public education as well as training for professional populations who work with individuals with TBI. Specifically, additional training of school professionals, from teachers and administrators to service providers, such as speech-language pathologists, and school psychologists, is recommended. Although recommended, preservice training is uncommon for teachers receive in the area of TBI (Tyler, 1997). Furthermore, in 2001, the National Association of State Directors of Special Education, Inc. (NASDSE), conducted a survey that revealed of the 43 states that participated, only 10 offered preservice courses in TBI for teachers and none offered a certification program (Markowitz & Linehan, 2001).

Likewise, Walker, et al. (1999) conducted a national survey of school psychology training programs to assess their training in neuropsychology and brain injury. Results suggested an overall lack of training. Of the 86 programs surveyed, only 27% of the programs had full-time faculty members with neuropsychology expertise (more often found in schools offering doctoral degree programs), only 23% of the programs required a complete course in neuropsychology, most programs endorsed the idea that students would have the opportunity to work with children with brain-injuries in practica rather than in specific courses, and, finally, most (86%) of the programs, at that time, did not plan to incorporate into their program training of neuropsychology or brain injury into future programs (Walker et al., 1999).

While preservice training appears to be limited at this time, support and recommendation for continuing education and in-service training for educators have been endorsed since the implementation of IDEA in 1991. Providing continuing education to school professionals may be a means for improving overall understanding, sensitivity, and demystification when working with children who have suffered a TBI (Ylvisaker et al., 2001). Blosser and DePompei (1991) recommended professional development and training programs as a means for educating school professionals about the needs of students with TBI. They proposed that training be comprised of the following topics: identification of the nature of TBI; similarities and differences between students with TBI and students with other types of handicapping conditions; the impact of impairments resulting from TBI on the student's learning and performance; program decision making; educational program development, including assessment and management strategies; and,

finally consultation and collaboration between professionals and with families for effective program planning (Blosser & DePompei, 1991). Moreover, Blosser and DePompei suggested a variety of formats for disseminating information, from didactic training to audio- and videotaped presentations, discussion groups, a varied-discipline panel, self-study programs, and even a question-answer session to address continued needs of educators when working with students with TBI.

Recent investigation has provided evidence for the effectiveness of two professional development practices: a TBI consultation team model and BrainSTARS, a manual-based intervention design (Glang et al., 2010). Glang, Tyler, Pearson, Todis and Morvant (2004) evaluated the effectiveness of the TBI consultation team model for providing education and consultation to school personnel. The model, which is comprised of: needs assessment, team recruitment, team training, and evaluation of both implementation and outcomes, provides a direct, practical, on-site approach that enables school professionals to address needs as they arise. Data suggest that this model is both cost effective and efficient in providing appropriate training and education to teachers working with students who have suffered a TBI (Glang et al., 2004). BrainSTARS also has been found effective at providing training in evidence-based interventions with hands-on practice and feedback (Glang et al., 2010).

While preservice training for school personnel, although the gold standard, remains limited, these two models of continued professional development appear to be effective, practical alternatives for fostering sensitivity, knowledge, and competency when working with children with TBI. Currently, the TBI consultation team model has

been adopted in Iowa, Kansas, Oregon, Arizona, Colorado, Pennsylvania, Tennessee, and Hawaii; utilization of the BrainSTARS program has been reported in the Rocky Mountain region as well as in Washington and Hawaii (Glang et al., 2010). Furthermore, continued national efforts have been made to raise TBI awareness, e.g., the month of March now is designated Brain Injury Awareness Month. While national-awareness efforts and the employment of these training programs have expanded (Glang et al. original study conducted in 2004 identified only three states endorsing the consultation model), many states, including New Jersey, still appear to lack the available resources and educator training necessary to instruct these children effectively.

Current Legislation in New Jersey

Legislation regarding mild TBI/concussion recently has been established with regard to student athletes and to the dangers surrounding head injury. The passage of New Jersey Law A-2743 in December 2010 regarding student-athletes and brain injury brings concussion awareness to the forefront, giving school personnel the added responsibilities of ensuring safety and managing students with concussions and other brain injuries. With that, training for teachers, administrators, and other school personnel, i.e., school psychologists, is foreseeable, as information needs to be gathered regarding concussions, head injury, diagnosis and prevention, computerized baseline testing, and necessary academic accommodations (Boyd, 2011). According to the law, each school district shall develop and implement, by the 2011-2012 school year, a written policy concerning the prevention and treatment of sports-related concussions and other brain injuries among student-athletes. Boyd reported that school personnel are key

contributors to the identification of concussions and to student recovery. As such, the question remains: Do the school psychologists, individuals expected to take the lead in facilitating school reentry through proper identification, assessment, and intervention for these children, have the necessary understanding and skill set in the area of TBI?

Conclusion

TBI is heterogeneous in nature, as many factors impact the manifestation of the cognitive sequelae. The cause of injury, type of TBI, age at the time of insult, diffuse or focal effects, severity, and premorbid conditions are just a limited number of dynamics that influence the effects that follow a TBI insult. As such, a child who has suffered a TBI insult neither presents precisely as another child with TBI nor recovers in exactly the same way. In fact each case is unique and individualized. Further, each child's progress and academic success presents vastly differently from those of a child who is diagnosed with a learning disability or is eligible for special education resulting from an emotionally disturbed classification. These exceptionalities and distinctive characteristics mandate a need for school psychologists to understand the appropriate identification, assessment, and intervention strategies that benefit this underserved population.

Research Hypotheses

It is hypothesized that practicing school psychologists within the state of New Jersey will endorse similar common myths and misconceptions as those of the general public as noted in the earlier Guilmette and Paglia (2004) study and will endorse greater myths than those practicing school psychologists from North Carolina as examined in the Hooper (2006) study.

There is a relationship between the degree held by a school psychologist (master's/master's plus, education specialist, and doctoral) and the number of years as a practicing school psychologist (0-5 years, 6-10 years, 11-15 years, 16-20 years, 21 years or greater) and his or her knowledge and perceived competence in identifying children who have suffered TBI. It is hypothesized that the higher the level of education and the greater the number of years in practice, the more knowledgeable and more competent the school psychologist is regarding identification of children with TBI.

There is a relationship between the degree held by a school psychologist (master's/master's plus, education specialist, and doctoral) and the number of years as a practicing school psychologist (0-5 years, 6-10 years, 11-15 years, 16-20 years, 21 years or greater) and his or her knowledge and perceived competence in understanding appropriate assessment procedures for children who have suffered TBI. It is hypothesized that the higher the level of education and the greater the number of years in practice, the more knowledgeable and more competent the school psychologist is regarding appropriate assessment procedures for children with TBI.

There is a relationship between the degree held by a school psychologist (master's/master's plus, education specialist, and doctoral) and the number of years as a practicing school psychologist (0-5 years, 6-10 years, 11-15 years, 16-20 years, 21 years or greater) and his or her knowledge and perceived competence in developing appropriate intervention strategies for children who have suffered TBI. It is hypothesized that the higher the level of education and the greater the number of years in practice, the more

knowledgeable and more competent the school psychologist is regarding intervention strategies and educational provisions for children with TBI.

Chapter Three

Methods

Participants

Participants in this study included practicing school psychologists and graduate school psychology interns within the state of New Jersey who volunteered to participate and who completed the survey in its entirety. Participants were gathered via individually contacting school psychologists through public school websites from various school districts within the 21 counties in New Jersey. While a total of 280 survey responses were received, 51 could not be utilized because of partial completion of the survey; as a result, a total of 229 participants comprised the final sample. As shown in Table 1, participants who completed the survey were from varying ethnicities and both genders. This sample is rather consistent with past surveys of school psychologists, in which approximately 70% of the participants were women, and all of the participants were of varying ethnicities, with the largest group being Caucasian (Curtis, Grier, Abshier, Sutton, & Hunley, 2002; Curtis, Hunley, & Grier, 2002).

