TEACHER, PARENT, AND SELF-PERCEPTIONS OF SOCIAL FUNCTIONING IN YOUTH WITH TRAUMATIC BRAIN INJURY

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Lindsey M. Feltz
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TEACHER, PARENT, AND SELF-PERCEPTIONS OF SOCIAL FUNCTIONING IN YOUTH WITH TRAUMATIC BRAIN INJURY

Name: Feltz, Lindsey, M.

APPROVED BY:

_____________________________
Susan Davies, Ed.D.
Advisory Committee Chair
Associate Professor
Department of Counselor Education & Human Services

_____________________________
Elana Bernstein, Ph.D.
Committee Member
Clinical Faculty
Department of Counselor Education & Human Services

_____________________________
Melissa S. Ginn, CCRC
Committee Member
Clinical Research Coordinator Team Lead
Center for Biobehavioral Health
The Research Institute at Nationwide Children's Hospital

_____________________________
Lesley Evans, Ph.D.
Committee Member Clinical Faculty
Department of Teacher Education
ABSTRACT

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Name: Feltz, Lindsey M.
University of Dayton
Advisor: Dr. Susan Davies

A traumatic brain injury (TBI) sustained during childhood can cause significant negative consequences in not only physical, cognitive, and academic functioning, but also emotional, behavioral and social functioning. These deficits are often interrelated and can adversely affect the individual’s daily living, including interactions with others. Social dysfunction is a particularly debilitating problem for children and adolescents who have sustained a traumatic brain injury (TBI). The social effects of TBI, particularly over time, are infrequently researched and therefore are not well understood by school personnel. This study examined the perceptions of teacher, caregiver and student regarding social functioning following a TBI by 1) comparing teacher and caregiver ratings of social skills at baseline, 6 months post-injury, 12 months post-injury, 18 months post-injury, and 7 years post-injury 2) examining self-ratings of social
competence 7 years post-injury in comparison to individuals who sustained an Orthopedic Injury (OI) and 3) comparing self-ratings of social acceptance to caregiver and teacher ratings of social functioning. No significant difference between caregiver and teacher ratings was found; however, a significant difference was detected between teacher ratings of individuals with OI and individuals with TBI. In addition, individuals with TBI did not perceive themselves as having any deficits in social acceptance or global self-worth; there were no significant differences in self-ratings between individuals with TBI and individuals with OI. Lastly, this study found discrepancies between self and parent ratings and self and teacher ratings. Such discrepancies suggest a lack of self-awareness in youth following a TBI.
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# TABLE OF CONTENTS

ABSTRACT.........................................................................................................................iv

ACKNOWLEDGMENTS.......................................................................................................vi

LIST OF TABLES ................................................................................................................ix

CHAPTER I: INTRODUCTION ............................................................................................1

CHAPTER II: LITERATURE REVIEW ................................................................................3

- Incidence .........................................................................................................................3
- Classification of TBI .......................................................................................................4
- Severity of TBI ................................................................................................................5
- Leading Causes of TBI ...................................................................................................7
- Support for Students with a TBI ...................................................................................8
- Consequences of TBI .....................................................................................................10
- Caregiver and Teacher Perspectives of Social Skills .....................................................18
- Self-Perceptions of Social Competence Among Individuals with TBI ......................21
- The Present Study .........................................................................................................22

CHAPTER III: METHOD ....................................................................................................24

- Research Questions and Hypotheses ...........................................................................24
- Research Design ..........................................................................................................26
- Participants ....................................................................................................................26
LIST OF TABLES

Table 1: Number of participants at each visit........................................28
CHAPTER I
INTRODUCTION

Millions of individuals are diagnosed with a traumatic brain injury (TBI) each year and many others sustain head injuries but are not formally examined by medical personal (Centers for Disease Control and Prevention [CDC], 2014a; Rosema, Crow, & Anderson, 2012). Children ages zero to four and adolescents ages 15 to 19 are at the greatest risk for sustaining a TBI (CDC, 2014a), largely due to falls in preschool-age children and motor vehicle accidents in older adolescents. While some classify TBI as a “low incidence” disability, TBI is actually the leading cause of disability and death in children and adolescent in the United States (Brain Injury Association of America, 2014). Children who sustain a TBI often suffer from short- and long-term negative consequences in physical, cognitive, academic, emotional, behavioral, and social functioning (Jantz, Davies, & Bigler, 2014). Symptom severity frequently corresponds with the severity of the injury, meaning the more severe the injury the more severe symptoms emerge (Yeates et al., 2010). Often, the negative consequences of a TBI are interrelated.

Previous research indicates that children who have sustained a TBI are at increased risk for developing poor social outcomes; in fact, social dysfunction was reported to be the most debilitating problem for children and adolescent survivors
(Rosema et al., 2012). Social effects of TBI have been infrequently researched and are therefore less understood than cognitive and physical effects (Rosema et al., 2012; Yeates, Taylor, Walz, & Stancin, 2010). Students with poor social skills often: (a) experience difficulties developing interpersonal relationships with parents, teachers and peers, (b) arouse negative reactions from others, which lead to peer rejection, (c) show signs of depression, aggression and anxiety, (d) demonstrate poor academic achievement, and (e) have a higher incidence of involvement in the criminal justice system as adults (National Association of School Psychologists [NASP], 2002).

Although potential aversive effects of TBI on social functioning are well-documented, there is limited research on teacher, caregiver, and self-perceptions of social skills in youth following a traumatic brain injury across time. This study aimed to address this by comparing teacher and parent ratings of children following a TBI at five intervals: baseline, 6 months post-injury, 12 months post-injury, 18 months post-injury and 7 years post-injury. In addition, this study examined self-reported ratings of social competence following a TBI in order to assess social self-awareness.
CHAPTER II
LITERATURE REVIEW

The first section of this literature review focuses on the incidence, classification, causes, and educational identification of traumatic brain injury (TBI). The next section of the literature review addresses potential effects of traumatic brain injury; particular attention is given to how brain injury affects social functioning in school-age youth.

Incidence

TBI is the result of an acquired injury to the brain by an external force or penetrating object (CDC, 2014a). An estimated 1.7 million people sustain a TBI each year in the United States (Faul, Xu, Wald, & Corondo, 2010). Of those, approximately 275,000 are hospitalized; 1.3 million are treated and released from the emergency department and 52,000 do not survive their injury. TBI contributes to nearly 30% of all injury-related deaths (Faul et al., 2010). These statistics are likely an underestimate of actual incidence rates, as TBI-related data were not collected from other facilities that evaluate individuals with TBI, such as doctors’ offices. In addition, prevalence data do not account for individuals who sustained a TBI but did not seek treatment.

Children zero to four years old, adolescents ages 15 to 19, and adults 65 and older are most likely to sustain a TBI (Faul et al., 2010). Males are at greater risk than females in every age group to obtain a head injury. Specifically, males, ages 0 to 4 years, have the
highest rates of TBI-related emergency department visits, hospitalizations, and death combined (Faul et al., 2010).

**Classification of TBI**

TBIs are classified as either: 1) open/penetrating head injury or 2) closed/non-penetrating head injury. These classifications are then divided further into subsets, described below.

Open or penetrating head injuries occur when an object pierces the skull or when the force from an object fractures the skull in a way that causes bone fragments to pierce at least the dura mater, the thick membrane surrounding the brain (Jantz et al., 2014). Open-head injuries are further divided into three subsets: penetrating, perforating and tangential (Erdogan, Gonul, & Seber, 2002; Harcke, Levy, Getz, & Robinson, 2008). Penetrating open brain injuries are the result of an object entering, but not exiting, the skull, such as a knife wound that penetrates the skull. Perforating head injuries occur when the object enters and exits (through-and-through), such as a bullet. Lastly, tangential head injuries occur when an object strikes the skull with enough force that cranial bones are inwardly broken and tear the dura mater. An example of this subtype includes being hit in the head with a hammer, which causes penetration to the skull and breaks internal cranial bones that pierce the dura mater (Jantz et al., 2014).

