TRAUMATIC BRAIN INJURY: THE EFFICACY OF A HALF-DAY TRAINING FOR
SCHOOL PSYCHOLOGISTS

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TRAUMATIC BRAIN INJURY: THE EFFICACY OF A HALF-DAY TRAINING FOR
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ABSTRACT

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The incidence rates of traumatic brain injury (TBI) are increasing, yet educators continue to be inadequately trained in assessing and serving students who have sustained a TBI. This study examines the efficacy of a half-day TBI training program for Ohio school psychologists designed to improve their knowledge and skills. Results indicated there was little increase in level of knowledge and skills from the pre-workshop to follow-up surveys. School psychologists exhibited an increase over time in confidence related to their decision making abilities in working with students with TBI. Given the results of this study, a need for increased training for school psychologists is needed in the area of TBI.

DEDICATION

This thesis is dedicated to my Mom, Dad, Amy, and Amanda, for their unending support and love. I am blessed to have you in my life.

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CHAPTER I

Introduction

Recent research supports the notion that students with traumatic brain injury (TBI) require specialized services (Deidrick & Farmer, 2005); yet recent statistics of incidence rates indicate few are receiving services under the TBI label (IDEA, 2007). Cognitive, behavioral, and academic deficits can all result from a TBI, and may require specialized assessment, instruction, modifications, and interventions in the educational environment (Deidrick & Farmer, 2005).

The unique needs of a student with TBI may pose challenges for educators when the student reenters the education system following the trauma. By evaluating the current methods and training of school psychologists in relation to TBI, the different areas for improvements can be determined. Evaluations completed at a workshop can help to determine the level of knowledge school psychologists have prior to the training and can be used to measure the differences school psychologists make after attendance at a workshop.

The purpose of this literature review is to address school psychologist knowledge and training of TBI, and efficacy of professional development programs. This literature review will give a summary of TBI, complications, and effects TBI can have on children in schools. It will summarize the knowledge, skills, and training of Ohio school psychologists in the area of TBI, and give an overview of professional development.

CHAPTER II

Literature Review

Traumatic Brain Injury

TBI is an acquired injury to the brain that is a result of an external force that causes disability and/or impairment (U.S. Department of Education, 2004). With the addition of TBI to the Individuals with Disability Act list of disability categories, it became an area of greater focus within schools (IDEA, 2004). With an emphasis being placed on TBI, it is necessary to determine the amount of knowledge school psychologists have in this area and how to expand that knowledge, if necessary.

Prevalence. Educators tend to believe TBI is a low incidence disability, when in actuality it is a major health concern (Langlois, Rutland-Brown, & Thomas, 2004). There are 1,116 students currently being served under the IDEA disability category of TBI in the state of Ohio, and 23,805 students are being served nationwide (IDEA, 2007). However, research indicates more than 130,000 students nationwide have obtained a TBI that would be considerable enough to qualify for special education services (Glang, Tyler, Pearson, Todis, & Morvant, 2004). The incidence rate of TBI is much higher than most believe, as it is the primary cause of injury, death, and long-term disability in children and adolescents (NIH, 2002; Yeates, 2000). Research has indicated that the incidence rate of TBI has continued in the years following the NIH study done in 2000 (Center for Disease Control, 2000; Hooper, 2006).

School-aged children are at the highest risk to incur a TBI (Arroyos-Jurado & Savage, 2008). If a school district has 10,000 students, the district can expect 20 or more students to acquire a TBI and need educational supports and services (Arroyos-Jurado & Savage, 2008). According to Yeates (2000), male students are more likely to obtain a TBI than female students, and the risk of TBI goes up with age. Risk for TBI begins to rise after age 5 and reaches its peak by age 18 (Yeates, 2000).

Causes. There are two main causes of TBI in children: transportation accidents and falls (Yeates, 2000). According to Yeates (2000), transportation accidents resulting in a TBI mainly take place in a motor vehicle or on a bicycle. Children from birth to age 5 are likely to have a TBI caused by a fall, older children are likely to have a TBI caused by a bicycle injury or sport injury, and adolescents are more likely to acquire a TBI through a sports injury or accident (e.g. motor vehicle or bicycle).

Impact of Traumatic Brain Injury

Due to the fact that TBI is a disability with varied outcomes, it is important for educators to be aware of the possible impairments students with TBI may exhibit so the children can receive the most appropriate special education services (Arroyos-Jurado & Savage, 2008).

Identification and impact of traumatic brain injury. It is essential for school psychologists to have knowledge regarding TBI and the impact that a TBI can have on children in schools. The knowledge school psychologists should have in order to be effective includes, pre-injury function, post-injury function, and the different factors that can be linked to both the recovery and outcomes of TBI (Arroyos-Jurado, Paulsen, Ehly, & Max, 2006). There can be several different effects from a TBI. Many of these

problems may not manifest themselves until months or even years after the injury has occurred (Glang, et al., 2004). Due to the possible delay in observable limitations following TBI, it is essential for school psychologists to have a strong knowledge base in TBI and the different problems that can result from TBI.

Cognitive impact. Many cognitive deficits can result from a TBI. General concerns with intellectual functioning can result in attention or memory difficulty and executive functioning issues (Glang, et al., 2004). Other cognitive impairments include processing speed and problems with aspects of pragmatic language (Mayfield & Homack, 2005; Yeates, 2000). Intellectual functioning, including motor control and speeded responses can be impaired by TBI. These complications can result in difficulties with tasks requiring these skills on intelligence tests (Yeates, 2000).

A TBI in a child will commonly result in impairments in executive functioning (Yeates, 2000). Executive functioning processes include: organization, working memory, planning, self-regulation, monitoring, and launching tasks (Conklin, Salorio, & Slomine, 2008; Deidrick & Farmer, 2005; Horton, Soper, & Reynolds, 2010). Impairments to executive functioning can result in complexities for schools. Children with these impairments may be able to function more easily in a structured one-on-one environment if they have sufficient fundamental skills. However, in a classroom that is more complex with less structure, students may have difficulties directing their behavior accurately to use the skills they have (Vriezen & Pigott, 2002).