School psychologists in the sample achieved varying levels of education including school psychology intern, master's, master's plus, education specialist level, and doctoral degrees. Since so few participants held only master's degrees (n = 4) and only one participant indicated her position as a school psychology intern, those responses were combined and subsumed into the master's plus category, and the category subsequently was referred to as the master's/master's plus level participants. Sample participants' ages ranged anywhere from 20 years to 60 years and older, with a median age range of 30 to

39 years. Additionally, sample participants had varying degrees of experience ranging from 5 or fewer years to 21 years and greater, with a median of 10 years or fewer of practice.

Table 1

Gender and Ethnicity

Characteristic	*n*	%
Gender		
Male	51	22.3
Female	178	77.7
Ethnicity		
African American	7	3.1
Asian American	3	1.3
Biracial/Multiracial	3	1.3
Caucasian	210	91.7
Hispanic/Latino	6	2.6

Measures

Instrumentation for this study included a survey, developed by the author, designed to measure the participants' conceptions and misconceptions regarding brain

injuries, as well as knowledge and self-perceived competence in the identification, assessment, and treatment strategies for children who have suffered a TBI (see Appendix A). Additional demographic information, as well as information regarding education and experience working with TBI in children was gathered at the conclusion of the survey. In order to ensure that the survey was appropriate for answering the hypotheses, the dissertation committee, consisting of three faculty members at the Philadelphia College of Osteopathic Medicine (PCOM), read the survey to ensure face validity. The resultant survey questionnaire contained questions of both a true-or-false format, and a seven-point Likert-scale format. Two preliminary questions were presented at the start of the survey to establish survey participation eligibility. The two inclusion questions asked participants if they were currently practicing as a school psychologist or as a school psychology intern or under an emergency certificate.

The survey was divided into four sections. The first section of the survey included a selection of 11 questions, as previously used in the original Gouvier et al. (1988) study and more recently the Hooper (2006) study, to assess practicing school psychologists' endorsement of common myths and misconceptions about TBI as one means of assessing their knowledge base in the area of TBI. Consistent with the original and subsequent studies, the answers were derived by choosing True, Partially True, Partially False, or False. The second section of the survey included 27 questions assessing knowledge in the areas of TBI identification, assessment, and intervention/educational provisions and treatment strategies for children with head injuries. These questions were answered using a seven-point Likert-scale format. The

third section of the survey comprised 16 questions assessing the self-perceived competence of practicing school psychologists in their identification, assessment and intervention/educational provisions for children with TBI. This section was answered using a seven-point Likert-scale. The final section of the survey consisted of questions designed to obtain basic demographic information of participants. Participants were asked to check the appropriate responses in this section.

Procedures

After the survey was drafted, it was sent through the Institutional Review Board (IRB) PCOM for approval. Upon approval, the survey was created in two formats. The first was a paper-and-pencil survey that was distributed among fellow school psychologists employed at the responsible investigator's current school district. The second format was developed for the purpose of e-mail distribution. The latter was created using a paid subscription to Survey Monkey© (http://www.surveymonkey.com). Contained within the survey was an invitation to participate, which included an explanation of the study, purpose of the study, and an approximate time requirement (10 to 15 min) to complete the survey. This cover letter (see Appendix B) that accompanied the survey also included a statement regarding consent procedures. The letter stated that by completing and returning the survey, the participant was consenting to utilization of information provided. There was also a statement informing participants that completion of the survey form was strictly voluntary, as well as a statement ensuring that their responses were confidential, as the surveys were anonymous, and no personally identifiable information was contained on the forms. Furthermore, since the forms were

not coded, there was no way of tracing surveys back to individual respondents. Finally, participants were informed to direct an e-mail to the study investigator or the dissertation chair if they wanted a copy of the final results. Contact information for the principal investigator, as well as for the dissertation chair, was provided if participants had any questions.

After the creation of the online survey, dissemination of the survey was conducted by e-mailing practicing school psychologists within various public school districts among the 21 counties within the state of New Jersey. School psychologists' e-mail addresses were obtained via public-school-district websites. The process of dissemination included an introductory e-mail invitation with a link to the online survey. The introductory invitation briefly explained the purpose of the study, which was to gather information regarding knowledge and perceived competence in the area of TBI among practicing school psychologist, and stated that the study was being conducted as partial completion of a doctoral degree (see Appendix C).

Three initial mailings and two subsequent follow-up invitations were delivered via e-mail. The initial e-mailing consisted of 617 invitations. A follow-up invitation was emailed to those who did not respond or partially responded to the initial email, 2 ½ weeks subsequent to the initial mailing. Moreover, in order to ensure the maximum response rate, an additional 377 e-mail addresses were gathered and an initial invitation was sent to those school psychologists at the same time the follow-up e-mail was delivered to the former potential participants. Two weeks later, an additional 136 new

e-mail addresses were compiled, and an initial invitation was sent to those school psychologists. Following the conclusion of an additional 2 weeks, a final follow-up e-mail was transmitted to all nonresponders and partial responders. Of the 1,130 e-mails disseminated, a total of 280 individuals responded and returned the survey, resulting in a 24.78% percent response rate. Of the 280 responses, 51 were not utilized because of incomplete responding or missing demographic information, resulting in a final sample size of 229 participants. After 8 weeks from the initial date of distribution, the survey results were collected and analyzed.

Analyses

To examine the specific research questions, descriptive and inferential statistics were computed using the computer-based statistical program, Statistical Package for the Social Sciences (SPSS), version 18. The information obtained from the completed surveys was coded on an Excel spreadsheet and the data then were entered into the SPSS program. Expressly, frequency data were calculated for the demographic information collected. Moreover, frequency tables were utilized to compare currently held myths and misconceptions to those revealed in the prior studies assessing misconception endorsement by the general public and school psychologists (Guilmette & Paglia, 2004; Hooper, 2006). As was executed in the prior studies, the survey responses to the first 11 questions regarding myths and misconceptions surrounding TBI were collapsed into a dichotomous fashion such that *True* included responses of *true* and *partially true* and *False* incorporated responses of *false* and *partially false.* Frequencies and percentages then were considered to assess endorsement of myths and misconceptions. To address

this research question, all of the data were reported in percentages of misconceptions for a particular item (i.e., items with incorrect responses). Given that the replicated Guilmette and Paglia (2004) findings were not significantly different from the original Gouvier, Prestholdt, and Warner (1988) findings from 16 years prior, the response rates from that more contemporary study were utilized to compare data with the current study.

Further inferential statistics were conducted to compare the results of the Guilmette and Paglia (2004) and Hooper (2006) prior studies to the current study by utilizing the Test for the Significance of a Proportion. Proportions for the first 11 survey items were converted to *z*-scores and compared to the proportions of the two former studies. Given the number of comparisons, the .005 significance level ($\alpha = .005$) was used for all analyses to control for experimentwise error.

For inferential statistics, to determine if a relationship existed between the highest degree earned and years of experience with knowledge and competence of identification, assessment, and intervention and educational provisions for children with TBI, this study required the use of 12 one-way analyses of variance (ANOVA) to determine if any differences existed between groups formed by the independent variables. The independent variables in the study included highest degree held, which included three levels, and years of experience, which encompassed five levels, while the dependent variables consisted of total knowledge and total perceived competence in the areas of identification, assessment, and intervention/educational provisions for children with head injuries. The .05 significance level ($\alpha = .05$) was used for all analyses.

Prior to formulating a total variable for knowledge, reverse scoring was required for 10 of the Likert-format survey questions to ensure that they were weighted correctly; these included Questions 2, 4, 9, and 12 under the knowledge of identification section; Questions 1 and 7 within the knowledge of assessment section, and finally Items 1, 2, 4, and 5 within the knowledge of interventions and educational provisions section. Once the necessary weighted reversals were complete, a summation was performed to establish the total variables for knowledge and competence in identifying, assessing, and providing educational interventions for children with TBI. The questions within each survey domain were summed by adding the Likert ratings across the questions. Specifically, a total score was created for knowledge of identification, a section that had 14 questions measured on a scale from 1-7; therefore, the minimum score was a 14 and the maximum score was 98. Knowledge of assessment of TBI had seven questions, with a minimum score of 7 and a maximum score of 49; likewise, the section comprising knowledge of intervention/educational provisions had a total of six questions resulting in a minimum score of 6 and a maximum score of 42. Equally, totals were formulated for the following three areas of competency: the section assessing competency of identification of TBI totaled four questions with a minimum score of 4 and a maximum score of 28, competency of assessment included five questions resulting in a minimum score of 5 and a maximum score of 35 and lastly, competency of intervention and educational provisions with a minimum score of 6 and a maximum score of 42. The final section included a total of six questions.