Closed or non-penetrating head injuries occur when the brain is adversely impacted by an external force that does not pierce the skull (Jantz et al., 2014). Such external forces include a bump, blow or jolt to the head (CDC, 2014a). There are two types of closed head injuries, which include contact force and inertial forces. Contact force head injuries occur when a moving object strikes a relatively stationary head, such
as a hockey puck striking a spectator in the audience (Jantz et al., 2014). An inertial force head injury, also known as an acceleration/ deceleration injury, occurs as a result of a person in motion colliding (accelerating) with a stationary object (decelerating), such as a person’s head hitting the steering wheel in an automobile accident. Damage to the brain can also occur due to internal bleeding, bruising, swelling or twisting or rotating movement of the brain.

**Severity of TBI**

Not all blows, bumps or jolts to the brain result in a TBI (CDC, 2014a). To be classified as a traumatic brain injury, the injury must have an adverse effect on daily functioning. An individual may not notice any symptoms at the time of injury, or symptoms such as headaches, fatigue, or visual disturbances may only occur for a short period. Because these symptoms are often subtle, diagnosing traumatic brain injury can be challenging. Symptoms also vary significantly from person to person. Therefore, severity classification of TBI falls on a continuum, such that two people classified within the same category may experience different symptoms, outcomes, and prognosis. The severity of a TBI is commonly determined using several methods of measurement, including the Glasgow Coma Scale (GCS, Tesdale & Jennette, 1974), length of loss of consciousness, and length of posttraumatic amnesia (Davies, 2014). The GCS is a standardized rating scale that measures an injured individual’s ability to open their eyes, communicate with others, and move their limbs within the first 24 hours post-trauma. The GCS scale ranges from 0-15 points and results in a severity classification of mild, moderate and severe (Tesdale & Jennette, 1974).
**Mild TBI.** Mild traumatic brain injury (mTBI) is the most common type of TBI and is estimated to account for approximately 75 percent of all TBIs in the United States (CDC, 2014b). A mild TBI is typically suspected if the head injury resulted in a reduction of brain functioning, no loss of consciousness or loss of consciousness for thirty minutes or less, a GCS score of 13-15 thirty minutes post-injury (CDC, 2014c); or post-traumatic amnesia that did not last longer than thirty minutes (Von Hahn, 2003). Concussions are typically categorized as a form of mild TBI.

Mild TBIs are further classified into two categories: complicated and uncomplicated. Individuals who acquire a complicated mild TBI show intracranial damage on neuroimaging technology, such as computerized axial tomography scans (CT-scan) on the day of injury (Jantz et al., 2014). Conversely, individuals with uncomplicated mild TBIs do not show evidence of intracranial damage on the day of injury (Jantz et al., 2014).

**Moderate TBI.** Moderate traumatic brain injuries comprise approximately 10 percent of all TBIs in the United States (Corrigan, Selassie & Orman, 2010). In general, an individual is suspected of sustaining a moderate TBI if he or she loses consciousness for 1-24 hours, experiences post-traumatic amnesia for 1-24 hours, obtains abnormal results from brain imaging, and obtains a GCS of 9-12 or experiences a coma of less than 6 hours after hospital admission (Jantz, et al., 2014).

**Severe TBI.** Similar to moderate TBI, approximately 10 percent of all TBIs in the United States are classified as severe (Corrigan et al., 2010). Individuals who have sustained a severe TBI often experience a loss of consciousness for more than 24 hours, post-traumatic amnesia for more than 24 hours, abnormal results from neuroimaging, and
a GCS less than or equal to 8 or experience a coma of longer than 6 hours after admission (Jantz et al., 2014). Common, potential effects of a non-fatal, severe TBI may include disturbances in cognitive functioning, motor functioning and emotional regulation (CDC, 2014c).

These adverse symptoms of a TBI can range in short- or long-term effects. Approximately 43 percent of survivors of severe TBI have a related disability one year after injury (Selassie, Zaloshnja, Langlois, Miller, Jones & Steiner, 2008). Such disabilities include: (a) functional limitations in activities of daily living, (b) experiencing significant post-injury symptoms, (c) experiencing cognitive complaints or (d) experiencing significant problems with mental health. More specifically this may include: (a) a lack of independence with dressing, eating and toileting, (b) blurred vision, seizures, loss of hearing or balance or irritability, (c) difficulty with memory, attention, problem solving, processing speed, orientation, clumsiness and follow through, (d) impaired viability, social functioning, and emotional stability. Individuals, who experience these severe symptoms are often unable to return to independent functioning, causing additional strain on the individual and his or her family (Selassie, Zaloshnja, Langlois, Miller, Jones & Steiner, 2008).

**Leading Causes of TBI**

Brain injury can result from numerous incidents. The leading causes of TBI-related emergency room visits, hospitalizations, and death include: falls (40.5%), unintentional blunt trauma (e.g., being struck by an object in the head; 15.5%), motor vehicle accidents (14.3%), assaults (10.7%) and unknown/other reasons (19.0%; CDC, 2014a). Falls, the leading cause, disproportionately affect the youngest and oldest age
groups. More than half (55%) of TBIs sustained in children ages 0 to 14 and more than two-thirds (81%) sustained in adults ages 65 and older are caused by falls (CDC, 2014a).

Blunt trauma, such as getting struck in the head, is the second leading cause of TBI for children 5-14 years old (CDC, 2014a).

**Support for Students with a TBI**

Because traumatic brain injuries vary in severity, treatment following injury varies as well. The United States federal law requires specialized services and free appropriate public education be provided to children ages 0 to 21 with a disability in the least restrictive environment. Early intervention services must be provided to children ages 0 to 2. Individuals who acquired a head injury may qualify for special education services, such as an Individual Education Program (IEP) or a 504 Plan, depending on the effects of the injury.

**Special education services.** The classification of traumatic brain injury was added to the special education disability categories under the Individuals with Disabilities Education Act (IDEA) in 1990 (United States Department of Education, 2004). Under IDEA, TBI is defined as:

…an acquired injury to the brain caused by an external physical force, resulting in total or partial functional disability or psychosocial impairment, or both, that adversely affects a child's educational performance. Traumatic brain injury 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.
Traumatic brain injury does not apply to brain injuries that are congenital or degenerative, or to brain injuries induced by birth trauma. (United State Department of Education, 2004, “Building the Legacy: IDEA 2004”, para.1)

An essential part of the TBI definition is that the disability adversely affects the child’s educational performance. Individuals with more severe TBIs are more likely to qualify for these services. A variety of services can be provided by the school to students who have sustained a TBI. Such services may include: special instruction, counseling, family training, speech and language pathology, occupational therapy, physical therapy, service coordination, assessment services, social work services, assistive technology devices, and transportation (Jantz et al., 2014). Special education services are specially designed to meet the individual needs of each student.

Approximately 26,000 students, ages 3 to 21, receive special education services under the TBI classification under IDEA, yet the TBI category only accounts for about 0.1% of students receiving special educational services (U.S. Department of Education, 2014). This is likely an underestimate of occurrences, considering an estimated 44,000 children are treated each year for TBI-related injuries (Faul et al., 2010). Under-identification of traumatic brain injury in special education may be partially due to misclassification. Symptoms of TBI may overlap with other presenting problems and therefore, students’ difficulties may be attributed to other disability categories (Davies, 2014) such as Emotional Disturbance, Other Health Impairments or Specific Learning Disabilities (Schilling & Getch, 2012). Additionally, not all TBI results in an adverse impact on academics, especially for students who sustain milder head injuries, and therefore may not require specially designed instruction.
Section 504 plans. A student who has sustained a TBI, but does not meet the qualification criteria under IDEA, may qualify for accommodations and/or modifications under Section 504 of the Rehabilitation Act of 1973. Section 504 is a federal law in the United State that states that “no qualified individual with a disability in the United States shall be excluded from, denied the benefits of, or be subjected to discrimination under” any program or activity that receives federal funding (U.S. Department of Justice, 2009). A student qualifies for accommodations under Section 504 if he or she has a physical or mental impairment which adversely affects one or more major life activities, has a record of this impairment or is regarding as having an impairment (U.S. Department of Education, 2013). Once a student is identified with a disability under Section 504, a Section 504 Accommodation Plan is created.