Language can also be impaired following a TBI. A deficit in pragmatic language can have a detrimental effect on the skills a child can demonstrate (Yeates, 2000). Difficulties with deciphering ambiguous sentences, formulating sentences, making

inferences, and understanding figurative expressions may all be impaired. Discourse, which involves the capability to communicate ideas through sentences to convey a message, is negatively impacted (Yeates, 2000). Students' ability to use expressive language and vocabulary is also negatively affected by TBI. Expressive language requires individuals to express themselves with spoken language, may be hindered by inappropriate pragmatics and word retrieval skills (Mayfield & Homack, 2005)

Behavioral impact. Many behavioral problems can occur due to a TBI. As students move back into their previously typical routine, many difficult behaviors may emerge (Mayfield & Homack, 2005). Behavior problems in younger children can include lack of concentration, restlessness, and impulsivity (Mayfield & Homack, 2005). Mayfield and Homack (2005), indicate adolescents may experience different behavioral symptoms as a result of TBI including, badly chosen comments, agitation, edginess, and irritability. TBI can generate several insufficiencies in the area of behavior (Yeates, 2000). Some of these deficits include problems with attention and memory, issues with alertness, and a deficit in the area of nonverbal skills. There may also emotional issues as a result of TBI (Feeny, 2010; Stavinoha, 2005). Students with TBI may have a problem with mood regulation, outbursts of temper, and a lack of frustration tolerance (Stavinoha, 2005). The impact of these behavioral issues can cause concern within academic and social realms for students with TBI (Yeates, 2000). For example, a student with TBI may make insulting comments to people or run from a person they would prefer to avoid (Mayfield & Homack, 2005).

Academic impact. The behavioral and cognitive deficits, such as, poor impulse control, lack of organization, slow mental processing speed, and inattention caused by

TBI has a tendency to adversely impact academic performance. If a student with TBI presents a decline in academic functioning, it is likely due to neuropsychological discrepancies and behavioral changes, rather than problems with academic skills (Yeates, 2000). Some of the academic deficits that appear after a TBI are processing speed, and issues with language skills, and attention or memory issues (Stavioha, 2005; Yeates, 2000).

Arroyos-Jurado & Savage (2008) suggest that due to the nature of TBI, interventions for students require collaboration between members of the child's special education team. TBI is multifaceted therefore treatments and interventions should meet the needs of the individual student and must be well coordinated throughout the team. Interventions for students with TBI require different qualities, such as flexibility, direct instruction, self-management, and variability (Arroyos-Jurado & Savage, 2008).

Education of Students with Traumatic Brain Injury

A student with an acquired TBI creates a challenge for schools and requires unique services, assessments, behavioral plans, and continuous examination of services and progress made by the student (Bullock, Gable, & Mohr, 2005; Deidrick & Farmer, 2005; Stavinoha, 2005). Over 130,000 children acquire a TBI each year and at least 30,000 of those students are severe enough to warrant special education services (Glang, et al., 2004). Therefore, educators must be prepared to provide these services for students (Arroyos-Jurado & Savage, 2008).

School reentry. The school reentry plan is essential and can impact the student's adjustment back into the school environment (Gfroerer, Wade, & Wu, 2008). According to Deidrick & Farmer (2005) the process for reentry into school is a four step process:

hospitalization or inpatient rehabilitation, the formation of a team at the school for reentry, the discharge from the hospital or rehabilitation, and progress-monitoring for the purpose of the adjustment of the child's services. The formation of a team and knowledge of everyone's role on the team are crucial to the reentry process (Clark & Hostetter, 1995; Deidrick & Farmer, 2005).

After the child has returned to school many factors must be taken into account to ensure a proper transition for the student. The educational environment must be adapted to the cognitive and physical needs of the student (Gfroerer, et al., 2008). The types of supports needed for the student must be established. Some students returning to the school following a TBI require modifications to the curriculum or an aide to provide one-on-one instruction (Deidrick & Farmer, 2005). Social skills deficits are common following a TBI and social skills interventions and training may also be beneficial (Deidrick & Farmer, 2005).

Assessment. Assessment is an integral part of the reintegration process for the student and school. Many aspects must be taken into consideration in regards to the assessment of a student with TBI. It is essential that assessment is modified for each individual child (Deidrick & Farmer, 2005). Assessment should also be conducted frequently at first and readdressed in the years following the injury in order to accommodate any additional issues or make changes to the plan in place (Deidrick & Farmer, 2005; Stavinoha, 2005). The amount of time since the TBI was acquired is also important (Stavinoha, 2005). Younger students may appear to not suffer negative outcomes, but as demands increase in school, more complications from the TBI may emerge (Stavinoha, 2005). An assessment for a TBI may need to take into account more

information than a traditional assessment (e.g., norm-referenced standardized assessments), such as student's performance prior to TBI, parent reports, and observations (Stavinoha, 2005).

Interventions. Students with TBI have unique needs; thus, interventions are an important aspect of their recovery (Arroyos-Jurado & Savage, 2008; Sullivan & Ricco, 2010). Some of the academic intervention techniques recommended by Clark, Russman, and Orme (1999) include: using direct instruction, teaching students with TBI to use self-management, and using a task analysis to ensure all skills required are within the ability of the student. Other recommendations were to break larger assignments down, extend assignment deadlines, and modify the students' workload.

Behavioral interventions for students with TBI can be crucial for student success. Clark (2002) recommended incorporating positive reinforcement to replace behavior problems with appropriate behaviors. It was also recommended these interventions begin soon after reentry and positive reinforcement should be used across all settings (Mayfield & Homack, 2005).