Chapter Four

Results

Demographic Characteristics and Background Information

All of the 229 participants included in the sample were practicing, certified school psychologists. Of those, 31 (13.5%) also reported holding a license in psychology. The majority of respondents held a master's/master's plus degree (*n* = 93, 40.6%), with the remaining educational levels identified as education specialist (*n* = 75, 32.8%) and doctoral degree (*n* = 61, 26.6%). Table 2 provides further demographic information, including age ranges of the sample participants and their years of experience as practicing school psychologists. The majority of the sample population was aged between 30 and 39 years, while an overwhelming preponderance of participants had been practicing school psychologists for 10 years or fewer.

Table 2

Age and Years of Practicing as a School Psychologist

Characteristic	*n*	%
Age (years)		
20 – 29	29	12.7
30 – 39	102	44.5
40 – 49	39	17.0
50 – 59	45	19.7

(Table 2 continues)

(Table 2 continued)

60 +	14	6.1
Number of years of practice		
0-5	60	26.2
6 -10	61	26.6
11-15	46	20.1
16-20	23	10.0
21+	39	17.0

TBI experience and training. Participants rated their overall level of experience in working with populations who suffered TBI by the following: 1 = I have had a great deal of experience, 2 = I have had minimal experience, and 3 = I have had no experience with working with the TBI population. Results revealed that most individuals surveyed had minimal experience with individuals with TBI (*n* = 172, 75.1%), just over three quarters of the sample surveyed, while 7% *(n* = 16) had a great deal of experience working with brain-injured individuals and 41 (17.9%) of the school psychologists sampled reported no experience in working with populations who suffered TBI. In fact, when asked to rank order their top three methods of training experience in the area of TBI, 89 of the participants sampled reported that they had received no formal training in TBI overall, while the majority of the sample (*n* = 183) revealed some level of training in

TBI provided via books/texts and research articles. The next most commonly overall rated method of training was derived from graduate coursework incorporated within a degree requirement (*n* = 115), followed by training via workshops and conferences (*n* = 107). Training obtained through graduate coursework beyond an individual's degree requirement was included in the overall top three rankings of 31 of the individuals sampled. District-based in-service programs accounted for the rankings of 26 individuals surveyed globally. A smaller sample of the population survey revealed some level of training by means of a manual-based program (*n* = 19) and online training (*n* =15). One should note that when responding to the top three rankings of TBI training, not all individuals sampled included three choices, especially those who revealed no formal training; in fact, five individuals did not include a top ranking, 30 individuals did not include a second ranking, and 62 participants did not include a third ranking of top TBI training experiences. Table 3 provides a detailed itemization of the top three rankings and percentiles of TBI training via the various methods mentioned.

Neuropsychological experience. Furthermore, individuals also were queried regarding their neuropsychology training. Of the sample, 46.7% (*n* = 107) indicated some level of training in neuropsychology, while the remaining 122 (53.3%) participants had received no neuropsychology training. As such, almost half of the sample reported some form of training in the area of neuropsychology.

Table 3

Ranking Top Three Methods of Training in the Area of TBI

Characteristic	*n*	%
First ranked		
Books/texts/research articles	40	17.5
Manual-based training	1	0.4
Online training	5	2.2
District in-service	8	3.5
Workshop/conference	36	15.7
Graduate coursework for degree requirement	63	27.5
Graduate coursework beyond degree requirement	14	6.1
No formal training	57	24.9
(Missing responses)	(5)	(2.2)
Second ranked		
Books/texts/research articles	83	36.2
Manual-based training	5	2.2
Online training	6	2.6
District in-service	10	4.4
Workshop/conference	44	19.2
Graduate coursework for degree requirement	31	13.5

(Table 3 Continues)

(Table 3 Continued)

Graduate coursework beyond degree requirement	10	4.4
No formal training	10	4.4
(Missing responses)	(30)	(13.1)
Third ranked		
Books/texts/research articles	60	26.2
Manual-based training	13	5.7
Online training	9	3.9
District in-service	8	3.5
Workshop/conference	27	11.8
Graduate coursework for degree requirement	21	9.2
Graduate coursework beyond degree requirement	7	3.1
No formal training	22	9.6
(Missing responses)	(62)	(27.1)

Frequency and Percentages of Myth Endorsement

The first hypothesis postulated that the current school psychologists surveyed would endorse similar myths and misconceptions to those of the general public (Guilmette & Paglia, 2004) and more than the practicing school psychologists in the Hooper (2006) study. Table 4 compares the percentages of misconceptions endorsed by the school psychologists in this study to those of the general public and the school psychologists surveyed from North Carolina. Upon comparison, overall results do not suggest global support of the first hypothesis that school psychologists in New Jersey

would endorse similar misconceptions and myths to those of the general public and more than the school psychologists from North Carolina; however, some significant findings were identified.

Table 4

Comparison of the Percentages of Participants from the School Psychologists in New Jersey (NJ) versus the School Psychologists in North Carolina (NC) and the General Public in Rhode Island (RI) Who Endorsed Misconceptions Across the Three Studies

Item	NJ (*n* = 229)	NC (*n* = 304)	RI (*n* = 179)
Myth or misconception			
1. Even after several weeks in a coma, when people wake up, most recognize and speak to others right away (F)	32.8	24.5	40.3
2. After a head injury, people can forget who they are and not recognize others but be perfect in every other way (F)	73.4	59.8	75

(Table 4 Continues)

(Table 4 Continued)

3.	Sometimes a second blow to the head can help a person remember things that were forgotten (F)	9.2	18.7	41.8	
4.	A little brain damage does not matter because people only use a small portion of their brains anyway (F)	2.2	1.7		17.4
5.	How quickly a person recovers from head injury depends mainly on how hard they work at recovery (F)	23.1	16.6		61.9
6.	A person who has recovered from a head injury is less able to withstand a second blow to the head (T)	15.3	33.4		36.8

(Table 4 Continues)

(Table 4 Continued)

7.	Complete recovery from a severe head injury is not possible, no matter how badly the person wants to recover (T)	52.0	53.0	60.3
8.	People who have had one head injury are more likely to have a second one (T)	63.8	44.7	68.1
9.	After a head injury it is usually harder to learn than before the injury (T)	28.4	36.1	35.8
10.	A head injury can cause brain damage even if the person is not knocked out (T)	1.3	39.1	8.3
11.	Whiplash injuries to the neck can cause brain damage even if there is not a direct blow to the head (T)	10.0	37.0	35.7

Note. Letters in parentheses represent the correct response for each item.

Overall, the respondents demonstrated an awareness of potentially harmful effects of brain damage. Respondents to the current study consistently reported fewer misconceptions regarding head injuries than those reported by general-population individuals surveyed in the earlier study. Further, only four of the 11 questions revealed endorsements of myths greater than those of the North Carolina study.

A direct comparison of the percent of endorsement for each item across the three samples revealed a combination of similar, fewer, and greater misconceptions of the current sample to those of the prior studies. Consistent with the hypothesis, similar myths were consistently endorsed for three of the 11 items across all three samples. For Item 1, New Jersey school psychologists and Rhode Island general public ($z = 1.57$, $p = .118$) as well as New Jersey school psychologists and North Carolina school psychologists ($z = 2.11$, $p = .034$) endorsed similar misconceptions. For item 7, school psychologists in New Jersey and the general public in Rhode Island ($z = 1.67$, $p = .094$) and school psychologists in New Jersey and school psychologists in North Carolina ($z = .23$, $p = .819$) endorsed equal misconceptions. Likewise, for Item 9, when comparing school psychologists in New Jersey to the general public in Rhode Island ($z = 1.59$, $p = .111$) as well as those in New Jersey to those in North Carolina ($z = 1.87$, $p = .061$), the samples endorsed similar myths and misconceptions. Moreover for Item 2, New Jersey school psychologists endorsed the myth in equal proportion to the general public in Rhode Island ($z = .37$, $p = .714$) and New Jersey participants endorsed more misconceptions than did North Carolina school psychologists ($z = 3.27$, $p = .001$). Similar findings were noted for Item 8: New Jersey school psychologists reportedly

endorsed an equal proportion of misconceptions to the Rhode Island general population (z = .91, p = .364) and greater misconceptions than the North Carolina school psychologists (z = 4.37, p = < .0001). Further, for Items 4 and 5, New Jersey school psychologists endorsed misconceptions similar to those of the North Carolina school psychologists (z = .42, p = .677; z = 1.88, p = .060), suggesting an equivalent proportion of misconception.

