2020

Positive Behavior Support-Based In-Home Services for Traumatic Brain Injury

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This is to certify that the doctoral dissertation by

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Walden University 2020

Abstract

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Clinical Psychology

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May 2020

Abstract

Researchers have demonstrated the effectiveness of positive behavior support (PBS) services in the in-home (IH) setting but few studies examined its use with traumatic brain injury (TBI) clients, and most of these were small sample cases. Additional research on IH PBS services for TBI clients was recommended, in particular using larger samples. The purpose of this study was to address that need by examining the effectiveness of IH PBS services in treating TBI-related challenging behaviors on a larger sample. The theoretical foundations for PBS, behaviorism, cognitive constructivism, social learning theory, and the biopsychosocial model of behavior, are described. The research questions asked whether there was an association between TBI clients receiving IH PBS services and the frequency of physical aggression, verbal aggression, and noncompliance they displayed. An ex post facto quantitative study was conducted using archival data from clinicians from an IH TBI services agency that provided supports to 62 clients for these 3 maladaptive behaviors. Chi square analysis of the aggregate categorical data examined the association between PBS services and the frequencies of those behaviors for those clients. Findings showed that PBS-based IH TBI services led to a reduction in physical aggression, verbal aggression, and noncompliance. Given the growing desire for IH services on the part of individuals with TBI, ensuring effective IH behavior supports is an important social change to how the healthcare system treats TBI. This study contributes to the literature on best practices for IH TBI behavior services and can help inform agencies and state oversight bodies about the use of PBS-based IH supports for TBI clients.

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Acknowledgments

My thanks to my dissertation committee members, Dr. Balkcom and Dr. McBride, for the assistance and guidance they provided during this project. I also want to acknowledge the support I received from Greg Murphy, M.A., our Doctoral advisor – I leaned on him numerous times over the past few years and always got the answers or assistance I needed.

Lastly, the most important teammate I had in this dissertation journey, my wife Jennifer, without whom I would not be writing this page!

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Chapter 1: Introduction to the Study

Introduction

The number of persons diagnosed with traumatic brain injury (TBI) has grown in recent years, and the trend is expected to continue (Barnes et al., 2017; McGuire, Kristman, Martin, & Bédard, 2017; Simpson, 2014; Taylor, Bell, Breiding, & Xu, 2017). This includes a large and growing number of serious motor vehicle accidents and veterans' combat-related head injuries (Barnes et al., 2017; Carlozzi et al., 2016; Gradus et al., 2015; Libin et al., 2017; Matarazzo, Signoracci, Brenner, & Olson-Madden, 2014). Given this growing number of individuals with TBI, effective treatment has become increasingly important for both general health care and military medical care, including symptoms related to maladaptive behaviors (Adams & Dahdah, 2016; Barnes et al., 2017; Gradus et al., 2015; Griesbach, 2015; Lawrence, Matthieu, & Robertson-Blackmore, 2017; Matarazzo et al., 2014). Therefore, the best practices for providing needed treatment have become an important area for research. The purpose of this study was to examine the effects of treating TBI-related behavior support needs within clients' homes through services based on the positive behavior support (PBS) model.

In Chapter 1, I discuss the background of the problem. Next, I provide the problem statement for the study, and explain the purpose for this study within the larger professional literature. The research questions are described and the theoretical framework for the project is provided. I then explain the nature of the research and the operational definitions used in the study. Assumptions inherent in this study and its scope and limitations are described. Finally, I discuss the significance of the study.

Background

Historically, supports for individuals with a TBI have mainly been provided through hospitals, clinics, veterans' centers, residential facilities, or other traditional institutional settings for health care delivery (Bartels & Van Citters, 2005; Hudson, 2016; Spagnuolo, 2016; Tarapore, Vassar, Cooper, Lay, & Galletly, 2016). In some cases, these supports were provided in-home (IH) by the person's social network, family, or friends (Adams & Dahdah, 2016; Carlozzi et al., 2016; Feeney & Achilich, 2014; Kratz, Sander, Brickell, Lange, & Carlozzi, 2017; Moretti, 2017; Saban et al., 2016). Often though, IH care from family and friends was not adequate to meet the full range of the clients' needs or could not be sustained due to the pressures placed on these social supports, and this often left the individual and their family with a choice between remaining in the home with less effective supports or opting for more traditional clinical settings to get needed care (Adams & Dahdah, 2016; Carlozzi et al., 2016; Feeney & Achilich, 2014; Kratz et al., 2017; Moretti, 2017; Saban et al., 2016).