Evidence-based interventions for students with TBI are limited, and interventions are often based on those designed for individuals with similar symptom patterns (McGrath, 2010). Due to symptom similarities between TBI and ADHD, in particular with executive functioning deficits, interventions that are used for students with ADHD are often used for students with TBI as well. Students with TBI are often distractible and may benefit from accommodations that students with ADHD receive, such as preferential seating, small group or individual setting to take examinations, and a note take or scribe (McGrath, 2010). Students with TBI have difficulties with language that could be

addressed with strategies used with students for language or speech functioning deficits (Laatsch, et al., 2007; Lewandowski & Rieger, 2009). Memory is also typically an area of difficulty for students that sustain a TBI, so interventions can be used, such as, shortening of directions, and breaking larger tasks down into smaller chunks (Lewandowski & Rieger, 2009).

School Psychologists and Traumatic Brain Injury

There are clear educational needs for individuals with TBI. Due to these increased educational needs of students, educators and support staff have a responsibility to gain awareness and knowledge in the area of TBI (Hux, Walker, & Sanger, 1996). School psychologists play an important role in several aspects, such as, assessment, treatment, and progress-monitoring (Hooper, 2006).

Training of school psychologists. Many graduate training programs for school psychologists require course work in a variety of areas related to issues school psychologists will encounter, but there is often a shortage of course work relating to TBI. There is generally a course required in the area of biological bases of behavior; however, these courses typically do not have a focus on TBI, but rather just give an overview of the disability (Hooper, 2006).

A survey of 86 school psychology programs in the U.S. revealed these programs do not appear to be training students to work with children who have acquired brain injuries (Walker, Boling, & Cobb, 1999). In addition, of the 86 programs surveyed, only 19 of them offered a course in neuropsychology. Hooper (2006) found that if school psychology graduate programs did have a course involving neuropsychology it was generally in a school that offered a doctoral degree in school psychology. Typically, if

school psychologists have any training in the area of TBI, it is generally not from their graduate program, but rather from additional trainings, workshops, or another area of related studies (Hooper, 2006).

Additional training in graduate programs in the area of neuropsychology and TBI can have positive effects. The increase in knowledge regarding the brain can help increase the understanding of other disabilities such as, autism, attention-deficit/hyperactivity disorder, and specific learning disability (Decker, 2008). Training in neuropsychology can benefit a school psychologist by providing the necessary tools to adequately understand the disability and provide the necessary special education services to the child (Deidrick & Farmer, 2005).

Knowledge of school psychologists. In a survey conducted by Hooper (2006) school psychologists were found to lack the knowledge required to discriminate between the typical myths and misconceptions about individuals with TBI. Over 83% of the respondents indicated they did not believe the training they received was adequate enough to work with the TBI population. Even the subgroup that felt they *had* sufficient knowledge and training to work with the TBI population tended to support the myths and misconceptions as frequently as the group that felt they did not have sufficient knowledge to work with students with TBI. These results indicate that it is likely that school psychologists do not have adequate knowledge to work effectively with TBI student populations.

Professional Development

Importance of professional development programs. As Hooper (2006) has indicated, there is a need for additional training for educators--school psychologists in

particular--in the area of TBI. Professional development can be any type of activity that increases knowledge, attitudes, and the skill set of educators. In turn, the level of learning students receive is improved (Guskey, 2000). It is essential for all individuals, especially those in education, to update skills and knowledge related to their career (Somers & Sikorova, 2002). A professional development program can help increase an individual's skill base which can lead to change in practice (Steinert, Meterissian, Liben, & McLeod, 2008; Steyn, 2006).

Characteristics of quality professional development programs. According to Steyn (2006), a quality professional development program requires several essential elements to be effective. The leader or leaders of the professional development program are critical for professional development program success. Leaders need to have a knowledgeable background in the professional development area, be inspirational, encourage and display teamwork, and provide individualized support. The leaders are responsible for assisting individuals in learning new skills and making changes to the way they practice. The professional development program must also provide a model appropriate for the participants to use and give examples for the participants to learn from. Finally, the individuals must be taught how to put the knowledge they obtained during the professional development program into practice.

Specifically for education, a quality professional development program should also include direct skill training along with modeling, practice, and feedback. To implement a proper professional development program for TBI, it should include training in the area of evidence-based interventions; assisted practice with newly obtained skills; ongoing feedback through mentoring, and consultation in the school environment (Glang,

Todis, Sublette, Brown, & Vaccaro, 2010). Professional development programs provide an opportunity for effective supports and instruction to be implemented by trained educators.

TBI in the schools workshop. The half-day TBI in the Schools Workshop was implemented at the Ohio School Psychologists Association (OSPA) conference in November 2009. The workshop was created due to the need for greater statewide training for school psychologists in the area of TBI. A proposal was sent to OSPA conference committee stating the need for training from Susan Davies, school psychology professor at University of Dayton. The proposal was presented to OSPA committee and was approved. The workshop was then developed in coordination with Sara Timms, from Columbus City Schools.

The workshop was designed to give participants information about TBI and describe a TBI initiative currently in place in Columbus City Schools, in Columbus, Ohio. The first half of the workshop described TBI and the current status of TBI in Ohio schools. The second half of the presentation was the explanation of a current program that is in place in Columbus City Schools. This program was developed by Ohio Legal Rights Services in 2006 and piloted in Columbus City Schools. It is directed at increasing awareness of TBI, better identification of students with TBI, and improving the education for students with TBI. For an outline of the workshop see Appendix B.

Summary

This study assessed the efficacy of a half-day TBI workshop for school psychologists. Participants' level of knowledge prior to the workshop and after the workshop was evaluated. The value of such a workshop is predicated on the belief that

many school psychologists are not receiving adequate training and are underprepared to work with these students.

CHAPTER III

Methods

Research Question

The focus of this research was to determine the effectiveness of a half day Traumatic Brain Injury (TBI) workshop on the skills and knowledge of school psychologists. It was expected that upon completion of the workshop, participants would have a better knowledge and skill base, which would assist with leading to more effective practice in the education and assessment for students with TBI. It was also expected that the school psychologists would feel more confident in their ability to work successfully with students who sustained a TBI. This workshop would be considered ineffective if after this workshop, participants had no change or a negative change in their knowledge and skill related to pediatric TBI than they had prior to the workshop.