A student with TBI who meets the eligibility requirements under Section 504 is entitled to reasonable accommodations or modifications written into his/her Section 504 Accommodation Plan. Possible accommodations for students with TBI may include: providing extended time on tests and assignments, receiving an extended school year, providing memory and organizational aids, administering alternative testing, training staff and peers about TBI, and implementing academic progress monitoring (U.S. Department of Education, 2010). If negative symptoms of TBI subside and no longer adversely impact a student’s education, the student would no longer need or be eligible for the accommodation plan under Section 504.

Consequences of TBI

TBI treatment should be individualized to each student because consequences of brain injuries exist on a continuum. The effects of the injury vary in severity, topography
and duration among affected individuals. Severity of post-injury consequences is positively correlated with the severity of the TBI; children with severe TBI will likely experience more profound deficits (Yeates, 2000). In addition to newly acquired neurological issues (e.g., headaches, sleep issues, seizures, and motor impairment), TBI can result in short- and long-term changes in cognitive, academic, behavioral, and social functioning (Schilling & Getch, 2012). These effects are often related. Changes in cognition, behavior, emotion and social functioning may occur early on or have a delayed onset following the injury. Symptoms are typically categorized as cognitive, emotional, behavioral or social.

**Cognitive consequences.** The most common side effects of TBI are memory problems, difficulty learning new information, difficulty processing information, and difficulty with speech and language (Arroyos-Jurado & Savage, 2008; Orstein et al., 2009); understandably so, these problems often adversely affect cognitive and academic functioning. Physical damage to the brain, particularly the temporal and frontal lobe, frequently results in memory problems (Bigler, 2007). Memory is one of the slowest cognitive skills to improve post-injury; it progressively recovers one to two years post-injury, but difficulties can continue up to ten years post-injury (Vaki, 2005). Such cognitive impairments can affect a student’s ability to remember previously learned academic content or acquire new academic skills.

Executive functioning, defined as the ability to reason, problem-solve, set goals, prioritize, self-monitor, self-correct, self-regulate, organize and plan, and initiate or inhibit behaviors, is also negatively impacted by a TBI. Executive functioning deficits affect 18-36 percent of individuals with TBI, across severity levels with individuals with
more severe TBI demonstrating greater executive dysfunction (Sesma, Slomine, Ding, & McCarthy, 2008). Brain injuries to the frontal lobe frequently result in difficulties with executive functioning (Jantz et al., 2014). Impairments in executive functioning can result in difficulty with completing multiple-step tasks (e.g., completing independent classwork), poor planning (e.g., not allowing enough time to complete assignments), poor follow through (e.g., partial completion of homework), impairments in communication, impulsive behavior, incongruent emotional responses (e.g., laughing at something sad), and rigid thinking (e.g., failing to see other’s perspectives; Jantz et al., 2014).

**Emotional consequences.** Common emotional difficulties experienced by students with TBI include depression, anger and irritability, posttraumatic stress, and anxiety (Kendary et al., 2012, Max et al., 2011, Max et al., 2012, Max et al., 2013). Newly acquired psychiatric disorders, such as PTSD, anxiety, depression and AD/HD, occur in approximately 28 percent of children (ages 5-14) who sustained a mild TBI in the 6-12 months after the injury (Max et al., 2013).

Depression is the most common psychiatric ailment to occur following TBI (Max et al., 2012). Older students are at greater risk of developing clinical levels of depression after sustaining a TBI (Max et al., 2012). The presence of depression after TBI is not linked with severity level. Rather, it is correlated with age of onset of TBI, family disorder, social support, adequate rehabilitation treatment and socioeconomic status (Max et al., 2012; Rapoport, 2012).

Irritability, a common symptom of depression, is also observed in those with TBI. Although individuals who have sustained a TBI may experience increased irritability, they may not demonstrate other symptoms of depression. They may, however, feel angry
or irritable about their new cognitive challenges, dependence on others, and decreased executive functioning (Hart, Vaccaro, Hays, & Maiuro, 2012). Due to declines in executive functioning, individuals may struggle to self-regulate, deescalate acting out behaviors, or control outbursts. Students with TBI who experience externalizing problems are likely to encounter increased difficulties with completing schoolwork, as well as difficulties getting along with peers and teachers (Jantz & Coulter, 2007).

Posttraumatic Stress Disorder (PTSD), a mental health disorder that occurs as a result of exposure to a traumatic event, has not been widely researched among students with TBI. Iselin, LeBrocque, Kenardy, Anderson, and McKinlay (2010) found that up to 15 percent of children and adolescents who sustained a TBI experience PTSD. Students with severe TBI report more PTSD symptoms than those with moderate or mild TBI (Hajek et al., 2010).

Regardless of severity level, individuals with TBI may report symptoms of anxiety disorders, including post-traumatic stress disorder, separation anxiety, phobias, general anxiety disorder, adjustment disorder with anxious mood, and panic disorder (Max et al., 2011). A study conducted by Max and colleagues (2011) found that new onset of anxiety disorder occurred in 8 percent of individuals with TBI, and 24 percent reported subclinical symptoms (demonstrating symptoms of a disorder that are not severe enough for a clinical diagnosis) of anxiety. New-onset of anxiety disorders was associated with younger individuals who had sustained a TBI and tended to be associated with depressive disorder (Max et al., 2011). Some students with TBI who experience greater behavioral inhibition may also experience isolation from class activities and
peers, greater apathy about school, and greater stress related to their reintegration into the classroom (Jantz & Coulter, 2007).

**Behavioral consequences.** Emotional and behavioral dysregulation frequently co-occur in students with TBI (Arciniegas & Wortzel, 2014). Students with TBI may exhibit significant behavioral problems, including but not limited to, increased aggression, hyperactivity, impulsivity, and inattention (Arciniegas & Wortzel, 2014). Students with TBI who demonstrate more externalizing behaviors are more likely to have difficulties with completing schoolwork and getting along with teachers and peers (Jantz & Coulter, 2007). Teachers reported more externalizing and school-related problems more frequently in students with TBI when compared to non-injured peers (Thaler, Mayfield, Reynolds, Hadland, & Allen, 2012).

**Social consequences.** Students who have emotional and behavioral difficulties often also experience difficulties with social functioning. Social functioning is defined as “the way an individual operates in a social environment by relying on social skills and interacting with others” (Beauchamp & Anderson, 2010, p. 40). Social functioning gradually develops in infancy and childhood and enhances during adolescence; it reflects the dynamic interplay between the individual and his or her environment (Beauchamp & Anderson, 2010). Social skills and social cognition represent different aspects of an individual’s overall social functioning (Yager & Ehmann, 2006). According to Beauchamp and Anderson (2010), social skills refer to “the cognitive and interpersonal abilities that are required for appropriate social behavior and positive interpersonal interactions” and social cognition refers to “the mental processes that are used to perceive and process social cues, stimuli and environment” (p. 40).
Disruptions to social functioning can lead to psychological distress, social isolation, and decreased self-esteem, which can significantly affect an individual’s overall quality of life (Beauchamp & Anderson, 2010). For example, a student with TBI who is easily irritable, acts out aggressively and does not understand subtle social cues may be viewed as “odd” by peers, who in return, tease or avoid that student.

Prior to the 1990s, research on TBI mainly focused on physical and cognitive outcomes (Rosema et al., 2012). In recent years, studies have focused on how TBI affects social functioning and social competence. There are several distinctions between social skills and social competences. Social skills typically refer to specific behaviors that individuals demonstrate to successfully complete social tasks, such as playing a game with peers or initiating conversations (Gresham, Elliot, Cook, Vance & Kettler, 2010). Social competencies are defined as the ability to achieve personal goals in social interaction while simultaneously maintaining positive relationships with others over time and across situations (Rubin & Rose-Krasnor, 1992). However, social competence is also a term used in literature to describe the other’s judgments or perspectives of an individual’s performance of social tasks (Gresham et. al., 2010). Overall, social skills are specific behaviors that lead to others’ judgments that these behaviors were competent or incompetent in accomplishing specific social tasks (Gresham & Elliot, 2008).