Paid IH support services bridged that gap and offered families a third option, remaining at home and receiving health care services, therapies, vocational training, and the like on an outreach basis (Feeney & Achilich, 2014; Formisano et al., 2017; Hopman, Tate, & McCluskey, 2012; McGuire et al., 2017; Moretti, 2017; Piccenna, Lannin, Scott, Bragge, & Gruen, 2017; Potter, Sansonetti, D'Cruz, & Lannin, 2017; Stubbs & Achat, 2016). Recent changes in health care funding on the state and federal government level have opened up more opportunities for individuals, including those with TBI, to receive professional support services within their homes whether as a stand-alone service or as a

complement to their natural supports like family (Abrams, 2017; Hobson-Williams, 2012; Hudson, 2016; Kitchener, Ng, Grossman, & Harrington, 2005; Mitchell, 2006; Moretti, 2017; Potter et al., 2017). Therefore, determining the most effective way to provide their supports IH has become important for ensuring that the health care system meets the needs of these individuals.

The varied needs for which these support services are sought include limitation of physical function, impairment in executive functioning and attention and decision-making skills, emotional disturbances, mental health difficulties, and deficits in abilities to satisfy some of their basic daily living needs (American Psychiatric Association [APA], 2013; Frazier, 2018; Jones-Berry, 2016; LoBlue et al., 2018; Matarazzo et al., 2014; Pagan et al., 2015; Piccenna et al., 2017; Tate, Wakim, & Genders, 2014). A primary area of treatment need is behavior deficits (Gould et al., 2017; Hicks et al., 2017; James, Strom, & Leskela, 2014; Sadeh et al., 2016; Wong, Rapport, Meachen, Hanks, & Lumley, 2016). Behavior support services, which aim to reduce maladaptive behaviors and increase adaptive behavior skills, is often a primary need area for individuals with TBI (Davies, Mallows, & Hoare, 2016; Feeney & Achilich, 2014; Feeney & Ylvisaker, 2008; Jones-Berry, 2016; Pagan et al., 2015; Ponsford et al., 2016; Simpson, Sabaz, Daher, Gordon, & Strettles, 2014). The best practices for providing IH behavior support services has become an important area for research.

Past researchers have studied how to effectively address behavioral health and independence through IH behavior supports (Bromer & Korfmacher, 2017; Feeney & Achilich, 2014; Hicks et al., 2017; Kalb, Beasley, Klein, Hinton, & Charlot, 2016;

Morant et al., 2017; Simpson et al., 2014; Stubbs & Achat, 2016). Several studies have focused on behavioral services for the TBI population (Feeney & Achilich, 2014; Feeney & Ylvisaker, 2008; Hicks et al., 2017; Jones-Berry, 2016; Meixner, O'Donoghue, & Witt, 2013; Pagan et al., 2015). Studies on IH behavior supports for TBI have shown that they can be effective (Arco & Bishop, 2009; Feeney & Achilich, 2014; Hicks et al., 2017; Saban et al., 2016; Ylvisaker et al., 2007). Of particular note for this research project were studies that have demonstrated the effectiveness of behavior support services based on the PBS model (Arco & Bishop, 2009; Davies, Mallows, 2016; Hamlet, Carr, & Hilbrand, 2016; Jamolowicz & Tetreault, 2015; Jones-Berry, 2016; Kyzar & Strickland-Cohen, 2017; Marshall & Mirenda, 2002).