Research Design

This research involved a survey designed to evaluate the impact of the TBI workshop was on the skills and knowledge, of the school psychologists who attended the workshop. The survey involved rating scale and open-ended questions. It was administered prior to the workshop, two months following the workshop, and one year following the workshop.

Participants

The participants for this study were the 82 individuals who attended the TBI in the Schools workshop at the OSPA Fall 2009 conference. Participants selected for the

two-month and one year follow-up studies were those who attended the presentation, filled out the original survey, and provided contact information for the follow-up.

The demographic information collected on the surveys included: the participants' status in the school psychology profession, the highest level of degree attained, when the degree was attained, current work setting, and the age of the students that the participant serves. Additional parts of the survey examined the participants' level of training and experience, their current level of knowledge, and their skill base regarding TBI.

The participants were selected by convenience sampling based on the data collected prior to the workshop, participation in the workshop, and at the two month follow-up. Those who provided contact information and responded to the two month follow-up study were included in the one year follow-up study.

Participants and Demographic Information

Status. Of the 82 participants included in the study at pre-workshop, 9% were graduate students, 18% were interns, and 73% were school psychologists. At the two month follow-up 15% were graduate students, 15% were interns, and 70% were school psychologists. At the one year follow-up, 5% were graduate students and 95% were school psychologists.

Degree earned. Of the 82 participants who participated in the pre-workshop survey, 51% had earned a Masters degree, 41% had earned an Educational Specialist degree, and 8% had earned a Doctorate. At the two month follow-up, 35% had earned a Masters degree, 55% had earned an Educational Specialist Degree, and 10% had earned a

Doctorate degree. At the one year follow-up, 33% had earned a Masters degree, 56% had earned an Educational Specialist degree, and 11% had earned a Doctorate degree.

Work setting. At the pre-workshop, 94% of the participants indicated that their current work setting was in public schools. The other 6% of the participants at the pre-workshop, indicated “other” as their current work setting, but did not further clarify their work setting. At the two month follow-up, 100% of the participants reported that their current work setting was in public schools. At the one year follow-up, 100% of the participants’ current work setting was in public schools. The ages of students that participants’ worked with ranged from preschool through high school (see Table 1).

Table 1
Distribution of School Setting

School Setting:	Percentage at Pre-Workshop	Percentage at 2 Month Follow-	Percentage at 1 Year Follow-Up
Preschool:	7%	0%	0%
Elementary:	17%	20%	28%
High School:	6%	10%	0%
Elementary and Middle School:	13%	15%	28%
Preschool, Elementary, and High School:	4%	10%	11%
Preschool, Elementary, Middle, and High School:	23%	15%	11%
Elementary, Middle, and High School:	16%	20%	11%
Middle and High School:	1%	5%	0%
Preschool, Elementary, and Middle School:	4%	5%	6%

Preschool and Elementary:	4%	0%	6%
Preschool and Middle School:	1%	0%	0%

Consent. The consent of the participants was their completion and return of the survey to the researcher. Prior to completing the workshop survey and two month follow-up survey, participants were told this research was part of a longitudinal study for a graduate student's thesis and that a two month and one year follow-up study would be given to those who provided their email address. Participants were also told that participation in the follow-up surveys was voluntary.

Confidentiality. Responses were recorded so the identity of the participants was only known by the researcher. Email addresses and surveys at the workshop were collected separately. The surveys were accessed only by the researcher and secured in a locked file box. All raw data that was collected was shredded and disposed of at the conclusion of the study. Data collected through the online survey tool was accessed only by the researcher and disposed of upon completion of the study.

Materials

Instrument. Hux, Walker, and Sanger (1996) developed a questionnaire designed to determine Speech and Language Pathologist's knowledge of TBI. A modified version of this questionnaire was used as the instrument in this study. Changes were made to the questionnaire to better relate to the school psychology profession. Certain questions were slightly altered or eliminated accordingly. The reliability and validity of this instrument is unknown. The instrument was pilot tested at University of Dayton during the fall of 2009 and changes were made from the suggestions of two

professors of school psychology and three practicing school psychologists. The results of pilot assisted with improving the clarity of the questions.

A content analysis was conducted on the survey's open-ended narrative question that asked participants to describe their concerns regarding providing services to students with TBIs.

Data Collection

The baseline data were collected by the researcher at the workshop "TBI in the Schools" in November 2009, prior to the workshop. The two month and one year follow-up studies were conducted through an online survey tool using the contact information provided by workshop participants to determine changes made in the practice for students with TBI by the school psychologists who attended the workshop. The first round of data was collected prior to the beginning of the workshop with a paper survey offered to everyone who attended the workshop.

CHAPTER IV

Results

This study was designed to determine the level of change, if any, in knowledge and skills of school psychologists from pre-training to one year post-training. Data were collected for the two month follow-up in January 2010 and for the one year follow-up in November 2010. The response rate for the follow-up studies was calculated from the original number of participants who completed the pre-workshop survey, 19 participants who completed the 2 month follow-up survey, and 18 who completed the 1 year follow-up survey. A 23% response rate was calculated for the two month follow-up, and a 22% response rate was calculated for the one year follow-up.

Data Analysis

Demographic data were collected through free response questions and a variety of multiple choice questions. Descriptive statistics were used to analyze the demographic data. The demographic data were primarily nominal (see Table 1, Table 2, and Table 3).

The questions used to determine participants knowledge and skills related to TBI were in a 5-point Likert Scale format (Strongly Agree to Strongly Disagree). The ordinal/interval data that were obtained from the responses was converted into scaled data. Scores were converted by giving correct answers (answering either Strongly Agree or Strongly Disagree correctly) 2 points. Partially correct answers (answering Somewhat Agree or Somewhat Disagree) were given 1 point. Incorrect answers (included all incorrect responses for the question and responses of Uncertain) were given 0 points. For

example, when looking at the question: *Most public schools have at least one student who has sustained a TBI*, the answer is true, or Strongly Agree. The answer of Strongly Agree would earn the participant 2 points, Somewhat Agree would earn 1 point, and Uncertain, Somewhat Disagree, or Strongly Disagree would earn 0 points.