Surprisingly, New Jersey school psychologists endorsed fewer myths and misconceptions when compared to the general public and to North Carolina school psychologists when examining some of the individual survey items. New Jersey school psychologists endorsed fewer misconceptions than the general public of Rhode Island for Item 4 and Item 5 (z = 5.36, p = < .0001; z = 7.93, p = < .0001), respectively. Correspondingly, New Jersey school psychologists endorsed fewer myths and misconceptions than both the general public in Rhode Island and school psychologists in North Carolina for Item 3 (z = 7.71, p = < .0001; z = 3.07, p = .002, respectively), Item 6 (z = 4.99, p = < .0001; z = 4.74, p = < .0001, respectively), Item 10 (z = 3.43, p = .0006; z = 10.29, p = < .0001, respectively), and Item 11 (z = 6.29, p = < .0001; z = 7.09, p = < .0001, respectively).

Descriptive Statistics

Table 5 reports descriptive statistics of means, standard deviations, and minimum/maximum ranges for the degree earned and knowledge in the areas of identification, assessment, and intervention and educational provisions for TBI as well as the perceived competence in the area of identification, assessment, and intervention and educational provisions for TBI. Participants were expected to report their highest degree

earned and their knowledge across these three areas of TBI. Absolute minimum and maximum ranges for knowledge of identification of TBI were 14 and 98 respectively, while the minimum knowledge of assessment of TBI was seven and the maximum 49, and lastly the minimum response range for knowledge of intervention and educational provisions of TBI was six and the maximum was 42. Moreover, absolute minimum and maximum ranges were gathered based on the school psychologists' responses to perceived competence in the area of identification of TBI (minimum, 4; maximum, 28), perceived competence in assessment of TBI (minimum, 5; maximum, 35), and perceived competence in providing interventions and educational provisions to children with TBI (minimum, 6; maximum, 42).

Table 5

Means, Standard Deviations and Minimum/Maximum Ranges for Level of Degree

Descriptive Statistic		Level of Degree		
		Master's/master's plus (n = 93)	Educational specialist (n = 75)	Doctorate (n = 61)
KI	*M*	65.66	68.65	67.07
	SD	7.57	6.53	7.92
	MIN	49	54	51
	MAX	87	84	86

(Table 5 Continues)

(Table 5 Continued)

CI	*M*	15.46	15.28	15.98
	SD	5.14	4.92	4.84
	MIN	4	4	5
	MAX	27	25	27
KA	*M*	31.34	32.77	32.69
	SD	4.28	3.86	4.61
	MIN	18	21	22
	MAX	41	41	43
CA	*M*	16.19	17.72	17.80
	SD	6.49	7.59	7.32
	MIN	5	5	5
	MAX	32	35	34
KIEP	*M*	25.77	26.07	25.82
	SD	3.68	3.07	3.40
	MIN	18	16	20
	MAX	36	34	35
CIEP	*M*	26.72	27.67	28.00
	SD	7.07	6.97	6.46
	MIN	6	11	14
	MAX	41	42	40

Note. *M* = mean; *SD* = standard deviation; *MIN* = minimum range; *MAX* = maximum range; *n* = number in each group; KI = knowledge in identifying; CI = competence in identification; KA = knowledge in assessing; CA = competence in assessment; KIEP = knowledge of intervention and educational provisions; CIEP = competence in intervention and educational provisions.

Descriptive statistics, including the sample size, means, and standard deviations, for years of practice as a school psychologist and the knowledge and perceived competence in the identification, assessment, and interventions for children with TBI is recorded in Table 6. Participants were expected to report their years of experience based on ranges provided as well as their knowledge and perceived competence across the three assessed areas of TBI. As previously mentioned, absolute minimum and maximum ranges for identification knowledge (14-98), assessment knowledge (7-49), and knowledge of interventions (6-42), as well as for competence in identification (4-28), assessment competence (5-35), and competence in intervention and educational provision (6-42), have been delineated. Minimum and maximum response ranges based on years of practice also are provided in the table.

Table 6

Means, Standard Deviations and Minimum/Maximum Ranges for Years of Practice

Descriptive Statistics		Years of Practice				
		0-5	6-10	11-15	16-20	21+
		(*n* = 60)	(*n* = 61)	(*n* = 46)	(*n* = 23)	(*n* = 39)
KI	*M*	67.58	66.92	65.61	66.87	68.03
	SD	6.04	7.56	8.98	7.32	7.31
	MIN	50	51	49	53	52
	MAX	84	83	86	87	85

(Table 6 Continues)

(Table 6 Continued)

CI	*M*	14.60	15.66	15.28	16.17	16.74
	SD	4.47	4.67	5.22	6.29	4.98
	MIN	4	6	4	4	6
	MAX	22	26	27	25	27
KA	*M*	32.55	32.62	31.65	30.65	32.38
	SD	4.34	4.26	4.25	4.10	4.30
	MIN	21	18	23	22	25
	MAX	41	42	43	41	43
CA	*M*	17.50	17.11	17.00	15.74	17.51
	SD	6.58	6.66	8.13	8.08	6.89
	MIN	5	6	5	5	5
	MAX	34	30	35	30	32
KIEP	*M*	25.58	25.51	26.00	26.04	26.69
	SD	0.42	0.44	0.41	0.74	0.67
	MIN	18	16	22	19	20
	MAX	32	34	34	33	36
CIEP	*M*	26.72	27.38	27.37	27.39	28.36
	SD	6.23	7.06	7.30	8.70	6.00
	MIN	11	14	13	6	15
	MAX	40	41	42	40	39

Note. *M* = mean; *SD* = standard deviation; *n* = number in each group; *MIN* = minimum range; *MAX* = maximum range; KI = knowledge in identifying; CI = competence in identifying; KA = knowledge in assessing; CA = competence in assessing; KIEP = knowledge of intervention and educational provisions; CIEP = competence in intervention and educational provisions.

Inferential Statistics

Degree earned and knowledge of TBI. The degree earned by school psychologists and their knowledge of TBI was assessed. A one-way ANOVA between the highest level of degree earned and overall knowledge in the identification of TBI revealed significance, $F(2, 226) = 3.46$, $p = .033$. Posthoc testing, utilizing the Bonferroni multiple comparisons, for further analysis revealed the significance was noted between the master's level group and the education-specialist-level school psychologists ($p = .027$), with the education specialist level demonstrating a greater knowledge of identification of TBI.

Further, a trend towards significance was noted between the highest level of degree earned and the confidence level for overall knowledge in assessment of TBI, $F(2, 226) = 2.98$, $p = .053$. Bonferroni multiple comparisons again revealed a trend approaching significance between the master's-level degree and the education specialist level ($p = .093$), with the latter demonstrating a trend toward a greater knowledge in assessment than the former group.

While highest degree earned and the knowledge of identification and assessment revealed significant results and trends toward significance respectively, no difference was identified between highest level of degree earned and overall knowledge of interventions and educational provisions for TBI, $F(2, 226) = .17$, $p = .847$.

Years of experience and knowledge of TBI. The years of experience practicing as a school psychologists was examined across knowledge in identification, assessment, and intervention and educational provisions for TBI. A one-way ANOVA revealed no

significance between the years of experience as a practicing school psychologist and the overall knowledge of identification of TBI, $F(4, 224) = .68$, $p = .605$. There was no significant relationship between years of experience and assessment of TBI, $F(4, 224) = 1.21$, $p = .307$. Additionally, there was no significant relationship between the years of experience as a school psychologist and the overall knowledge of interventions and educational provisions for TBI in the schools, $F(4, 224) = .88$, $p = .479$.