The PBS model is a systematic approach to addressing maladaptive behaviors and improving individuals' quality of life (Association for Positive Behavior Support [APBS], 2014; Davies, Mallows, 2016; Hamlet et al., 2016; Jamolowicz & Tetreault, 2015; Madden, 2013; Sailor, Dunlap, Sugai, & Horner, 2009; Wehmeyer, 2013). PBS stresses the functional behavior assessment of an individual's particular need areas and a proactive approach to service interventions that address those areas (APBS, 2014; Arco & Bishop, 2009; Carr et al., 2002; Davies, Mallows, 2016; Freeman, Baker, & Horner, 2002; Guercio, 2018; Hamlet et al., 2016; Jamolowicz & Tetreault, 2015; Sailor et al., 2009; Shawler, Blair, Harper, & Dorsey, 2018). An additional element is the emphasis on use of natural consequences to maladaptive behaviors as opposed to artificial consequences that can often be disconnected from the challenging behavior and, thus,

less effective long term (APBS, 2014; Hamlet et al., 2016; Jamolowicz & Tetreault, 2015; Sailor et al., 2009; Shawler et al., 2018; Wehmeyer, 2013).

Researchers have shown that PBS-based support services are effective interventions for behavior change and developing adaptive behavioral skills (APBS, 2014; Arco & Bishop, 2009; Blair, Fox, Lentini, & Blair, 2010; Davies, John-Evans, Mallows, & Griffiths, 2016; Davies, Mallows, 2016; Hamlet et al., 2016; Jamolowicz & Tetreault, 2015; Kyzar & Strickland-Cohen, 2017). Several studies have demonstrated the effectiveness of PBS services in the IH settings (APBS, 2014; Arco & Bishop, 2009; Davies, Mallows, 2016; Feeney & Achilich, 2014; Jamolowicz & Tetreault, 2015; Jones-Berry, 2016; Marshall & Mirenda, 2002; Sailor et al., 2009; Wehmeyer, 2013). However, what has not been well enough shown yet is the degree to which PBS-based IH interventions benefit TBI clients' behavioral health.

Few studies have examined both components, PBS and IH, in services to the TBI population (Arco & Bishop, 2009; Davies, Mallows, 2016; Jones-Berry, 2016; Moretti, 2017; Wehmeyer, 2013). Most of them were single-case studies and others were projects with a small sample size. Many of these projects focused on the needs of families dealing with spouses or adult children returning to the home after a TBI or were single participant studies of parents of young children with TBI (Arco & Bishop, 2009; Dunlap et al., 2013; Jones-Berry, 2016; Moretti, 2017). Some of these studies, as well as others, have concluded that additional research in the area of IH PBS services for TBI is needed (Arco & Bishop, 2009; Blair et al., 2010; Hicks et al., 2017; Moretti, 2017; Wehmeyer, 2013). In particular, additional research that examines larger groups of clients is called

for. Such research can have important practical applications to the field of TBI services, such as guiding agencies that provide IH TBI care. The current study was intended to examine the impact of utilizing PBS-based IH interventions on a larger, agency level.

In this study, I examined the association between maladaptive behavior frequency and the use of PBS-based IH interventions through analyzing archival client services data supplied by clinicians of a community agency who provided IH behavior supports to individuals with TBI. The sample size requested for the study was the total number of clients served by the clinicians of the agency who received behavior support services for the targeted types of maladaptive behavior: noncompliance/verbal aggression/physical aggression. The results from this study are intended to help inform decisions about whether the PBS service model should be utilized more widely by TBI community services agencies, including those receiving state and federal funding for the provision of IH TBI care.

Problem Statement

The presence of a TBI creates widely varying treatment needs for clients (Adams & Dahdah, 2016; Barnes et al., 2017; Gould, et al., 2017; Gradus et al., 2015; Graham, West, Bourdon, Inge, & Seward, 2016; Hicks et al., 2017; Jabalera, Prats, & Lusilla, 2012; James et al., 2014; Libin et al., 2017; Matarazzo et al., 2014; McGuire et al., 2017; Simpson, 2014). These include physical, mental, and emotional consequences for the client if their TBI-related needs are not properly addressed. Traditionally, they require treatment in hospitals or other institutional settings (Adams & Dahdah, 2016; Griesbach, 2015; Hudson, 2016; Libin et al., 2017; Meyers, 2016; Pagan et al., 2015; Spagnuolo,

2016; Tarapore et al., 2016; Taylor et al., 2017). Recent changes in the health care insurance industry have allowed TBI patients to have an alternative choice though, receiving some care within their homes from clinical professionals and caregivers on an outreach basis (Abrams, 2017; Hobson-Williams, 2012; Hopman et al., 2012; Hudson, 2016; Kitchener et al., 2005; Moretti, 2017; Potter et al., 2017; Simpson et al., 2014; Tate et al., 2014).