The majority of the literature on social functioning in individuals with TBI focuses on three main components: (1) social adjustment, (2) social interactions, and (3) social cognition (Rosema et al., 2012; Yeates et al., 2007). This is consistent with Yeates and associates’ integrative multilevel model, which identifies these three social components as vital for social competence (Yeates et al., 2007; Rosema et al., 2012).
**Social adjustment.** Social adjustment is the “capacity of individuals to adapt to the demands of their social environment” (Beauchamp & Anderson, 2010, p. 40). It is also the “degree to which children get along with their peers; the degree to which they engage in adaptive, competent social skills and the extent to which they inhibit aversive, incompetent behavior” (Crick & Dodge, 1994, p. 82). Social adjustment is often rated using a variety of questionnaires, such as the *Vineland Adaptive Behavior Scale* (VABS, Sparrow, Cichetti, & Balla, 2005) and the *Behavior Assessment System for Children* (BASC-3; Reynolds & Kamphaus, 2015; Rosema et al., 2012).

Research on social adjustment in youth with TBI is contradictory: Some studies have found greater impairments in socialization and communication skills in children and adolescents with TBI when compared to control groups (Fletcher, Ewing-Cobbs, Miner, Levin, & Eisenberg, 1990; Ganesalingma et al., 2011; Levin, O’Connell & Grossman, 2009; Max et al., 1998; Poggi et al., 2005; Yeates et al., 2010), whereas no significant differences were shown in other studies (Anderson et al., 2001; Chapman et al., 2010; Hanten et al., 2008; Papero et al., 1993; Poggi et al., 2005, Ross et al., 2011).

The relationship between injury severity and social adjustment is also unclear. Some research suggests that severe TBI results in increased difficulties with social adjustment (Chapman et al., 2010; Fletcher et al., 1990; Ganesalingma et al., 2011; Max et al., 1998; Yeates et al., 2010). However, other research found no significant differences in severity groups (Papero, Prigantano, Syder, & Johnson, 1993).

**Social interactions.** Social interactions are defined as the social actions and reactions between two or more people (Beauchamp & Anderson, 2010). Ross et al. (2011) compared children with and without TBI and found no significant differences in
friendships, as measured by the *Friendship Quality Questionnaire* (Parker & Asher, 1993). Conversely, parent ratings on the social domains of the *Childhood Behavior Checklist* (CBCL; Achenbach & Edelbrock, 1983) indicated that children with TBI had fewer close friendships (Prigantno & Grupa, 2006). The severity of the TBI was also correlated with fewer close friendships, such that children with severe TBI had fewer close friendship than children with moderate-mild TBI and children with moderate TBI had fewer close friends than children with mild TBI (Prigantno & Grupa, 2006).

**Social cognition.** As previously stated, social cognition refers to the mental processes used to interpret and comprehend social cues, stimuli, and environments (Beauchamp & Anderson, 2006). Social cognition can include social problem solving and social information processing.

Hanten et al. (2008) assessed social problem solving in children with TBI with the *Interpersonal Negotiation Strategies* (INS; Yeates et al., 1990) task, which poses hypothetical interpersonal dilemmas. Individuals with TBI were asked to define the problem (e.g., miscommunication between two people), generate alternative strategies, select and implement strategies and evaluate outcomes. The researchers found that students with TBI obtained significantly lower scores on social problem-solving tasks from baseline through one-year post-injury (Hanten et al., 2008). Hanten et al. (2011) conducted a similar study using a virtual reality version of the INS tasks. Results were consistent with their previous finding in that adolescents with TBI had more difficulty with social problem solving when compared to non-injured peers. Furthermore, adolescents who sustained a TBI were more likely to provide impulsive, self-centered solutions than were the comparison adolescent group (Hanten et al., 2011). Poor
executive functioning, a consequence of TBI, is also associated with difficulties with social problem-solving and poorer social outcomes (Muscara, Catroppa & Anderson, 2008).

Social information processing is primarily evaluated through theory of mind, or the ability to read the intent of others, and emotion perception. Research has demonstrated that children with TBI have more difficulty recognizing emotions of others when compared to control groups (Tonks et al., 2007). Students with TBI who cannot spontaneously recognize the facial expressions and emotions of others are likely to respond inappropriately (Jantz et al., 2014). For example, if a student with TBI cannot recognize that her comment intentionally offended her peer, she would not know to apologize to her peer (Jantz et al., 2014).

**Other social concerns.** Many children with TBI often experience high numbers of school absences due to temporary withdrawal from school because of hospitalization, rehabilitation treatments and various doctor appointments. Like students with chronic health impairments, students with TBI reported feelings of isolation after multiple absentees from school (Kaffenberger, 2006). Students with recently acquired TBIs are often restricted from engaging in physical activities, such as sports. Restrictions may lead to the perception that the student is different, resulting in a lack of acceptance by peers (Jantz et al., 2014).

**Caregiver and Teacher Perspectives of Social Skills**

To assess social functioning, behavior rating scales are most commonly administered to parents/caregivers, teachers and students. Behavior ratings scales are indirect measures of behavior, as they require the rater to retrospectively assess the
occurrence of specific behaviors (Gresham & Lambros, 1998; Gresham et. al., 2010).

Benefits of behavior rating scales include: (a) behaviors are quantifiable and results can go through reliability and variability analysis, (b) a broad range of behaviors can be assessed, (c) multiple raters, such as parents/caregiver, teachers and students, can be used to rate behaviors and (d) normative data provide a comparison for judging severity of behaviors (Gresham & Elliot, 2008). Using multiple informants, such as parents and teachers, is often considered the gold standard in assessing psychological conditions, because it provides valuable information such as behavioral consistencies, responsiveness to changes, etc. (Achenbach, 2006; De Los Reyes, Thomas, Goodman, & Kundey, 2013).

Research has suggested that informants cannot be replaced by each other since they reflect variations in perceptions of the child’s capabilities (Achenbach, McConaughy & Howell, 1987). These multiple perceptions therefore provide a more comprehensive portrayal of the child’s present state (Silberg et al., 2015).

Research over the years has consistently found a modest agreement among different informants’ ratings of children and adolescents psychopathology (Kraemer et. al., 2003), adaptive behavior (Harrison & Oakland, 2003) and social competence (Gresham, & Elliot, 1990; Gresham et. al., 2010; Renk & Phares, 2004). After analyzing patterns of agreement among teachers, parents/caregivers and students, Gresham et al. (2010) found that teachers provided slightly less favorable ratings of social skills than parents on the Social Skills Improvement System-Rating Scales (SSIS-RS, Gresham & Elliot, 2008). On social skills scales, parents tend to give the most favorable ratings, followed by students and then teachers. Similarly, Robbins and Merrell (1998) found low to modest associations between parent and teacher ratings of social competence and
antisocial behavior, as measured by the *Home and Community Social Behavior Scale* (Merrell & Caldarella, 2008) and *School Social Behavior Scales* (Merrell, 1993).

These differences between parent and teacher perceptions of social skills specifically in the TBI population have not been thoroughly examined in the research literature to date. The majority of current TBI research focuses on parent perceptions, student perceptions, or observations of the individual with TBI. Out of 28 studies included in a systematic review of the literature of social functioning of children and adolescents following a TBI, only three included teacher rating scales (Rosema et al., 2012). Even if the study collected teacher input, comparisons of teacher and parent ratings were not analyzed.

Previous research has compared teacher and parents’ perceptions of executive functioning following a TBI (Armstrong-Betts, 2012). This research found no significant variations between raters when executive functioning was measured at baseline, 6 months, 12 months and 18 months post-injury (Armstrong-Betts, 2012). Because students with TBI who have executive dysfunction are at-risk for social difficulties (Muscara et al., 2008), it is likely that parent and teacher perspectives of social function in injured students would be similar to the findings of Armstrong-Betts (2012).

However, prior research suggests that teachers are regarded most reliable in reporting hyperactivity, whereas mothers are regarded as most reliable for reporting oppositional and internalizing behaviors (Loeber, Green & Lahey, 1990). Furthermore, McCann et al. (2014) found that teachers reported significantly more difficulty with behavior regulation than parent reports. Although Silberg et al. (2015) found that emotional-behavioral scores of children following severe TBI fell within the average
range when rated by both teachers and parents, significant differences were found between parents and teachers’ reports on attention and rule breaking behavior, with parents reporting more significant difficulty with attention problems, and teachers reporting more significant difficulty with rule breaking. In regards to executive functioning, the researchers also found that scores fell within the average range when measured on the *Behavior Rating Inventory of Executive Function* (BRIEF; Gioia et al., 2000); however, teachers tended to report greater difficulty on several domains. Over time, parents’ reports changed, whereas teacher reports did not, possibly suggesting that informants’ perspectives vary across time. Given these findings, teachers in this current study may report individuals with TBI as having more difficulty with social competence, since individuals with TBI are at-risk for behavioral dysregulation, which often corresponds with social difficulties.