An independent samples *t* test was used to analyze the knowledge and skill based questions. The p-value was set at .05 to determine significance.

Data were collected on how comfortable and qualified the participants felt in regards to specific skills in relation to TBI using a 5-point Likert Scale (Not at all Qualified to Highly Qualified). Descriptive statistics were used to analyze the Likert Scale questions.

Open-ended questions gave participants the opportunity to express concerns they have related to working with this population, and what they would like more information about. A content analysis was conducted on the open-ended questions to describe the comfort, qualification, and concerns of school psychologists. The open-ended responses were addressed by the researcher by looking at the specific patterns that developed from the participants at each time period based off of all comments that were received. The researcher established categories for the concerns noted by participants based off of the patterns. The specific categories that were developed based off of the concerns were: TBI is a low incidence disability, coordination with outside agencies, resources and funding, academic programming, lack of training and professional development, determination of whether or not an injury had occurred, what is needed for qualification purposes, and how to locate resources.

Training of participants. Training in TBI was determined by self-report from the survey at the pre-workshop. Each of the participants reported whether or not they had received TBI training, and if so, what type of training they had received. Type of training may have been a training session, workshop, or coursework during graduate program. Of the participants, 46% had not received any type of training prior to the workshop, and 54% had received some type of training (see Table 2).

Table 2

Distribution of TBI Training Prior at Pre-workshop

Type of Training:	Percentage:
No Training	47%
Coursework only	35%
Coursework and Training Session/Workshop	12%
Training Session or Workshop only	6%

Some of the participants had indicated that they had attended a training session or workshop on the topic of TBI prior to the TBI in the Schools workshop. For those participants training that was previously done included, workshops done by personnel from Children's Hospital, School Neuropsychology year long training program, Neuropsychology certification, and National Association of School Psychologists (NASP) convention workshop.

Number of years since degree and identification. The relationship between the number of years since participants had obtained their last degree, and the number of students with a TBI that they had identified or worked with was examined. Participants

varied regarding the average number of students with TBI participants had worked with when compared the number of years since they had obtained their last degree (see Table 3).

Table 3

Number of Years Since Previous Degree and Students Identified with TBI at Pre-workshop

Number of years since last degree:	Average number of students identified:
0-8 years since last degree obtained:	1.1
9-18 years last degree obtained:	2.9
19-28 years last degree obtained:	2.8
29-38	2.3

At the follow-up studies, participants were given the opportunity to state the number of students they had identified with a TBI in the past year. At the two month follow-up, 8 of the 19 participants reported they had identified at least one student with a TBI in the past year, and on average, 1.4 students with TBI. At the one year follow-up, 4 of the 18 participants reported they had identified at least one student with a TBI in the past year, and on average, 1.3 students with TBI. At the pre-workshop participants had identified or worked with approximately 2.3 students with a TBI, on average.

At the follow-up studies, participants were given the opportunity to state the number of students they had identified with a TBI in the past year. At the two month follow-up, 8 of the 19 participants reported they had identified at least one student with a TBI in the past year. At the one year follow-up, 4 of the 18 participants reported they had identified at least one student with a TBI in the past year.

Knowledge and Skills

It was hypothesized that upon completion of the workshop, participants' would have an increase in knowledge and skills. Overall, there was an increase in knowledge and skills from pre-test to two month follow-up; however that knowledge was not maintained at the one year follow-up. An independent-samples t test was conducted, with the time of the workshop taking place as the independent variable (pre-workshop, two month follow-up, one year follow-up) and knowledge of a specific TBI skill or practice as the dependent variable. An independent samples t test was used as opposed to a paired samples t test due to an inconsistent sample size.

When examining the pre-workshop knowledge and skills with the two month follow-up knowledge and skills, the test yielded significant results, $t(378.53)=-4.70$, $p=.00$. Participants' reported significantly more knowledge and skills according to the survey at two months post-workshop ($M=1.78$, $SD=.56$) when compared with pre-workshop ($M=1.56$, $SD=.70$).

When examining the pre-workshop knowledge and skills with the one year follow-up knowledge and skills, the test did not yield significant results, $t(284.72)=-1.56$, $p=.12$. Participants' did not report significantly more knowledge and skills according to the survey at one year post-workshop ($M=1.65$, $SD=.72$) when compared with pre-workshop ($M=1.56$, $SD=.70$).

Participants' from the workshop demonstrated strength in several areas at the two month follow-up as measured by the percentage of correct answers (see Table 4). A greater percentage of participants with training knew that a multifactorial evaluation should not be delayed for a student who has sustained a moderate to severe TBI; students

with TBI have difficulty forming and maintaining relationships; behavior problems are common among students with TBI; goals for students with a TBI need to be altered frequently; less structured measures are more beneficial than standardized tests when assessing deficits secondary to TBI.

Participants' from the workshop demonstrated strength in several areas at the one year follow-up as measured by the percentage of correct answers (see Table 4). A greater percentage of participants with training knew that a multifactored evaluation should not be delayed for a student who has sustained a moderate to severe TBI; there are many similarities between students with ADHD and students with TBI; students with TBI have difficulty forming and maintaining relationships; goals for students with TBI need to be altered more frequently; less structured measures are more beneficial than standardized tests when assessing deficits secondary to TBI.