Given the growing number of persons with TBI and the appeal to many of receiving supports IH versus in traditional clinical settings, the move to IH services marks a significant change in the way the national health care system supports TBI patients. Behavior support services have become a major need area for these clients (Arco & Bishop, 2009; Dunlap et al., 2013; Feeney & Achilich, 2014; Jones-Berry, 2016; Moretti, 2017). Supporting the move to IH TBI behavior supports in place of service in traditional institutions requires additional research showing that the behavioral needs created by TBI can be adequately met within the IH environment, including research that examines the different modes of IH behavior supports for TBI. This study adds to the literature and knowledge in the field by examining the impact of PBS-based IH services to individuals with TBI on a larger level, that of multiple clinicians each working with multiple clients.

Purpose of the Study

In this study, I examined whether there is an association between the display of maladaptive behaviors by individuals with TBI and the receiving of PBS-based IH support services. This study was focused on the frequencies of maladaptive behaviors

prior to and after PBS-based IH support services were provided to these clients with TBI. In this quantitative study, I examined the association between the receipt of PBS-based interventions – the Independent Variable (IV) – and the reported frequency of three categories of maladaptive behavior – the Dependent Variables (DV): physical and verbal aggression (DV1 and DV2) and noncompliance (DV3).

Research Questions

RQ1: Is there a difference in frequency of physical aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services?

$H_0$1: There is no difference in frequency of physical aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services.

H_A1: There is a difference in frequency of physical aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services.

RQ2: Is there a difference in frequency of verbal aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services?

$H_0$2: There is no difference in frequency of verbal aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services.

H_A2: There is a difference in frequency of verbal aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services.

RQ3: Is there a difference in frequency of noncompliance behaviors for persons after they have received PBS-based IH services compared with before they received such services?

$H_0 3$: There is no difference in frequency of noncompliance behaviors for persons after they have received PBS-based IH services compared with before they received such services.

$H_A 3$: There is a difference in frequency of noncompliance behaviors for persons after they have received PBS-based IH services compared with before they received such services.

Theoretical Framework for the Study

The service model examined in this study, PBS, is based on concepts put forth in behaviorism, cognitive constructivist (CC) theories, and social learning theory (APBS, 2014; Jamolowicz & Tetreault, 2015; Sailor et al., 2009; Wehmeyer, 2013). First, the PBS model accepts that external stimuli can influence individuals to choose certain behaviors, as put forth in behaviorist theories (Baum, 2017; Burgos, 2016; Cadena, 2016; Catania, 2013; Edwards, 2016; Geller, 2015; Jamolowicz & Tetreault, 2015; Moore, 2017; Skinner, 1938, 1953, 1966; Zilio, 2016). The PBS model also holds, as has been posited in cognitivist theories, that internal stimuli, like cognitive and emotional factors, can contribute as well (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von

Glasersfeld, 1974; Wadsworth, 2004; Weimer, Parault Dowds, Fabricius, Schwanenflugel, & Woon Suh, 2016). Social learning theories emphasize that both factors are at work in behavior choices (Bandura, 1977, 1986; Herrmann, Call, Hernàndez-Lloreda, Hare, & Tomasello, 2007; Kunkel, Hummert, & Dennis, 2006; Vygotsky, 1978, 1980).

Behaviorism

Jamolowicz and Tetreault (2015) explained that an understanding of PBS begins with a basic grasp of the ideas put forth originally in the classic works of Skinner and other early proponents of what would come to be called the behaviorism school of thought (Baer, Wolf, & Risley, 1968, 1987; Cadena, 2016; Catania, 2013; Edwards, 2016; Moore, 2017; Skinner, 1938, 1953, 1966; Zilio, 2016). The tenets of behaviorism propose the interconnectedness of behaviors and the environment within which they present (Catania, 2013; Edwards, 2016; Geller, 2015; Jamolowicz & Tetreault, 2015; Moore, 2017). Proponents hold that changes in the rates of behavior can be produced through certain identified conditions being present naturally or through the introduction of certain stimuli (Baer et al., 1968, 1987; Cadena, 2016; Catania, 2013; Edwards, 2016; Geller, 2015; Moore, 2017; Skinner, 1938, 1953, 1966; Zilio, 2016). Subsequent research has supported the connection between certain conditions or stimuli and predicted behavior change (Baum, 2017; Burgos, 2016; Cadena, 2016; Catania, 2013; Geller, 2015; Zilio, 2016). The influence of external factors on behavioral choices became an important component of future theories like applied behavior analysis, which shares many features with the PBS model and its practices (Baer et al., 1968, 1987; Catania,