Degree earned and competence in TBI. School psychologists' highest degree earned was assessed across the overall level of perceived competence in identifying, assessing, and providing interventions and educational provisions to students with TBI. A one-way ANOVA revealed no significance between the highest level of degree earned and overall perceived competence in identification of TBI, $F(2, 226) = .35$, $p = .702$. There was no significant relationship between the highest degree earned among participants and their perceived competence in the assessment of TBI, $F(2, 226) = 1.35$, $p = .262$. Moreover, no significant relationship was identified between the degree earned by school psychologists and their perceived competence in providing interventions and educational provisions in the schools for TBI, $F(2, 226) = .74$, $p = .478$.

Years of experience and competence in TBI. The years of experience as a school psychologist was compared to the perceived competence in identifying, assessing, and providing interventions for children with TBI to see if a relationship did, in fact, exist between these two variables. A one-way ANOVA was conducted. The ANOVA revealed no difference between variables with regard to the years of practice and the

perceived competence in identification of TBI, $F(4, 224) = 1.24$, $p = .294$. No difference was revealed for the years of experience and the perceived competence in assessment of TBI, $F(2, 224) = .29$, $p = .884$. Finally, no significant relationship was revealed between the years of experience as a school psychologist and the perceived competence in providing interventions and educational provisions for children with TBI, $F(4, 224) = .33$, $p = .855$.

Chapter Five

Discussion

The purpose of this study was to investigate New Jersey school psychologists' knowledge and perceived competence in the area of traumatic brain injury (TBI) identification, assessment, and provision of educational intervention and care. Furthermore, this study sought to compare New Jersey school psychologists' endorsement of myths and misconceptions about TBI to the endorsements of North Carolina school psychologists and the general public as reported in prior studies. Of the participants, 229 voluntarily completed the survey, responding to questions regarding TBI in children as well as providing demographic and background information.

Descriptive Interpretations

Survey results revealed a large proportion of the sample (40%) held a master's degree compared to an education specialist (33%) or a doctoral degree (26%) and just over three quarters of the respondents reported having minimal experience in working with children with TBI. Moreover, 89 of the 229 participants revealed no formal training in the area of TBI when asked to rank order their training experience. In fact, when participants were asked to rate how prepared they felt to work with children with TBI based on their training, only 2.2% of respondents indicated they feel "most" confident; in fact, more than half (54%) revealed feeling less than moderately confident in their preparedness based on training received. These reports are analogous to the Hux, et al. (1996) study of speech-language pathologists, which found that the majority of respondents both with and without TBI training reported feeling unqualified to case

manage and provide information to teachers and students regarding TBI, almost half did not perceive themselves as qualified to assess and treat children with TBI. Professionals report perceptions of being ill prepared to work with this population in school settings. These results support the findings of prior research (Hooper, 2006; Hux, et al., 1996; Markowitz & Linehan, 2001; Walker, et al., 1999), suggesting that training in the area of TBI is limited and the ongoing need for training continues.

Myths and Misconceptions

Analysis revealed that New Jersey school psychologists endorse myths and misconceptions similarly to participants in prior studies. In fact, support of the first hypothesis was demonstrated with consistencies in myth endorsement compared to the general public for five of the 11 questions: Items 1 ("Even after several weeks in a coma, when people wake up, most recognize and speak to others right away"); 2 ("After a head injury, people can forget who they are and not recognize others but be perfect in every other way"); 7 ("Complete recovery from a severe head injury is not possible, no matter how badly the person wants to recover"); 8 ("People who have had one head injury are more likely to have a second one"); and 9 ("After a head injury it is usually harder to learn than before the injury"). Further, for Items 2 and 8, New Jersey school psychologists endorsed significantly greater misconceptions than those endorsed by the North Carolina school psychologists surveyed by Hooper (2006), suggesting greater inaccurate beliefs among participants of the current study. In general Items 1 and 2 pertained to knowledge of memory and learning post TBI while Items 7, 8, and 9 tended to relate to recovery from TBI. The results of this study suggest that New Jersey school

psychologists hold false beliefs regarding TBI specifically in the areas of memory and learning, as well as of recovery subsequent to a TBI. As such, this finding indicates that there has been no significant growth in the level of knowledge regarding moderate to severe brain injury when compared to the general public in the Guilmette and Paglia (2004) study conducted 7 years prior. Furthermore, the findings of the 2004 study were not significantly different from those of the Gouvier et al. study conducted in 1988, which further suggests the current findings reveal little progress in knowledge of TBI sequelae and recovery across the past 23 years.

While the issue of inaccurate beliefs still exists regarding some aspects of knowledge of TBI there has been some significant advancement suggested by the results of this study. In fact, New Jersey school psychologists endorsed fewer misconceptions than those endorsed by the general public of earlier studies on two items (Item 4 "A little brain damage does not matter much, because people only use a small portion of their brains anyway" and Item 5 "How quickly a person recovers from head injury depends mainly on how hard they work at recovery") and fewer misconceptions than both the general public and the North Carolina school psychologists on four of the 11 items (Items 3, "Sometimes a second blow to the head can help a person remember things that were forgotten"; 6, "A person who has recovered from a head injury is less able to withstand a second blow to the head"; 10, "A head injury can cause brain damage even if the person is not knocked out"; and 11, "Whiplash injuries to the neck can cause brain damage even if there is not a direct blow to the head"). Generally speaking, Items 10 and 11 deal primarily with mechanisms of brain damage and concussions, topics that have had

significant media exposure as of late, especially in sports-related news; so too have the detrimental effects of recurrent head traumas (Items 3 and 6), as NFL football sportscasters recently have highlighted athletes with recurrent head injuries and the aftereffects. Furthermore, with the adoption of the latest legislature in the state of New Jersey regarding concussions and return-to-play guidelines for school districts effective September of 2011, perhaps school psychologists have increased awareness of the potential causes and dangers of TBI.

Knowledge and Competence of TBI Identification

The second hypothesis stated that there would be a relationship between the degree held and the years of experience as a school psychologist and the amount of knowledge and perceived competence in the area of identification of TBI. It was hypothesized that the higher the degree earned and the more years of experience, the greater the knowledge and the more competent an individual would be in identifying TBI in pediatric populations. Identification knowledge consisted of information regarding TBI sequelae, learning and behavioral consequences that often manifest post TBI, and school-based identification procedures.

In contrast to prior research that found no differences between education levels and knowledge of TBI (Guilmette & Paglia, 2004; Hooper, 2006), the results of this study demonstrated a significant difference between the master's/master's plus and the education specialist degree participants with regard to knowledge of TBI identification, with a greater knowledge base reported by the individuals who earned an Education Specialist degree. This finding suggests that those with a higher level of education

demonstrated a better understanding of identifying TBI in pediatric populations. Further these results also may indicate that the master's/master's plus level school psychology degree offers less coursework/training in the area of TBI when compared to programs for the education specialist degree, results similar to those of the Walker, et al. (1999) investigation, which revealed a dearth of school psychology programs that offered coursework on brain injuries and neuropsychology. Training of school professionals appears to be limited. In fact, Hux, et al. (1996) found that of those speech-language specialists who obtained training in the area of TBI, almost half had done so through continuing education rather than during their degree coursework. As such, these results indicate a need for a re-evaluation of current master's level school psychology programs and the incorporation of training in TBI. Moreover, the demand for a proliferation of continuing-education training for school psychologists in the area of TBI identification is evident.

No significant differences were noted when comparing the education specialist and the doctoral-level school psychologists or the master's-level to the doctoral-level school psychologists with regard to knowledge in identification of TBI. Furthermore, no significant differences were noted across years of experience as a practicing school psychologist and the identification of TBI in pediatric populations. These findings are consistent with both the Guilmette and Paglia (2004) and the Hooper (2006) studies, indicating that the variable of years of experience had no influence on participants' knowledge of TBI.