**Self-Perceptions of Social Competence Among Individuals with TBI**

A common consequence following a traumatic brain injury, particularly a moderate to severe TBI, is impaired self-awareness (Prigatano, Borgaro, Baker, Wethe, 2005). Self-awareness, the ability to recognize difficulties caused by neurological damage, is typically assessed by comparing the discrepancies between the injured individuals’ self-report of functioning with the reports of collateral raters, such as caregivers or teachers (Hart et al., 2004). Large discrepancies among raters may suggest poorer student awareness.

Self-awareness is essential to post-injury recovery, as it motivates individuals to engage, learn and carry out treatment (Riggio & Wong, 2009). In adults, increased awareness is also associated with a higher quality of life and faster return to work (Kelley
et al., 2014), and may lead to fewer maladaptive behaviors and cause less caregiver
distress (Prigatano et al., 2005).

Generally, individuals with TBI have better self-awareness of physical
functioning than of cognitive and behavioral functioning (Richardson et al., 2015). There
is evidence to suggest that individuals with TBI are not accurate raters of their own
cognitive and behavioral functioning early after an injury (Richardson et al., 2015).
Several studies have found that injury severity and duration after injury are significant
predictors of awareness (Hart, Seingourel, & Sherer, 2009; Dirette, Plaiseier, & Jones,
2008; Morton & Barker, 2010); however, others studies have not (Ciurli et al., 2010;
Port, Willmott, & Charlton, 2002, Bivona et al., 2008, Richardson et al., 2015). Results
from several studies suggest that deficits in self-awareness persist at least five years after
a TBI occurred (Corrigan, Smith-Knapp & Granger, 1998; Kelley et al., 2014).

In regards to social-perceptions, individuals with TBI may show variations in
social self-awareness. Some studies have not found an overall significant difference in
self-ratings of social functioning (Kelley et al., 2014; Wolfe et al., 2015). However,
individuals with severe TBI rated themselves as experiencing less victimization than their
peers. Better executive functioning predicted smaller discrepancies in scores (Wolfe et
al., 2014).

The Present Study

Children and adolescents with TBI are at an increased risk for social dysfunction.
However, research is conflicting as to the severity, degree and area of social functioning
affected by TBI; social functioning remains poorly understood in youth who have
sustained a TBI and the long-term social impacts are even less understood. The majority
of prior studies examine social skills at one single administration of a behavioral measure instead of longitudinally. This methodology does not allow for examination of whether social skills ratings are consistent across time. In order to provide adequate, effective treatment, further research is needed to investigate the predictors and social outcomes in children and adolescents with TBI. Comparisons of teacher and parent ratings are also needed to determine if situational variables exist. For example, a caregiver may observe a child in a wider variety of settings, whereas a teacher only observes a student in the school setting. Comparisons of student ratings with parents and teacher ratings may also illuminate the level of self-awareness a student possesses.

The current study examined the differences in teacher and caregiver perceptions of social skills over time in youth who have sustained a TBI, as well as the injured students’ perceptions. Past research on social skills in youth with TBI primarily focused on caregiver ratings (Rosema et al., 2012). Several studies have examined both caregiver and teacher ratings and found that both raters perceived deficits in social functioning in youth with TBI (Ganesalingam et al., 2007a; Ganesalingam et al., 2007b); however, limited research has compared the discrepancies between caregiver and teacher ratings. Informant discrepancies in rating scales have practical implications for treatment and assessments of social-behavioral functioning (Gresham et al., 2010).

The present study also examined the perceptions of social acceptance in students who have sustained a TBI. Research suggests that individuals with TBI have poor self-awareness, which can lead to a reduced ability to understand another’s perspective (Bivona et al., 2014). Lastly, this study examined if self-perception of social acceptance is correlated with social functioning, as rated by caregivers and teachers.
CHAPTER III

METHOD

Research Questions and Hypotheses

The following research questions were examined in the present study:

**Research question 1.** What is the relationship between caregiver and teacher ratings of social skills in youth with TBI at baseline, 6 months post-injury, 12 months post-injury, 18 months post-injury, and 7 years post-injury?

**Hypothesis 1.** Prior research regarding parent and teacher ratings of individuals functioning following a TBI are inconclusive. Most studies rely on caregiver ratings alone, resulting in a lack of information on teachers’ ratings of social skills, which may differ from those reported by parents. In general, parents tend to report more positive social-emotional functioning than teachers. Past research has indicated that teachers are most reliable in reporting hyperactivity, whereas mothers are most reliable for oppositional and internalizing behaviors (Loeber, Green & Lahey, 1990). Furthermore, McCann et al. (2014) found that teachers reported significantly more difficulty with behavior regulation than parent reports. Similarly, Silberg et al. (2015) found discrepancies in parent and teacher ratings of individuals with severe TBI on several behavioral and executive functioning domains, with teachers reporting more difficulty with executive functioning and attention problems. Given that behavioral regulation and
executive functioning are linked to social functioning and based on these prior studies, it was hypothesized that discrepancies would exist between caregiver and teacher reports, with teachers’ ratings students with TBI as having more difficulty with social skills than parents in youth with TBI.

**Research question 2.** How do students who have sustained a TBI rate their social acceptance and self-worth seven years after the sustained injury?

**Hypothesis 2.** It was hypothesized that students who have sustained a TBI will not perceive themselves as different from peers. Furthermore, it was hypothesized that youth with TBI will rate their social acceptance and self-worth as similar to typical peers and will not report any social deficits. Research suggests individuals with TBI lack self-awareness (Tate et al., 2014). Finally, it was hypothesized that due to poor self-awareness, youth with TBI will not perceive significant levels of social incompetence.

**Research Question 3.** What is the relationship between students’ ratings of social competence and caregiver and teacher ratings of social skills in youth who have sustained a TBI when measured seven years post-injury?

**Hypothesis 3.** Prior research indicates that individuals with TBI are often not reliable self-reporters of their cognitive and behavioral functioning early after the injury (Richardson et al., 2015), which may be due to a lack of self-awareness. Due to these findings, it was hypothesized that a discrepancy would exist in student ratings of social acceptance and caregiver and teacher ratings of social functioning. Similar to findings by Wolfe et al. (2014), it was hypothesized that individuals with more severe TBIs would demonstrate a larger discrepancy in scores, suggesting poorer self-awareness.
**Research Design**

Data for the current study were collected as part of a larger prospective, longitudinal study that included children who sustained a TBI or Orthopedic Injury (OI) without head injury. The children in this study sustained an injury in early childhood and were followed into early adolescence. A prospective cohort study (TBI vs. OI) was used to compare teacher, caregiver and self-ratings of social skills and social competence in students who have sustained a TBI. This design was selected due to the inability to randomly assign participants to experimental groups. The explanatory variable was the evaluator’s relationship with the student (i.e., teacher, caregiver, self). The outcome variables were the scores obtained on the Preschool and Kindergarten Behavior Scale-Second Edition (PKSB-2, Merrell, 1994), Home & Community Social Behavior Scale (HCSBS; Merrell & Caldarella, 2008), School Social Behavior Scale, Second Edition (SBSS-2; Merrell, 1993) and Harter Self-Perception Profile for Children (Harter, 2012).

**Participants**

Participants were recruited based on consecutive admissions to three pediatric hospitals and one general hospital. A sample of \( n = 102 \) teachers, \( n = 207 \) caregivers and \( n = 221 \) students was utilized for this study. The data of 14 caregivers were eliminated from this study due to missing or incomplete data. Participants were preselected due to their inclusion in an existing data set provided by Cincinnati Children’s Hospital Medical Center (CCHMC) in Cincinnati, Ohio. Information obtained was void of any identifying information of parent and teacher ratings, as well as child participants’ information. Data were collected from three different hospital sites in Ohio.
The study was approved by the Institutional Review Board (IRB) of all participating hospitals and informed consent was obtained before participation.