2013; Guercio, 2018; Horner & Sugai, 2015; Jamolowicz & Tetreault, 2015; Madden, 2013; Zilio, 2016).

Cognitive Constructivism

PBS also holds that internal stimuli, like cognitive and emotional factors, can contribute along with the external factors that are central to behaviorism (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016). The CC approach emphasizes this contribution by internal causes for behavior (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016). According to this approach, a person's mental processes are active in the learning process, where behaviors arise from cognitive development and change through experience (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016). Individual development is primary over externally driven learning (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016). Intrinsic motivation is the primary factor not external motivation that is central to behaviorism (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016).

Social Learning Theory

In social learning theory (SLT), it is posited that behaviors are learned through interactions with others and observing what they do (Bandura, 1977, 1986; Herrmann et al., 2007; Kunkel et al., 2006; Vygotsky, 1978, 1980). According to SLT, new or amended behaviors result from an individual noting what consequents arise from the

actions they witness others engaging in then deciding whether to reproduce them – e.g., gaining something desirable or having unwanted things occur less often or to a lesser degree (Bandura, 1977; 1986; Herrmann et al., 2007; Kunkel et al., 2006; Vygotsky, 1978, 1980). There are, then, elements of external influence and internal processing, essentially accepting aspects of both the behaviorist model and the CC model. SLT is considered a bridge between CC and behaviorism because of its emphasis on a social context for cognitive learning processes and its focus on internal processes, like attention and motivation, as being needed to learn behaviors (Bandura, 1977; 1986; Herrmann et al., 2007; Kunkel et al., 2006; Vygotsky, 1978, 1980).

Research has shown that SLT can be used effectively to explain and understand a number of behaviors and social processes. In the medical and health care field, research has demonstrated the utility of SLT in understanding cognitive deficits and communication challenges such as those posed by a TBI (Herrmann et al., 2007; Kunkel et al., 2006). Behavior support services from the perspective of SLT doctrine build on the idea that caregivers demonstrate or model appropriate behaviors and assist the individual in recognizing the social and cultural fit that these have in their environment (Herrmann et al., 2007; Kunkel et al., 2006; Whiten, McGuigan, Marshall-Pescini, & Hopper, 2009). In this way, the caregiver/staff person is integral to the learning process of TBI clients getting IH treatment.

Nature of the Study

In this quantitative study, I examined the frequencies of TBI clients' maladaptive behavior (specifically, physical aggression, verbal aggression, and noncompliance) prior

to and following receipt of PBS-based IH behavior support services. Data were collected from clinicians' archival data on clients' maladaptive behaviors when they received services from a local community services agency. Monthly reports summarizing the frequency of episodes of clients' behaviors within the 3-year period selected for examination were used to develop an aggregate sum of each category of behavior across the sample for the two periods being examined (i.e., the month prior to and the month after 1 year of receiving services). These aggregate data were used to examine whether the PBS-based services had an impact on the behaviors these IH supports were intended to treat. The interventions were all PBS-based supports that focused on proactive training, use of natural consequences versus artificial punishments, and identifying and teaching replacement behaviors. The aggregate total frequency of each type of behavior for the entire sample in the month prior to receiving the PBS-based services and the month after 1 year of services were compared to determine whether there was an association between PBS-based services and the frequency of maladaptive behaviors.

Operational Definitions

Several terms were used in this study, including IH support services, maladaptive behaviors, PBS, and TBI. In this section, I provide definitions of these terms as they pertain to this study.