As for perceived competency in identification of TBI, no differences were noted between the levels of degrees (master's/master's plus, education specialist, doctoral degree) earned or the number of years of experience (0 to 5 years, 6 to 10 years, 11 to 15 years, 16 to 20 years, 21 years or greater). Analysis revealed, however, that respondents overall felt least confident in identifying a mild TBI when compared to moderate or severe injuries. In effect, almost 70% of respondents reported feeling less than moderately confident (measured by a response less than 4 on the 7-point Likert scale, with 4 equaling moderately confident) in identifying a mild brain injury. While moderate to severe head injuries present with some of the most damaging and identifiable effects (perhaps the reason for reports of greater competence in the identification of these), identification of concussion and of symptoms post injury are still of concern because these injuries may manifest with cognitive and behavioral consequences as well (Taylor et al., 2010). Additionally, only 44% of participants reported feeling competent in interpreting the results of a neuropsychological assessment conducted on a child who suffered a TBI. Overall, school psychologists, regardless of degree or years of practice, do not perceive themselves as highly competent in the identification of TBI.

Knowledge and Competence of TBI Assessment

The third hypothesis stated that there was a relationship between the degree earned by the school psychologist (master's/master's plus, education specialist, and doctoral) and the years of experience as a school psychologist (0 to 5 years, 6 to 10 years, 11 to 15 years, 16 to 20 years, 21 years and greater) with the knowledge and competence in the assessment of TBI. It was hypothesized that the higher the degree earned and the

greater the years of experience, the more knowledgeable and competent the professional would be in understanding assessment strategies of TBI. The survey was comprised of various questions regarding modes of assessment and timelines of assessment. Analysis revealed a trend only in the level of degree held and the knowledge of assessment of TBI when comparing master's/master's plus participants to those holding an educational specialist degree. Although not statistically significant, the trend suggested a greater knowledge base among the education specialists in their knowledge in assessment of head injuries. No differences were noted between the master's/master's plus and doctoral or the education specialist and the doctoral-level degree. What is more, no significant differences were noted across years of experience as a practicing school psychologist and the knowledge in assessment of TBI in pediatric populations. These findings again are consistent with prior research (Guilmette & Paglia, 2004; Hooper, 2006).

Although no significant differences were noted between groups, analysis of data revealed that knowledge of assessment among participants is imperfect. While speaking school psychologists generally endorsed the belief that an ecological approach to assessment is best and they understood the importance of neuropsychological assessments prior to school reentry, erroneous beliefs existed regarding efficacy of assessments and timelines for some. Fewer than one quarter (approximately 22%) of school psychologists surveyed more than moderately believed (a response greater than 4 on a 7-point Likert scale, with 4 equaling moderate belief) that educational evaluations overestimate the learning abilities of children who have suffered a TBI. As educational evaluations assess prior knowledge often left intact post head injury, not novel learning,

these measures are inaccurate assessments for determining current functioning of children with head injuries and may overvalue their actual abilities (Farmer & Peterson, 1995; Semrud-Clikeman, 2001; Ylvisaker et al., 2001).

Likewise, greater than half of the school psychologists surveyed (approximately 54%) believed more than moderately (a response greater than 4 on a 7-point Likert scale, with 4 equaling moderate response) that it is sufficient to reassess pediatric students with TBI every 3 years. Research, however, endorses initial assessment at the time of school reentry then periodic reassessments (re-evaluations/IEP revisions every 3 to 6 months) during the first 5 years post injury, as needed based upon ongoing academic challenges (Hibbard et al., 2006). Savage (1991) recommended reassessments every 6 to 8 weeks upon the initial return to school. Regardless of the exact timeframe of monitoring, findings suggest that reassessment occur more frequently than the timeframe is recommended by the IDEA (2004) of annual progress or triennial re-evaluations. Consequently, current research suggests that greater knowledge in the area of assessment of TBI is warranted for practicing school psychologists.

Interestingly, no differences between groups were noted when comparing degree earned and years of experience to perceived competence in assessment of TBI. Competency in assessment was demonstrated through the respondents' confidence in administration of various neuropsychological assessments and comprehensive evaluations to determine functioning of children with TBI. Fewer than half of all school psychologists surveyed revealed feeling more than moderately competent (a response greater than a 4 on the 7-point Likert scale, with 4 equaling a moderate response) in

providing comprehensive assessments (approximately 37%), administering the NEPSY-II (approximately 25%), Delis-Kaplan Executive Function System (D-KEFS; approximately 12%), and various memory scales (approximately 42%). These findings are remarkable since almost half of the school psychologists surveyed reported some training in neuropsychology. Additionally, research suggests that a greater preponderance of coursework in neuropsychology is found at the doctoral-level (Walker, et al., 1999), it is therefore surprising that no differences in competence were reported among the different levels of degree earned. On the contrary, years practicing may have less of an impact on competency in the area of TBI since only recently has there been a rise in the interest in the field of neuropsychology (Hale & Fiorello, 2004).

Knowledge and Competence of TBI Intervention and Educational Provisions

The last hypothesis stated that a relationship would be noted between the degree earned (master's/master's plus, education specialist, doctoral) and years of experience (0 to 5 years, 6 to 10 years, 11 to 15 years, 16 to 20 years, 21 years or more) to the knowledge and competence in providing interventions and educational provisions for children who have suffered a TBI. It was hypothesized that school psychologists with a higher degree and more years of experience would possess more knowledge and competence in the area of providing interventions in the school setting. Knowledge of effective intervention strategies and competence in providing interventions and educational provisions and support were assessed. The results of these analyses revealed no differences among groups between the level of degree earned and years of practicing

with regard to knowledge and competence of intervention strategies for TBI in pediatric populations.

Results suggest that most practicing school psychologists demonstrate an understanding that there is a need for behavioral interventions and that counseling and social-skills training are often effective treatment strategies for children with brain injuries. However, being sensitive to the idiosyncratic presentation of children with brain injuries and to their individualized response to interventions is a concern as greater than 40% of respondents more than moderately (a response greater than a 4 on a 7-point Likert scale, with 4 equaling a moderate response) believed that children with TBI and children with learning disabilities respond similarly to educational interventions. In addition, few (30%) school psychologists more than moderately (a response greater than a 4 on a 7-point Likert scale, with 4 equaling a moderate response) believed that as children with brain injuries age they experience greater and more varied difficulties, a theme commonly addressed in prior research because of maturation and natural brain development (Morrison, 2010). While some misconceptions persist regarding knowledge of appropriate interventions, most school psychologists surveyed reported a high level of competence in providing interventions and school-based consultation. This incongruence is concerning, as practicing school psychologists, although competent, may not possess accurate knowledge in the area of TBI interventions and therefore may not be providing optimal strategies.

Limitations

A number of limitations are noted with the current study. As with any survey research, there is questionable reliability and validity to this study, especially since the principal investigator developed the second, third, and fourth sections of the survey and did not utilize a previously standardized measure to establish knowledge and competence of TBI among school psychologists. This study is limited by construct validity, to the extent that the questions developed were not tested for psychometric properties and may not directly assess identification, assessment, and intervention knowledge of TBI as anticipated. Moreover, the first section of the survey, although a replication of prior studies, does not have well-established reliability and validity. Results of this survey should be used as an estimate, not a measure, of absolute knowledge of TBI-related information, as previously indicated by prior researchers (Springer et al., 1997).

Furthermore, external validity is limited. The generalization of this study is difficult because a true random sample of school psychologists could not be obtained; rather, participation was limited only to New Jersey school psychologists who invested the time and effort to complete the survey in its entirety. Also, selection bias is a contributable limitation to this study in that participants may have volunteered to complete the study because they had knowledge about TBI. It is possible, since many surveys were started but discarded and incomplete and therefore unusable, that school psychologists who viewed the subject matter and questions queried, opted out of the study because they could not contribute in this area. Consequently, the sample of school psychologists utilized in this study may have constituted professionals more prepared to

complete the survey, thus resulting in selection bias. If more school psychologists had responded and completed the survey, perhaps more reports would have revealed a greater dearth of knowledge and competence in the area of TBI in pediatric populations. As well, attrition rates may be attributed to the length of the survey and the amount of time required to complete the items. Additionally, possible confusion with regard to the format and wording of questions may have contributed to the attrition rates.