Table 4

Percentage of Participants Answering Knowledge Questions Correctly

Question:	Pre-Workshop N=82	2 Month Follow- Up N=19	1 Year Follow-Up N=18
Neuropsychological evaluation must be conducted prior to planning an educational program for a student with TBI. (F)	74%	79%	83%
A multifactored evaluation should be delayed for a student who has sustained a mod. to severe TBI until brain has had time to recover. (F)	39%	79%*	78%*
Most public schools have at least one student who has sustained a TBI. (T)	94%	95%	94%
Many students with TBI display characteristics similar to those with ADHD. (T)	85%	95%	100%*

Student with TBI often have difficulty forming and maintaining relationships. (T)	60%	89%*	73%*
Students who have sustained mild TBIs rarely display behavior problems. (F)	74%	95%*	72%
TBI is equally common in males and females. (F)	35%	53%	50%
Recovery following TBI may continue for several years. (T)	96%	100%	100%
A student's cognitive and behavioral problems resulting from a TBI may not be evident until years post-injury. (T)	73%	89%	89%
Goals for students with TBI may need to be revised more frequently than goals for students with other types of disabilities. (T)	89%	100%*	100%*
Standardized tests are more beneficial than less structured measures in assessing deficits secondary to TBI. (F)	61%	90%*	72%*

*Indicates significance at the .05 level.

Confidence at One Year Follow-Up

The confidence level of School Psychologists working with students with TBI was assessed using questions that related to how qualified they felt to conduct specific activities and tasks related to TBI. Participants used a 5 Point Likert Scale to assess their confidence and level of qualification, with a 1 being “Not At All Qualified” and a 5 being “Highly Qualified”. It was determined that from pre-workshop to one year post-workshop that confidence gradually grew for the participants (see Table 5).

Table 5
Participants Rating of Qualification and Confidence

Time of Rating:	Rating of Confidence:	Qualification:
Pre-Workshop	2.77	Not Qualified
Two Month Follow-Up	3.00	Somewhat Qualified
One Year Follow-Up	3.41	Somewhat Qualified

Comfort and Qualification

Comfort and qualification. At the pre-workshop and both follow-up assessments, participants were given the opportunity to rate their comfort level with specific skills related to TBI. The relationship between the increase in knowledge and how participants rated their level of comfort with specific skills related to TBI was examined (see Figure 1).

Figure 1

Participant Comparison of Correct Response and Feeling of Confidence

At the pre-workshop, participants' felt most qualified to monitor classroom behavior and academic progress for students with TBI (41% felt qualified), provide educators with information about TBI (30%), and to provide school based interventions for students with TBI (30%). Participants' felt least qualified to differentiate between students with TBI and students with cognitive impairments (25%) and assess students who display signs of TBI (22%) (see Table 6).

At the two month follow up, participants' felt most qualified to monitor classroom behavior and academic progress (42%) and to design appropriate accommodations and modifications for students with TBI (48%). Participants' felt least qualified to assess students who display signs of TBI (21%) and to serve as a case manager for a student with TBI (26%) (see Table 6).

At the one year follow-up, participants' felt most qualified to provide educators with information about TBI (72%), design appropriate accommodations and modifications for students TBI (67%), and monitor classroom behavior and academic progress (67%). Participants' felt least qualified to assess students who display signs of TBI (38%) and serve as a case manager for a student with TBI (38%) (see Table 6).

Table 6
Percentage of Self-Reported Skills of Participants

Skill Area Qualification	Pre-Workshop N=82	2 Month Follow- Up N=19	1 Year Follow-Up N=18
Be a part of a multidisciplinary team serving a student with TBI.	20%	21%	33%
Serve as a case manager for a student with TBI.	24%	26%	38%
Provide educators with information about TBI.	30%	32%	72%
Provide students in my school with information about TBI.	27%	32%	44%
Provide assessment services for students who display signs of TBI.	22%	21%	38%
Provide appropriate school-based interventions for students with TBI.	30%	32%	39%
Design appropriate accommodations and modifications for students with TBI.	27%	48%	67%
Differentiate between students with TBI and students with cognitive impairments.	25%	42%	56%
Monitor classroom behavior and academic progress for students with TBI.	41%	42%	67%

Concerns

At the pre-workshop assessment and both follow-up assessments, participants were given the opportunity to discuss any concerns they continued to have relating to TBI and what they feel they still need in order to appropriately work with students with TBI through the open-ended question that asked *what their primary concerns were related to providing services for student with TBIs*. The concerns of the participants were then broken into categories based off of their self-reported concerns (see Table 7).

Table 7
Self-Reported Concerns of Participants at Pre-workshop, 2 Month Follow-up, and 1 Year Follow-up

Self-Reported Concerns of Participants:	Number of Participants' that Reported Concern at Pre-Workshop (N=82)	Number of Participants' that Reported Concern at 2 Month Follow-Up (N=19)	Number of Participants' that Reported Concern at 1 Year Follow-Up (N=18)
Low incidence disability	5	0	2
Communication with medical professionals	4	3	3
Resources and funding	1	0	4
Academic programming	7	3	0
Lack of training and professional development	10	0	0
Other concerns: Determination whether or not a TBI had occurred	0	0	1
Other concerns: What is needed for qualification	0	0	1
Other concerns: How to locate resources for additional training	5	0	1

Other concerns: Resources for gaining more information	0	0	1
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Low incidence disability. One of the concerns expressed by participants' was the idea that TBI is a low incidence disability. At the pre-workshop and one year follow-up a concern reported was that TBI "is such a low incidence disability that it may be missed by some personnel". The idea of a TBI being a low incidence disability was shared other participants.

Communication with medical professionals. Coordinating and "communicating with medical professionals" and outside agencies was another area of concern expressed by participants. At the pre-workshop, participants' reported this as an area of concern. One participant at the pre-workshop stated their concern was "transitioning from medical to schools, making sure care is appropriate." The concern of coordinating and communicating with medical professionals was a concern expressed by participants'.

Resources and funding. Another area of concern reported by participants was the lack of funding for providing adequate services for students with TBI. At the pre-workshop, 1 of the 82 participants indicated this as a concern, stating that "funding and doing more with fewer financial resources" is a concern. No participants at the two month follow-up indicated resources and funding as a concern. At the one year follow-up, 4 of the 18 participants reported this as a concern, stating: "having the resources to provide services needed and training for educators about TBI". Another participant from the one year follow-up expressed that they do not have "the resources to provide services

needed”, including ability to progress monitoring as frequently as needed, screening tools, and personnel to assist with the intense treatment needed.