In-home (IH) support services: These supports involve providing professional and paraprofessional clinical services in the individual's home (Bromer & Korfmacher, 2017; Hobson-Williams, 2012; Marshall & Mirenda, 2002; Moretti, 2017; Piccenna et al., 2017; Stubbs & Achat, 2016). Services are sought that address behavioral or other health needs

that clients have. Therapists, clinicians, and other support staff work with the individual and their family/social supports within the home setting where the behavioral or other needs present (Farag et al., 2016; Feeney & Achilich, 2014; Hopman et al., 2012; Saban et al., 2016).

Maladaptive behaviors: Behaviors that are chosen by an individual to meet specific needs but that result in situations that are not generally healthy for the individual are considered maladaptive (Baines, Liu, Lewis, & Evans, 2013; Davies, Mallows, 2016; Gould et al., 2017; Miller & Pollack, 2018; Samson, Hardan, Lee, Phillips, & Gross, 2015). The individual's choice of action (or inaction) results in situations that are either harmful to or less than beneficial for them or others around them. There is a failure to opt for alternate behaviors that can serve the function in more effective or less harmful ways, including passive behaviors, like noncompliance, or interpersonal behaviors, like verbal aggression, temper tantrums, and physical aggression (Arco & Bishop, 2009; Baines et al., 2013; Davies, Mallows, 2016; Gould et al., 2017; Hicks et al., 2017; Miller & Pollack, 2018; Rojahn, Matson, Lott, Esbensen, & Smalls, 2001; Samson et al., 2015; Simpson, 2014).

Positive behavior supports (PBS): A systematic approach to reducing maladaptive behaviors and improving adaptive behavior skills, thereby improving an individual's quality of life (APBS, 2014; Hamlet et al., 2016; Jamolowicz & Tetreault, 2015; Shawler et al., 2018). It stresses the need to determine what factors are at work in maintaining those negative behaviors or could be introduced to increase their adaptive behaviors. An understanding of the reinforcements at work is a primary focus; functional behavior

assessment of an individual's particular need areas and a proactive approach to service planning are additional keys to this (APBS, 2014; Arco & Bishop, 2009; Freeman et al., 2002; Guercio, 2018; Hamlet et al., 2016; Jamolowicz & Tetreault, 2015; Shawler et al., 2018). An emphasis is placed on the use of natural consequences to maladaptive behaviors as opposed to artificial consequences that can often be disconnected from the challenging behavior and, thus, less effective in the long term (APBS, 2014; Carr et al., 2002; Hamlet et al., 2016; Sailor et al., 2009). Self-driven service planning and goal setting by the client is also a key factor (APBS, 2014; Arco & Bishop, 2009; Carr et al., 2002; Jamolowicz & Tetreault, 2015; Sailor et al., 2009; Shawler et al., 2018).

Traumatic brain injury (TBI): This term covers a variety of conditions that result from significant damage to a person's brain caused by physical injury to the head, disease, or illness (APA, 2013; National Institutes of Health, 2018). It is outlined in the Diagnostic and statistical manual of mental disorders (5th ed.), as a neurocognitive disorder (NCD; APA, 2013). It typically results in limitation to the individual's normal daily activities and disturbances of their mental health state. Characteristic symptoms of TBI include deficits of memory, learning, attention, perception, language, social understanding, and/or functioning (Adams & Dahdah, 2016; APA, 2013; Carlozzi et al., 2016; Childers & Rutherford, 2017; French, Lange, & Brickell, 2014; Gould et al., 2017; National Institutes of Health, 2018; Reddy, Rajeswaran, Devi, & Kandavel, 2017; Wortzel & Arciniegas, 2014).

Assumptions

I made a number of important assumptions in this study. Some related to the specific service being examined (i.e., IH services for TBI clients), while others related to the data used in this study.

The first assumption was that the move to IH services for treating TBI-related behavioral needs will continue to be desired by patients. Another was that it will continue to be supported by state and federal governments and the health insurance industry. It is reasonable to accept these assumptions given the growing number of clients with TBI and individuals with other behavior-related medical treatment needs, like developmental disabilities and memory care, who are choosing the IH treatment option.