Furthermore, responder bias may be a concern, as the survey subjectively measured self-perceptions of knowledge and competence levels. This method of measuring actual knowledge and competence is not as valid as more concrete measures, such as direct observation or more standardized measures. Participants may want to give answers in a more favorable way, by responding to what appears to be "morally or ethically" correct, given what they think the investigator wants, based on what they think the survey is intended to measure. Lastly, the survey employed a forced-choice response format, which required respondents to answer all the questions on the survey for the purposes of obtaining composite scores necessary for use during the analysis phase. This format may have coerced respondents to provide guesses on items, thereby, compromising the assessment of actual knowledge and competence.

Recommendations for Future Practice and Research

Continued efforts are vital in improving school psychologists' knowledge and competencies when working with children who have suffered a TBI. Emphasis on enhancing and incorporating training about knowledge of TBI and school-based implications into graduate programs remains an ongoing necessity. In particular, training

ought to concentrate on identification, assessment and intervention strategies for TBI in pediatric populations. Efforts must be made by colleges and universities to ensure that coursework is provided in the area of TBI, as head injuries constitute an eligibility category of its own, according to the IDEA (2004).

As such, the National Association of School Psychologists (NASP) may need to impose training requirements specific to TBI for universities and college programs. In fact, this study raises some ethical considerations. Most notably, NASP has an established code of ethics, *Principles for Professional Ethics* (2010), of which *Principle II.1. Competence* explicitly purports that "To benefit clients, school psychologists engage only in practice for which they are qualified and competent." Further, *Standard II.1.1* states, "School psychologists recognize the strengths and limitations of their training and experience, engaging only in practices for which they are qualified. They enlist the assistance of other specialists in supervisory, consultative, or referral roles as appropriate in providing effective services." Moreover, the IDEA in 1990 established the identification of TBI as an eligibility classification category, which, in turn, mandates special education services for children who are identified under the TBI category. IDEA's inclusion of TBI as an eligibility classification category thereby requires school psychologists to have an understanding and firm knowledge of head injuries, their ramifications, and the necessary interventions needed for children with these injuries. Yet, this study reveals a deficiency or, at best, inconsistencies in knowledge and competence among practicing school psychologists in the area of TBI identification, assessment, and intervention strategies, thus implying ethical considerations that need to

be addressed. Also, an expansion in continuing-education workshops and in-service programs for practicing school psychologists must be available as results of this study suggest that greater years of experience do not necessitate better knowledge and competence in this area. The need for access to training and awareness of consequences of TBI still persists as a need.

Ongoing research is needed to establish a means for open dialogue between medical and school personnel. As medical professionals possess an abundance of knowledge regarding TBI and, more specifically, information distinctive to the presentation of the child with TBI, transferring that knowledge from the medical profession to the school psychologists would only improve the care and treatment of the child upon school reentry.

Lastly, more research is required to develop functional school-based cognitive rehabilitation programs for children with TBI. School psychologists tend to believe that educational interventions similar to those provided for students with learning disabilities are as effective for children with TBI, a belief that is inaccurate (Farmer & Peterson, 1995). Prior to implementation of specific academic, cognitive, or behavioral intervention, a recommended task analysis of skills should be executed to determine the skills that remain intact and those that are now lacking so that proper interventions can be put into action (Farmer & Peterson, 1995; Semrud-Clikeman, 2001).

Conclusion

This study proposed to assess New Jersey school psychologists' knowledge and self-perceived competence in the areas of TBI identification, assessment, and school-

based intervention strategies. It also sought to determine current school psychologists' endorsement of common myths and misconceptions regarding TBI and compare those beliefs to findings of past research. The underlying goal was to determine if knowledge of TBI has increased and if any identifiable differences were noted among practicing school psychologists with regard to overall knowledge of head injuries.

Results of this study reveal overall enhancement in knowledge of mild TBI and concussions as well as of the impact of serial brain injuries with fewer endorsements of misconceptions and myths in these areas when compared to findings in prior research. Inaccurate beliefs espoused by current practicing school psychologists were similar, however, to those of the general public and North Carolina school psychologists in areas of TBI recovery, amnesia, and brain damage, thus suggesting an ongoing need for school professionals to increase their awareness of TBI sequelae and recovery issues, especially with regard to more severe head injuries.

Further, this study reveals a difference in the knowledge base in identifying TBI when comparing school psychologists with a master's degree to school psychologists with an education specialist degree; indicating greater knowledge in identification among those with the education specialist degree. While not statistically significant, a similar trend was noted when comparing school psychologists with a master's degree and those with an education specialist degree in their knowledge of TBI assessment procedures. Moreover, while most practicing school psychologists felt competent in providing intervention strategies for children with head injuries, they did not necessarily possess accurate knowledge of TBI. As such, results implicate an ongoing need for further

training and graduate-degree program enhancement in the area of TBI, especially at the master's degree level.

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Appendix A
Survey

Traumatic Brain Injury Survey: Practicing School Psychologists

Preliminary Questions:
Are you currently a practicing school psychologist? Yes _____ No _____

Are you currently completing a school psychology internship or working as a school psychologist under an emergency certification? Yes _____ No _____

*If you answered **No** to **both** of the above questions, and you are not currently performing school psychologist duties in a school, thank you for your participation, but you are not eligible to complete the survey.*

I. Knowledge as determined by endorsement of misconceptions of TBI

Please read the following statements and indicate if they are True (T), Probably True (PT), Probably False (PF), or False (F), by circling your chosen response:

1. Even after several weeks in a coma, when people wake up, most recognize and speak to others right away.

   T……PT……PF……F

2. After a head injury, people can forget who they are and not recognize others but be perfect in every other way.

   T…...PT…...PF……F

3. Sometimes a second blow to the head can help a person remember things that were forgotten.

   T……PT……PF……F

4. A little brain damage does not matter because people only use a small portion of their brains anyway.

   T…….PT……PF……F

5. How quickly a person recovers from head injury depends mainly on how hard they work at recovery.

   T…….PT……PF……F

6. A person who has recovered from a head injury is less able to withstand a second blow to the head.

   T……PT……PF……F

7. Complete recovery from a severe head injury is not possible, no matter how badly the person wants to recover.

   T……PT……PF……F

8. People who have had one head injury are more likely to have a second one.

   T……PT……PF……F

9. After a head injury it is usually harder to learn than before the injury.

   T……PT……PF……F

10. A head injury can cause brain damage even if the person is not knocked out.

    T……PT……PF……F

11. Whiplash injuries to the neck can cause brain damage even if there is not a direct blow to the head.

    T……PT……PF……F

II. Knowledge of school psychologists in the area of TBI consequence, identification, assessment and interventions/provisional services

Please read the following questions and indicate (by circling) your response on a scale of 1 to 7, with 1 being the least and 7 being the most. Please mark 4 for a moderate amount.

Identification

1. To what extent do you believe children who suffer brain injuries often exhibit symptoms of distractibility and inattention?

   1……2……3……4……5……6……7

2. To what extent do you believe children who suffer brain injuries often have a difficult time remembering information prior to their head injury, but can remember information presented post injury?

   1……2……3……4……5……6……7

3. To what extent do you believe a concussion is considered a type of mild head injury?

   1……2……3……4……5……6……7

4. To what extent do you believe children with brain injuries often process information just as easily and quickly as they did before the injury?

   1……2……3……4……5……6……7

5. To what extent do you believe children who suffer brain injuries often have trouble learning new skills?

   1……2……3……4……5……6……7

6. To what degree do you believe children who suffer brain injuries experience dramatic personality changes?

   1……2……3……4……5……6……7

7. To what extent do you believe children with brain injuries often show signs of depression and withdrawal?

   1……2……3……4……5……6……7

8. To what extent do you believe concussions can lead to behavioral and cognitive problems in school?

1……2……3……4……5……6……7

9. How strongly do you believe parents inform the school after their child sustains a brain injury?

   1……2……3……4……5……6……7

10. To what degree do you believe most children who sustain brain injuries are *not* identified by their school?

    1……2……3……4……5……6……7

11. To what extent do you believe that children with TBI are overlooked or misidentified in the school setting?

    1……2……3……4……5……6……7

12. To what extent do you believe that most children with brain injuries are eligible for services under the TBI classification category?