Academic programming. Participants reported concerns with dealing with the educational impact, including appropriate academic programming, progress monitoring, and goals for students with TBIs. At the pre-workshop, 7 of the 82 participants reported this as an area of concern. One of the participants at the pre-workshop stated that a major area of concern was “identification and interventions that really assist the students—academic programming specifically is a huge area.” At the two month follow-up, 3 of the 18 participants reported that academic programming is a concern. A major area of concern was “academic programming for students—I think students with TBI are frequently mis-identified and may not get the services they need” was expressed as a concern at the two month follow-up.

Lack of training and professional development. Lack of training was a concern expressed by participants. At the pre-workshop, ten of the 82 participants reported they had a lack of training or professional development in the area of TBI. One participant at the pre-workshop indicated that they had not had “enough training on the issue.” A general lack of training was only noted at the pre-workshop.

Other concerns. Additional concerns were expressed by participants at the one year follow-up. One participant expressed concern about how to determine whether or not a TBI had occurred: “My primary concern is how to increase finding out when and if there was a brain or head injury in the first place.” One participant expressed concerns about what to do when a school receives documentation a TBI occurred and what exactly is needed for qualification purposes: “We recently received hospital stay discharge papers

with “TBI” listed as diagnosis but no follow-up, transition, or neurological assessment. Is that discharge statement enough to warrant an educational diagnosis of TBI coupled with teacher observations, works samples, MFE, etc.” In addition to the concerns noted, participants indicated they would like more information regarding how to locate resources to provide services and additional training, and continuing education availability.

CHAPTER V

Discussion

The workshop was designed to increase knowledge and skills to positively impact assessment and services for students with TBI. It was hypothesized that upon completion of the workshop, participants would have a better skill and knowledge base. At the two month follow-up, there was significance; however, there was no significance at the one year follow-up. Therefore, the hypothesis was not supported over time. While there was not an overall significant increase in participant knowledge and skills, some questions did yield significant improvements, including: *conducting a prompt multifactored evaluation for a student that has sustained a TBI; difficulty students with TBI have forming and maintaining relationship; awareness of how common behavior problems are among students with TBI; awareness of how frequently goals for students with TBI need to be altered; the types of assessments that will yield the best results when working with a student with TBI; the similarity of characteristics between students with ADHD and student with TBI* .

It was also hypothesized that the school psychologists would feel more confident in their knowledge of TBI in their decision making abilities in working with students with TBI. This hypothesis was supported, with a slight increase over time of confidence of the participants in regards to their decision making abilities in working with students with TBI.

Professional development for educators often relies upon an expert from the outside who delivers information. Educators are then expected to transfer that knowledge over into practice (Glang, et al., 2010). This type of professional development is not always effective in helping educators put into practice any new skills or knowledge that is learned (Glang, et al., 2010). Glang, et al. (2010) suggested that a strong professional development program should have not only direct training for skills, but also practice with skills, ongoing mentoring and feedback, and consultation in the school environment to cultivate long term change in knowledge and practice. This workshop relied upon an expert from outside of the practitioners' district and there was no mechanism in place for ongoing practice of skills, mentoring, feedback, or consultation. Therefore, the results of this study support the findings of Glang et al. that a delivery of information from an expert outside of the district is not sufficient for ensuring transfer of new knowledge into practice.

Results from Walker, Boling, and Cobb (1999) proposed that due to the lack of faculty with neuropsychological expertise, most school psychology programs do not have the necessary means to develop proper methods for integrating neuropsychology into their programs. Though school psychologists often do not receive formal training in TBI, some may have obtained knowledge for other resources, including, independent reading, or other workshops or presentations.

Overall, there was not a sufficient and consistent increase in participants' knowledge and skills as a result of the workshop. Previous research has indicated that a "one-shot" professional development program often does not lead to long lasting change in practice or retention of knowledge (Glang, Tyler, Pearson, Todis, & Morvant, 2006).

This conclusion provides support for more broad-based training in the area of TBI, including, increased coverage in school psychology training programs, follow-up training and support for professional development participants, and the expansion of professional development opportunities, including advanced professional development workshops (eg., consultation with outside agencies, educating students with TBI, etc.). Previous research has also indicated that longitudinal studies have a tendency to have a loss of participants over time, which may have an impact on the validity (Kazdin, Esveltd-Dawson, French, & Unis, 1987).

Limitations

There were several limitations to this research project. The first limitation is the way the sample was obtained and availability of participants. The sample that was obtained was a convenience sample. The only participants included were those from the original two data collections who attended the workshop, responded to the survey, and provided contact information for the one year follow-up survey. There was a low follow-up response rate for the follow-up knowledge assessments. A factor impacting the response rate is the lack of email addresses acquired at the workshop for the follow-up studies. There was a lack of information regarding how previous training and education impacted the pre-test responses. Another limitation to this study is other knowledge the participants may have obtained from another source other than the workshop, and how that may affect the results of the data. This study relied on self-report of the participants. This is a limitation, as participants may not have responded accurately and participants with a particular interest TBI may be have been most likely to respond. Another limitation is that this study is a longitudinal study; thus, a number of participants dropped

out of the study. An independent samples t test had to be completed, as opposed to a paired samples t test due to the lack of consistency of the participants at each survey administration.

Directions for Future Research

Future research should examine the training that school psychologists receive in graduate school. Additional research can study specific courses graduate students take, what is covered in those courses, and how much time is spent on TBI.

Research is also needed in the area of retention and transfer of knowledge and skills to long-term practice. For example, additional research can examine the qualities of a workshop that leads to long-term retention of skills. Previous research has indicated follow-up support and skill trainings are critical to transfer workshop knowledge and skills over to long-term retention and to use them in practice (Glang, et al., 2006).