Mothers of children comprised 93.7% of the caregivers, fathers 1.4%, grandmothers .9%, and a combination of caregivers (e.g. mother completed the rating form for the first five visits and the father completed the form on the last visit) across the duration of this study made up the remaining 1.5%. Teacher demographic information was not requested by Cincinnati Children’s Hospital during data collection, thus it is not available for the present study. Data collection occurred in two phrases; phrase one occurred shortly after injury at 6, 12 and 18 months post injury and the second when the child entered middle school or early adolescence approximately 7 years later. Over the course of data collection, each child was rated by at least two different teachers since the children moved from one grade to the next.

The child participants in the sample were initially recruited for the study when they were preschool aged and data was collected for over seven-years post-injury. The median age at injury was approximately five years old. Nearly 56% of child participants were males; 42.1% were females. The majority of the children were identified as Caucasian (71.0%); whereas 28.1% were identified as other nonwhites. Students in the sample included individuals with TBI (n=102) and Orthopedic Injury (OI) (n=119). Researchers often use individuals with OI as a comparison group for individuals with TBI because both groups have experienced trauma and hospitalization, and both have similar premorbid functioning and background demographics (Janusz et al., 2002; Yeates et al, 2013). A group of (n =119) individuals who sustained an orthopedic injury served as a comparison for the present study. Individuals who sustained in OI in this study had a
documented bone fracture in an area other than their heads, required an overnight hospital stay and did not experience any loss of consciousness. The student participants consisted of 10.4% with severe TBI, 29.0% with moderate/complicated mild TBI (presence of depressed skull factor or trauma-related intracranial abnormality; Williams, Levins, & Eisenberg, 1990), and 6.8% mild TBI. The remaining 53.8% comprised the OI group. Over time, students moved or opted out of the study, therefore the number of participants declined over the duration of the longitudinal study. The table outlines the number of student participants at each visit.

Table 1

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<th>Number of Participants at Each Visit</th>
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<tr>
<td>Baseline post injury</td>
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<td>Number of participants</td>
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**Measures**

The Preschool and Kindergarten Behavior Scales-Second Edition (PKBS-2, Merrell, 1994), Home & Community Social Behavior Scale (HCSBS; Merrell & Caldarella, 2008) and School Social Behavior Scales, Second Edition (SSBS-2; Merrell, 1993) were used to gather data from caregivers and teachers regarding social skills in students who sustained a TBI or OI. The Harter Self-Perception Profile for Children was
administered to youth who sustained a TBI or OI to assess perceptions of social acceptance and global self-worth.

**Preschool and Kindergarten Behavior Scales-Second Edition (PKBS-2; Merrell, 1994).** The PKSB-2 is 76-item behavior and social rating scale completed by the parents or school-based raters (anyone working with the child) of young children, ages three to six years old. The PKSB-2 usually takes raters approximately 8 to 12 minutes to complete. The PKSB-2 is divided into two scales the Social Skills (34 items) and Problem Behavior (42 items). The scales are further broken down into cluster areas including Social Cooperation, Social Interaction, Social Independence, Externalizing Problems and Internalizing Problems. Each item is based on a four-point scale (0=never, 1=rarely, 2=sometimes, 3=often). The subscale standard scores for the Social Skills Scale and Problem Behavior Scale are summed and converted to a composite standard score (mean=100, standard deviation=15). The Social Skills Scale describes positive social skills that are typical of well-adjusted, young children, meaning higher scores indicate social competence. Conversely, the Problem Behavior Scale includes items that describe problem behaviors commonly seen in children of this age.

The PKSB-2 has adequate psychometric properties. Internal consistency reliability coefficients ranged from .81 to .97. Test-retest reliability, with an administration interval of 3 weeks, ranged from .58 to .87 and an administration interval at three months, ranged from .66 to .78. Inter-rater reliability between teachers and teacher aides was found to be moderate for both Social Skills, ranging from .36 to .61 and Problem Behaviors, ranging from .42 to .63. Inter-rater reliability between home and preschool raters ranged from .20 to .57 for Social Skills and .13 to .42 for Problem
Behaviors. The PKBS-2 has demonstrated positive correlations with the following measures: Social Skills Rating System (Gresham & Elliott, 1990), Achenbach Teacher's Report Form (Achenbach, 1991), and the Adjustment Scales for Children and Adolescents (McDermott, Marston, & Stott, 1993).

**Home and Community Social Behavior Scale (HCSB; Merrell & Caldarella, 2008).** The Home & Community Social Behavior Scale (HCSB) is a 64-item behavior rating scale completed by parents or home-based caregivers of children and adolescents between the ages of five and eighteen (Merrell & Caldarella, 2008). The HCSBS provides ratings of social skills and antisocial behaviors and takes approximately 8 to 10 minutes to complete (Merrell & Caldarella, 2008). The HCSBS provides two total scores for Social Competence and Antisocial Behavior. HCSBS scores have a mean of 50 and a standard deviation of 10. The HCSBS uses the following classifications to determine “Social Functioning Level:” high functioning (>80th percentile for the Social Competence scale), average (20-80 percentile for the Social Competence scale and <80th percentile on Antisocial Behavior Scale), at-risk (5-20 percentile and 80th-95th percentile on Antisocial Behavior Scale), and high risk (<5th percentile on Social Competence and >95th percentile on Antisocial Behavior Scale; Merrell & Caldarella, 2008).

The HCSBS has adequate psychometric properties. Internal consistency reliability coefficients (alpha and split half) range from .91 to .97. Test-retest reliability, with an administration interval of 2 weeks, ranges from .82 to .84 on the Social Competences scale and subscales, and .89 to .91 on the Antisocial Behavior scale and subscales (Merrell & Caldarella, 2008). Inter-rater reliability, with most respondents being two parents, ranges from .85 to .86 on the Social Competences scale and subscales and .64 to
.71 on the Antisocial Behavior scale and subscales (Merrell & Caldarella, 2008). The HCSBS has demonstrated positive correlations with the following criterion measures: Social Skills Rating Scale (Gresham & Elliot, 1990), Conners Parent Scale-Revised (Conners, 1997), Child Behavior Checklist (Achenbach, 1991a), Behavioral Assessment System for Children (Reynolds & Kamphaus, 1992), ADHD Symptoms Rating Scale (Holland, Gimple & Merrell, 2001), and Psychopathy Screening Device (Frick, Bodin, & Barry, 2000).

**School Social Behavior Scale, Second Edition (SSBS-2; Merrell, 1993).** The School Social Behavior Scale, Second Edition (SSBS-2) is a companion scale to the HCSBS. The SSBS-2 is 64-item norm referenced, standardized rating scale designed to be completed by school personnel to rate the social competence and antisocial behaviors of youth ages 5-18 (Merrell, 1993). Similar to the HCSBS, the SSBS is composed of two scales: Social Competence and Antisocial Behavior. SSBS scores have a mean of 50, with a standard deviation of 10 and report a “Social Functioning Level,” analogous to the HCSBS.

Internal consistency reliability coefficients (alpha and split half) range from .91 to .98 (Merrell, 1993). Test-retest reliability, with an administration interval of 1 to 3 weeks, ranges from .86-.94 and .68-.82, respectively. Inter-rater reliability ranges from .55-.82. (Merrell, 1993). The SSBS-2 has demonstrated positive correlations with the Conners’ Teacher Rating Scale and Child Behavior Checklist (Conners, 1990), Waksman Social Skills Rating Scale (Waksman, 1985), Scale of Social Competence and School Adjustment-Adolescent Version (Walker & McConnell, 1995), Achenbach System of
Empirically Based Assessment: the Teacher’s Report (Achenbach, 1991b), and Preschool and Kindergarten Behavior Scale (Merrell, 1994).

For this study, the social competence composite from the PKBS-2, HCSB and SSBS were used. Since the PKBS-2 reports standard scores and the HCSB and SSBS report T-Scores, both data sets were transformed into z-scores to allow for comparison across measures.