    1……2……3……4……5……6……7

13. To what extent do you believe that asking parents if their child has been in an accident, experienced a fall, been unconscious, or hospitalized is a good strategy for identifying if a brain injury has occurred?

    1……2……3……4……5……6……7

14. To what degree do you believe that students are more likely to be identified and receive services when hospital to school transitions occur?

    1……2……3…...4……5……6……7

Assessment

1. To what extent do you believe that once a child has returned to school following a head injury, psychological and educational assessments are appropriate for assessing that child?

   1……2……3……4……5……6……7

2. To what extent do you believe ecological approaches to assessment (interview, observation, classroom functioning, inventories), rather than standardized batteries, provide a more robust indicator of a child's functioning post brain injury?

   1……2……3……4……5……6……7

3. To what extent do you believe assessments should occur more frequently than the mandated three year re-evaluation for children with brain injuries?

   1……2……3……4……5……6……7

4. To what extent do you believe that neuropsychological assessment should be completed prior to a child's reentry into school?

   1……2……3……4……5……6……7

5. To what extent do you believe educational/academic evaluations overestimate the learning abilities of children with brain injuries?

   1……2……3……4……5……6……7

6. How strongly do you believe that collecting pre-injury data regarding academic and socio-emotional performance as useful information for proper assessment of children who suffered brain injuries?

   1……2……3……4……5……6……7

7. To what extent do you believe IQ scores provide good information for placement decisions for children who have sustained a head injury?

1……2……3……4……5……6……7

Intervention/Provisional Services

1. To what extent do you believe children with TBI and children with learning disabilities respond similarly to educational interventions?

   1……2……3……4……5……6……7

2. To what extent do you believe behavioral interventions are usually not required for children with brain injuries?

   1……2……3……4……5……6……7

3. How strongly do you believe that children with brain injuries usually experience greater and more varied problems as they get older?

   1……2……3……4……5……6……7

4. To what extent do you believe that Child Study Team members should develop new IEP's on an annual basis for children with brain injuries?

   1……2……3……4……5……6……7

5. To what extent do you believe individual therapy has been found ineffective for children with brain injuries due to their newly acquired deficits?

   1……2……3……4……5……6……7

6. To what extent do you believe social skills groups are effective for providing short-term benefits for children with brain injuries?

   1……2……3……4……5……6……7

III. Competence in the area of identification, assessment and interventions/provisional services

Please read the following questions and indicate (by circling) your response on a scale of 1 to 7, with 1 being the least and 7 being the most. Please mark 4 for a moderate amount.

Identification

1. How competent do you feel in distinguishing between mild, moderate, and severe brain injuries?

   1……2……3……4……5……6……7

2. How comfortable do you feel in interpreting neuropsychological assessments of children who have suffered a TBI?

   1……2……3……4……5……6……7

3. How comfortable do you feel interviewing parents to determine if a head injury has occurred?

   1……2……3……4……5……6……7

4. How comfortable do you feel providing transition services, between the hospital and school, for children who have sustained a TBI?

   1……2……3……4……5……6……7

Assessment

5. How competent do you feel providing comprehensive assessments to establish the functioning of children who have brain injuries?

   1……2……3……4……5……6……7

6. How prepared do you feel to assess and interpret data on children who have sustained a brain injury?

   1……2……3……4……5……6……7

7. How confident do you feel administering the NEPSY-II measure to children who have suffered a head injury?

   1……2……3……4……5……6……7

8. How comfortable do you feel administering the D-KEFS test to children who have suffered a head injury?

   1……2……3……4……5……6……7

9. How comfortable do you feel administering a memory scale (WRAML, CMS, WMS) to children who have suffered a brain injury?

   1……2……3……4……5……6……7

Intervention/Provisional Strategies

10. How important do you feel it is to have parent/family involvement when a child reenters school following a TBI?

    1……2……3……4……5……6……7

11. How competent to do you feel in developing intervention strategies and educational programs (IEP's) for children with brain injuries?

    1……2……3……4……5……6……7

12. How competent do you feel in providing consultation services to teachers who require support for students with brain injuries?

    1……2……3……4……5……6……7

13. How competent are you in knowing when to provide/recommend remediation versus compensatory strategies for children with TBI?

    1……2……3……4……5……6……7

14. How comfortable to do feel in providing direct services to children who have suffered a head injury?

    1……2……3……4……5……6……7

15. From the following list, please rank your top three (3) (most extensive/informative) forms of training you have received in the area of TBI?

    Books/Texts/Research Articles _____
    Manual-based program _____
    Online Training _____
    District-based In-Service _____
    Workshop/Conference _____
    Graduate Course for degree requirement _____
    Graduate Course beyond degree requirement_____
    No Formal Training in TBI _____

16. Do you feel your training (be it in-services, workshops, conferences, and/or coursework) has prepared you to provide treatment/interventions for children with brain injuries?

    1……2……3……4……5……6……7

IV. Demographic and Background Information

Please respond to the following questions by checking the appropriate response:

1. Gender: Male _____ Female _____

2. Ethnicity:

    African-American _____
    Asian-American _____
    Caucasian _____
    Hispanic/Latino-American _____
    Native American _____
    Pacific Islander _____
    Bi/Multi-Racial _____
    Other _____

3. Please indicate your age:

   20-29 years _____
   30-39 years _____
   40-49 years _____
   50-59 years _____
   60+ years _____

4. Please indicate your highest degree attainment:

   School Psychology Intern _____
   Master's _____
   Master's Plus _____
   Education Specialist _____
   Doctorate _____

5. Please indicate the number of years you have practiced as a school psychologist:

   0-5 years _____
   6-10 years _____
   11-15 years _____
   16-20 years _____
   21 years or greater _____

6. Have you received a certification in school psychology?

   Yes _____ No _____

7. Are you a licensed psychologist? Yes _____ No _____

8. Have you received any training in Neuropsychology?

   Yes _____ No _____

9. Overall how much experience would you say you have in identifying, assessing and providing interventions for the TBI population?

   I have had a great deal of experience working with this population _____
   I have had minimal experience working with this population _____
   I have had no experience working with this population _____

Appendix B

Invitation to Participate

Dear Colleague,

You are being asked to participate in a research study exploring the self-perceived knowledge and competency level of school psychologists in identifying, assessing, and treating children with Traumatic Brain Injuries (TBI) in the school setting. This survey will be used for Doctoral dissertation purposes at the Philadelphia College of Osteopathic Medicine (PCOM) by Melissa Santaguida DeLuca. You will be asked to rate your knowledge and competence levels on various questions related to identifying, assessing, and treating TBI in the school setting; as well as, answer several demographic questions. This survey will take approximately 10-15 minutes to complete.

There are minimal risks associated with this study concerning asking respondents for their self-perceived competency levels. Potential benefits include increased knowledge about the nature of TBI. Documentation including the correct answers and best practices to each question and a summary of School Psychologist's knowledge and perceived competence about TBI are available upon request. These documents can be sent to participants after the data collection has been completed.

Your participation is completely voluntary, and consent will be assumed if the questions have been answered. You may withdraw from the study at any time, without penalty. The results of the survey will be kept completely confidential. The data will be kept anonymous by having no personal identifiers used. Further, surveys will not be coded so there will be no way of tracing surveys back to respondents.

Thank you in advance for your participation. Should you have any questions, or if you would like the results, please contact Melissa Santaguida DeLuca at PCOM at Melissasan@pcom.edu. You may also contact the dissertation chair for this study, Lisa Hain, Psy.D. at Lisahai@pcom.edu or 215-871-6618.

Sincerely,

Melissa Santaguida DeLuca
(732) 773-0556
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Appendix C

Invitation E-mail with Link

I am conducting a survey of school psychologists' perceived knowledge and competence in the area of TBI for my doctoral dissertation, and your response would be appreciated. Here is a link to the survey:

https://www.surveymonkey.com/s.aspx

If you know of other practicing school psychologists or school psychology interns, within the state of New Jersey, who would be willing to participate in the study, please feel free to forward this survey.

Thanks for your participation!

Please note: If you do not wish to receive further e-mails from us, please click the link below, and you will be automatically removed from our mailing list.

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