Research is being conducted regarding the knowledge, skills, and training of teachers, special education teachers, and teacher training programs. This is a vital area of research to be conducted because previous research has indicated a lack of understanding educators have in regards to the multifaceted and distinct issues that students with TBI are faced with in the classroom (Glang, et al., 2006).

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Appendix A Workshop Survey

School Psychologist Knowledge and Experience Related to Traumatic Brain Injury**Background Information** (circle all that apply)

Status:	Graduate Student Intern School Psychologist
Degree:	Masters Specialist Doctorate
Year of Last Degree Completion:	Before 1970 1971-1980 1981-1990 1991-2000 2001-2009
Current Work Setting:	Public School Private School University Hospital Other_____
Age of Students Served (in current position):	Preschool Elementary Middle High College

Training and Experience

YES NO Have you previously attended a training session or workshop on the topic of TBI?

If "yes", describe_____

YES NO Did you have coursework in your graduate program on the topic of TBI?

If "yes", describe_____

YES NO Have you worked with students identified with TBI?

If yes, approximately how many *throughout your career*? _____

If yes, approximately how many *in the past year*? _____

Knowledge Related to TBI

Indicate the strength of your agreement or disagreement with each statement *as a generalization*.

SD = Strongly Disagree
 D = Somewhat Disagree
 U = Uncertain
 A = Somewhat Agree
 SA = Strongly Agree

SD D U A SA	A neuropsychological evaluation must be conducted prior to planning an educational program for a student with TBI.
SD D U A SA	A multifactored evaluation should be delayed for a student who has sustained a moderate to severe TBI until the brain has had sufficient time to recover from injury.
SD D U A SA	Most public schools have at least one student who has sustained a TBI.
SD D U A SA	Many students with TBI display characteristics similar to those of students with ADHD.
SD D U A SA	Students with TBI often have trouble forming and maintaining relationships.
SD D U A SA	Students who have sustained mild TBIs rarely display behavior problems.
SD D U A SA	TBI is equally common in males and females.
SD D U A SA	Recovery following TBI may continue for several years.
SD D U A SA	A student's cognitive and behavioral problems resulting from TBI may not become evident until several years post-injury.

SD D U A SA Goals for students with TBI may need to be revised more frequently than goals for students with other types of disabilities.

SD D U A SA Standardized tests are more beneficial than less structured measures (e.g., interviews, checklists, observations) in assessing deficits secondary to TBI

Skills for Serving Students with TBI

How qualified do you feel qualified to do each task at the present time? (1 being not at all qualified and 5 being highly qualified)

- 1 2 3 4 5 Assess students who display signs of TBI.
- 1 2 3 4 5 Serve as a case manager for a student with TBI.
- 1 2 3 4 5 Provide educators with information about TBI.
- 1 2 3 4 5 Provide students in my school with information about TBI.
- 1 2 3 4 5 Provide school-based interventions for students with TBI.
- 1 2 3 4 5 Differentiate between students with TBI and students with cognitive impairments.
- 1 2 3 4 5 Differentiate between students with TBI and students emotional disturbances.
- 1 2 3 4 5 Design appropriate accommodations and modifications for students with TBI
- 1 2 3 4 5 Monitor classroom behavior and academic progress for students with TBI.

What are your primary concerns about providing services to students with TBI (e.g. personal continuing education needs, academic programming for students, education of school personnel about TBI, transitioning students from medical facilities to schools, etc.)?

Adapted from Hux, K., Walker, M., and Sanger, D.D. (1996)

Appendix B TBI in the Schools Workshop Outline

The intended learning outcomes from the TBI in the Schools Workshop and components of the program included:

- Understanding of TBI definition and educational implications.
 - Presentation discussed examples of TBI (according to Ohio definition of TBI), and the deficits that can be produced from a TBI.
- Knowledge of etiology and incidence of TBI.
 - Discussed the relationship between age and injury and prevalence rates.
- Understanding of programs related to the current cycle of under-identification and under-service of students with TBI.
 - Included an explanation of the number of students currently being served under the TBI label in Ohio, as well as the possible reasons for the under-identification of students with TBI (e.g., being served under another label), and the idea that due to the under-identification or mislabeling, these students may not be receiving appropriate services for their needs.
- Special considerations for the assessment of students with TBI and ideas for school-based observations.

The second half of the presentation was the explanation of a current program that is in place in Columbus City Schools in Columbus, Ohio. This program was developed by Ohio Legal Rights Services in 2006 and piloted in Columbus City Schools. It is directed at increasing awareness of TBI, better identification of students with TBI, and improving the education for students with TBI.

- Improved school re-entry for students with TBI who are transitioning back to school from hospital or rehabilitation.
 - Discussed the factors that should be considered for transitioning students back into schools.
- Collaboration strategies with rehab and hospital personnel, parents, school nurses, and other related service personnel.
 - It was suggested that a clear outline for team members be created, and those necessary participants were listed. The Columbus program also designated one school psychologist in the district to specifically work with all students being evaluated for TBI in Columbus City Schools.
- Model service delivery for students with TBI (both in regular education and special education settings).
 - Training was given for service delivery and identification of students with TBI to school personnel.
 - Universal screening procedures were also explained. Examples for how information about TBI was given out (tri-fold handouts and

other awareness materials) were given to all school buildings to increase awareness were provided to participants.

- Intervention selection and progress monitoring (both academic and behavioral).
 - Much detail was given in the presentation regarding how to determine eligibility and plan for intervention.
 - Highlighted concerns for intervention planning, four major goal areas for interventions, and educational approaches.
 - Discussed compensatory strategies, environmental modifications, behavioral interventions, social and emotional intervention planning, counseling techniques, and progress monitoring.
- Prevention strategies (e.g., via contact with school athletic programs).
 - Included the expansion of the project to athletics.
 - Discussed the different laws for sports concussions, expansion of training for coaches and athletic directors, explanation of concussion tool kits, and a referral plan were all discussed as a part of the workshop to expand prevention strategies.