**Harter Self-Perception Profile for Children (Harter, 2012).** The Harter Self-Perception Profile for Children is a self-report rating scale of social concept. There are five domains, including: Scholastic Competence, Social Competence, Athletic Competence, Physical Appearance and Behavioral Conduct (Harter, 2012). The earlier version of the Harter Self-Perception Profile for Children included a Social Acceptance domain, instead of the Social Competence domain. The Harter Self-Perception Profile for Children also offers a separate Global Self-Worth subscale (Harter, 2012). Unlike many other rating scales that use a five-point Likert-scale, the Harter Self-Perception Profile uses a “structured alternative format” (Harter, 2012, p.4) that was designed to counteract the tendency to provide socially desirable responses and to provide raters with a range of response choices. Data from this study utilized scores on the Social Acceptance and Global Self-Worth subscales.

Each of the six subscales on the Harter consists of six items, totaling 36 items. Items are scored on a scale from one through four, where one represents the least adequate self-judgment our represents and four represents the most adequate self-judgment (Harter, 2012). The rating scale can be administered to individuals in grades three through eight.
The Harter Self-Perception Profile has adequate psychometric properties. Internal consistency ranges from .71 to .91 (Harter, 2012). Test-retest reliability was not reported (Harter, 2012). The normative sample consisted of eight samples, four from 1985 and four updated samples from the late 1990s. The updated sample was comprised of 1096 individuals in third to eighth grade, approximately 58% of whom were male. All eight samples were drawn from Colorado. The findings were reported to be comparable to the author’s earlier samples in New York, California and Connecticut (Harter, 2012). These samples draw from lower middle to upper middle socioeconomic classes. Approximately 90% of the subjects were Caucasian (Harter, 2012).

**Procedures**

Families were recruited from admissions at four different hospitals in Ohio for children with traumatic brain injuries. Once a child was medically stable, caregivers were approached in the hospital and informed consent was obtained, if families decided to participate. Participants were provided various assessments at multiple points across initial visit up to 18 months post injury, including the social skills data utilized in this study. Parents were then invited to participate in the long-term follow up when the student entered fifth grade. Parents were contacted by phone, letter and e-mail. If contact information was outdated, family members or friends, who the family listed previously, were contacted to obtain new contact information. All data was collected by the participating hospital via interviews or mail correspondence. Interviewers were trained and supervised by principal investigators. Several rating scales were mailed to participants, particularly teachers, who were asked to mail back the completed forms.
Data from the study was obtained in collaboration with the original researchers from one of the participating hospitals.

Social skills data obtained on the Home & Community Behavior Scale, School Social Behavior Scale, Second Edition and Harter Self-Perception Profile were previously collected by researchers at the four participating hospitals. When pre-injury baseline data were collected at the time of injury, many children were not yet in a formal school setting. Therefore, daycare providers’ ratings were used in place of teacher ratings for these children. Follow-up ratings were obtained at 6 months, 12 months, 18 months and 7 years post-injury.
CHAPTER IV

RESULTS

Data were analyzed using multiple statistical analyses, including ANOVA, paired-sample t-test and Pearson correlations, to determine if: 1) group differences exist between teacher and caregiver ratings of social functioning in children who sustained a TBI, 2) if differences exist between self-reported ratings of social concept between individuals who sustained a TBI or Orthopedic Injury (OI) and 3) if correlations exist between teacher, caregiver and self-ratings. The number and composition of participants differed at each measurement point (baseline, 6 month, 12 month, 18 month or 7 years post-injury) due to a lack of consistency in responders across time. To adequately compare data across time, participants were eliminated from the data set if ratings scales were not completed at each time point. Additionally, teachers completing the teacher rating form changed as children advanced grades.

Research Question 1

The first research question examined differences between teacher and caregiver ratings of social functioning in individuals with TBI, and was analyzed using a 2x5x2 ANOVA. The ANOVA failed to detect a significant main effect difference between rater (caregiver and teacher), time of visit (baseline, 6 month, 12 month, 18 month or 7 years post-injury), and individual being rated (TBI and OI). However, the interaction between
rater and individual being rated (TBI vs. OI) was significant ($F(1, 1227) = 7.591, p < 0.05$), indicating a significant difference between caregiver ratings of individuals with TBI ($M = .299$), caregiver rating of individuals with OI ($M = .228$), teacher rating of individuals with TBI ($M = .247$) and teacher rating of individuals with OI ($M = .480$). The interaction effect indicates that individuals with OI had higher mean scores than individuals with TBI when rated by teachers, suggesting that individuals with OI were rated as having stronger social competence than individuals with TBI when rated by teachers.

The original objective was to conduct an additional analysis to evaluate the relationship between the severity of TBI and the ratings of caregiver and parents. However, the data were not mutually exclusive and thus could not be analyzed as originally planned.

The results of the 2x5x2 ANOVA does not support the hypothesis that caregiver and parent ratings of social functioning would differ. However, results do suggest a difference between teacher ratings of individuals with TBI and OI.

**Research Question 2**

An independent samples $t$-test was conducted to evaluate the hypothesis that individuals with TBI would rate their self-worth or social acceptance similarly to individuals who sustained an OI. The independent samples $t$-test failed to detect significant differences between outcomes on the Harter Global Worth for individuals with TBI ($M = 3.35, SD = 0.56$) and individuals with OI ($M = 3.42, SD = 0.52$). An additional independent-samples $t$-test failed to detect significant differences between
outcomes on the Harter Social Acceptance in the scores for individuals with TBI ($M=2.99$, $SD=0.74$) and scores for individuals with OI ($M=3.19$, $SD=0.67$).

An additional ANOVA was conducted to evaluate the relationship between severity of TBI and scores on the Harter Social Acceptance Scale at the seven-year follow-up visit. The one-way ANOVA yielded no significant differences between the severity and scores on the Social Acceptance Scale. Similarly, another one-way ANOVA analysis yielded no significant differences between the severity of TBI and the scores on the Harter Global Worth scale. The results of the one-way ANOVA support the hypothesis that individuals with TBI rate their social acceptance and self-worth similarly to individuals with OI, regardless of severity.

**Research Question 3**

Initially, the outcomes on the HCSBS Social Skills Composite, SSBS Social Skills Composite and Social-Acceptance Scale on the Harter Self-Perception Profile for Children were going to be used to analyze the relationship between student’s ratings of social acceptance and caregiver and teacher ratings of social skills in youth who have sustained a TBI when measured seven years post-injury. However, because the variables were not all measured in similar units, they could not be analyzed as planned. Instead, an overall scatter plot for all three variables was computed to assess the relationship among caregiver and teacher perceptions of social functioning along with self-ratings of social acceptance. Results indicate a weak, positive correlation between self-ratings and caregiver ratings, $r (123) = 0.27$, $p < 0.002$ and a weak, positive correlation between self and teacher ratings, $r (88) = 0.23$, $p < 0.039$. Results support the hypothesis that there is a
discrepancy between student ratings of social acceptance and caregiver and parent ratings of social functioning. However, caution should be given, as the relation is weak.
CHAPTER V
DISCUSSION

Review of Purpose and Major Findings

Social dysfunction can be one of the most debilitating problems for children and adolescents who have sustained a traumatic brain injury (TBI). Social effects of TBI, particularly over time, are infrequently researched and, therefore, not well understood by school personnel. This study aimed to examine teacher, caregiver and student perceptions of social functioning following a TBI by: 1) comparing teacher and caregiver ratings of social skills at baseline, 6 months post-injury, 12 months post-injury, 18 months post-injury, and 7 years post-injury, 2) examining self-ratings of social acceptance and self-worth 7 years post-injury in comparison to individuals who sustained an Orthopedic Injury (OI) and 3) comparing teacher and caregiver ratings of social functioning with self-ratings of social acceptance.

In regards to the first research question, analysis failed to detect a significant difference between caregiver and teacher ratings; however, a significant difference was detected between teacher ratings of individuals with OI and individuals with TBI. For the second research question, findings indicated that individuals with TBI did not rate their social acceptance or self-worth any differently when compared to individuals with
OI. Lastly, teachers’ and caregivers’ perceptions of social functioning were not significantly correlated with individual’s perceptions of social acceptance.

**Interpretation of Findings Relative to Hypotheses**

**Research Question 1.** Contrary to the findings that teacher and caregiver ratings of emotional and behavioral functioning differ across time following a TBI (Silberg et al., 2015), the current study did not find significant differences between teacher and caregiver perceptions of social functioning in youth with TBI across five measurement points (baseline, 6 month, 12 month, 18 month or 7 years post-injury). However, the results of this study are consistent with the findings of Armstrong-Betts (2012) and Chevignard et al. (2015), who found consistencies between teacher and caregiver perceptions of executive functioning in youth with TBI.

Because there were no clinically significant differences between caregiver and teacher ratings found in this study, this indicates that teacher and caregivers have similar perceptions of social functioning in youth following a TBI, suggesting that student behavior is stable across settings. Consistent ratings among raters may be viewed as encouraging, as caregivers and teachers work together to meet the individual needs of the student. When behavior is consistent across settings, less time can be devoted to identifying the areas of concern and more time to developing interventions. Furthermore, when perceptions are similar across raters, there may be less disagreement and conflict when determining appropriate interventions.

Findings also suggest that teachers rated individuals with TBI as having more difficulties with social functioning when compared to students with OI. Although prior studies yielded inconsistent results regarding differences in social functioning among
individuals with TBI and their peers, the current study adds to the research (Fletcher et al., 1990; Ganesaling et al., 2011; Levin, O’Connell & Grossman, 2009; Yeates et al., 2010) supporting these claims. Specifically, this study found that teachers rated individuals with TBI as having more social difficulties than peers, specifically that individuals with TBI struggle to relate to peers, demonstrate poor self-management skills/compliance, and exhibit more inappropriate behavior in the academic setting.

Because there was a difference between social functioning among individuals with TBI and OI, social intervention for students with TBI is warranted in the school setting. Social interventions following a TBI have not been widely researched, but, such is the case with any disability group, interventions should been based on individual needs of the students. Such interventions may focus on increasing social communication, social adjustment and social interactions with others.

**Research Question 2.** As predicted, students with TBI did not perceive deficits in their social acceptance or self-worth, which is consistent with the perceptions of the OI comparison group. In addition, no group differences were found based on severity of TBI, indicating that individuals with TBI, regardless of severity of injury sustained, did not perceive their social acceptance or self-worth differently than their OI counterparts. However, research suggests that individuals with TBI are not always reliable reporters of their own behaviors (Richardson et al., 2015); thus, self-reports are often compared to collateral reports to determine consistency.

Yeates et al. (2013) found comparable results to the present study, but used an alternative method of data collection. Instead of analyzing self-ratings, the researchers used peer ratings of their classmates with TBI. Yeates et al. (2013) concluded that peer
acceptance did not differ from the OI group or differ based on severity of the TBI. However, individuals with severe TBI were noted as having higher levels of peer rejection and victimization, as well as a lower likelihood of having mutual friends in the classroom (Yeates et al., 2013).

To determine if the current study’s participants were reliable self-raters, an additional analysis was conducted to compare self-ratings with caregiver and teacher ratings, as addressed in Hypothesis 3.

**Research Question 3.** Discrepancies were found between self and caregiver ratings and self and teacher ratings. Variations between raters have been found in adult individuals with TBI (Kelley et al, 2014); however, such discrepancies have not been found in children following a TBI (Wolfe et al., 2014), with the exception of individuals with severe TBI. The inconsistencies between raters may indicate a lack of self-awareness—a common issue following TBI.

Inadequate self-awareness of an individuals’ deficits may be a defense mechanism that protects his or her self-esteem from peer rejection and victimization or may be the result of frontal lobe damage. Regardless, these individuals may think more positively of themselves and their skills, which may inhibit their abilities to alter or compensate for their inappropriate behaviors in social situations. These individuals may perceive that they have friendships, but friendships are not reciprocated by their peers. Individuals with TBI have fewer mutual friendships and experience more peer rejection when compared to individuals with OI (Yeates et al., 2013). These characteristics, the combination of peer rejection and fewer mutual friendships, are associated with increased
long-term risk of poorer psychological adjustment, academic performance and health status (Cacioppo et al., 2002; Rubin et al., 2012; Yeates et al., 2013).

To help prevent these long-term risks, it is beneficial for school psychologists to evaluate student’s self-awareness following a TBI. To do so, school psychologists may compare self-ratings and teacher or caregiver ratings of social functioning. They could also use “best friend nominations” where students within the classroom discreetly report their best friends (Bukowski & Hoza, 1989; Yeates et al., 2013). Discrepancies among lists may indicate that mutual friendships do not exist. Students identified as demonstrating impairments in self-awareness, rejection by peers, and impaired social skills would benefit from intervention designed to enhance identification of their inappropriate social behaviors (Yeates et al, 2013), combined with learning and practicing appropriate replacement behaviors. Interventions addressing self-awareness in the TBI population has largely focused on adults, particularly in the occupational setting (Fleming & Ownsworth, 2006; Wolfe et al., 2014). However, it is important to provide early intervention to children to help prevent long-term risks.

Limitations

The data used in this study were part of a preexisting data set, therefore the research questions had to fit the confines of the existing data, which proved to be a significant limitation. Specifically, missing data or additional informational could not be collected. A detailed description of participant demographics, particularly the teacher respondents, was limited, which threatens the study’s external validity. It was not possible to examine the potential sources that might explain differences between raters, such as emotional stress, gender, age, and experience working in a school or with
individuals with TBI. Additionally, instruments that did not have the same units of measure were used in this study and thus, could not be properly analyzed. Lastly, the Harter Self-Perception Profile for Children is recommended to be used for individuals up to the eighth grade, however two participants in the study were older than the suggested range at the time of the 7-year follow-up. Since their age is outside the normed population for the measure, their responses may lack validity.

Because participants were recruited based on admission to the hospital following a TBI or OI, random selection of participants was not an option, limiting the ability to generalize these findings to the larger TBI population. A larger sample size would provide increased generalizability to the larger TBI population. In regards to threats to internal validity, experimental treatment diffusion may have occurred, as caregivers and parents may have met over the course of the study to discuss the student’s behavior and how to support him or her in the academic setting. Despite these limitations, the findings of this current study add to the knowledge regarding the impact of TBI on social functioning in youth who sustained head injuries.

**Future Research**

Limitations of this study help provide direction for future research. This study emphasizes the importance of continuing to use a multi-rater approach to obtain a holistic view of a student who sustained a TBI including using a self-report for older students. Although there were not significant differences between caregiver and teacher ratings, there were discrepancies found between caregiver and student and teacher and student ratings, suggesting limitations in self-awareness. In future research, it is recommended that a similar study be conducted utilizing a commonly used ratings scale that has a
parent, teacher and self-version in order to compare outcomes more easily, such as Social Skills Improvement System (SSiS) Rating Scales (Gresham & Elliot, 2008) or the social composites on the BASC-3 (Reynolds & Kamphaus, 2015). Having teachers, parents and students complete multiple ratings scales may also provide a more comprehensive “picture” of the student instead of relying on one measure to depict student characteristics.

This study examined social functioning up to seven years post injury. At the last measurement point, many of the participants were entering middle school. During this period, demands on a student’s independence in both the executive functioning and social functioning realms increases, potentially leading to more challenging situations. As the student enters high schools, environmental demands continue to increase. Therefore, it is recommended that future longitudinal studies be conducted to see if social functioning changes over time, especially as social demands increase. The current study points to a need for future intervention research that looks at improvements in self-awareness as a potential means of bolstering social competence among youth with TBI.

**Conclusion**

Social impairments have been inconsistently found among individuals following a TBI in previous studies, where some study have found significant differences in functioning when compared to peers, other studies have not. However, when social impairments do exist, they are reported to be one of the most debilitating consequences of a TBI. Parent, teacher and self-ratings are often used to measure social functioning in the home and school setting. Results of this study found that caregivers and teachers rate social functioning similarly. Teachers tended to rate individuals with TBI lower than
their peer comparisons. In addition, individuals with TBI did not rate their social acceptance any differently than their peers, indicating that they perceive they are accepted by their peers. Discrepancies exist between self and caregiver as well as self and teacher reports, which may suggest that individuals with TBI have a lack of social awareness. Future research is needed to examine if such deficits exist and effective interventions that can be implemented.
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