Use of archival data led to another assumption relating to the source of information being used. I assumed that there would be an adequate amount of data available from the clinicians' records to draw a sufficient sample size of clients who received these services. Related to this was the assumption that the collected data are accurate and reliable. The ability of staff to accurately record whether the behaviors were observed and for clinicians to reflect those data in their monthly reports was largely reliant upon the quality and amount of training each received. The training provided to staff for providing the PBS-based behavior interventions was assumed to be adequate given that this training is mandated by the state and the quality of care is routinely monitored by officials. Likewise, given that the source of data is from clinicians who were qualified to work for an agency approved to receive funding for providing the IH

TBI supports service, it was reasonable to expect an adequate amount and level of training.

Scope and Delimitations

The focus of this study was the association between PBS-based IH TBI support services and the frequency of the three most common behavioral symptoms seen in the population: verbal and physical aggression and noncompliance with necessary tasks. The range of behaviors allowed for analysis of the association between PBS services and these different symptoms of TBI. I used the reported frequency of maladaptive behaviors as given by the agency's data tracking system for this examination.

The population examined was individuals previously diagnosed with a TBI who received IH behavior support services from clinicians at a community services agency. They received IH services from an agency that was approved by state and federal oversight bodies to provide insurance-funded support services. In most cases, the clients had chosen to receive the IH service, while in a relatively few cases, the individuals had limited capacity for choosing treatment delivery type and the decision for IH TBI services was made by family or another caregiver.

I selected the PBS approach for examination based on previous research that demonstrated the effectiveness of the model for treating behavior-related needs in other populations, including school-age children, individuals with developmental disabilities, adults with dementia and related memory care needs, among others. Classic behaviorist theoretical models were considered, as were models of CC psychology and SLT, the guiding theoretical components of PBS.

The delimitations were the selected population, service type to be examined, and the research questions chosen. The research was limited to individuals with TBI and service type was limited to IH PBS-based behavior supports. The findings may be able to be extended to other settings like traditional TBI care facilities, such as clinics and hospitals. Extension to other populations who receive PBS-based support services that do not necessarily present with the types of needs typical of TBI symptoms may also be feasible.

Limitations

A variety of factors may influence the clients' tendency to choose maladaptive behaviors at different times, including the quality of service delivery by each staff person or caregiver, the client's attitude toward those service providers, and clients' moods and disposition at different times of a day or week, etc. (Carlozzi et al., 2016; Formisano et al., 2017; Griesbach, 2015; Jones-Berry, 2016; Potter et al., 2017; Saban et al., 2016; Tarapore et al., 2017). The internal validity of this study was directly related to the consistency of service provision and participation on the part of the client. The ability to generalize results from this study was limited by these factors.

The sample size available for this study was a potential limitation (see Shadish, Cook, & Campbell, 2002; VanVoorhis & Levonian Morgan, 2006). With the focus on the three target behaviors (i.e., physical aggression, verbal aggression, and noncompliance), only clients whose services were focused on all three of these behaviors were selected for this study. Additionally, only clients for whom data were collected and were made available were included in this study. Similarly, the length of time that the

agency had compiled the data for each client was a potential limitation. Some clients could not be included in the data sample because they did not meet the 1-year length of service receipt required for this study. Reasons for limits in length of service included time since clients were referred to the agency for services, early discontinuation of services on the part of the client, or cessation of services by the agency and subsequent discontinuation of service delivery. For these reasons, the sample size was lower than initially hoped for.

The limited scope noted above with respect to level and type of training provided to support staff from whom data were being gathered was a potential confounding variable. Effective data collection and recording was an important factor, including staff not allowing their personal biases toward the client to influence their data reporting processes or having a felt need to document some or all behaviors in either a positive or negative light. There may have also been unknown conditions or other contributing factors at the clients' homes or within the agency where the archival data originated. These factors could have potentially biased the clinicians who completed the data reports. Such potential biases were considered when data were analyzed and interpreted.

A threat to external validity was presented by the lack of knowing whether the severity of TBI present in the sample was representative of the general population of TBI sufferers. The clients whose data were gathered may have symptoms that are not representative of the overall population of individuals receiving IH behavior supports for TBI. I did not intend for this study to represent the larger population of individuals who

have received behavior support services IH versus other more traditional settings, which also presented a potential challenge.

Significance

In this study, I examined the association between IH PBS-based supports and frequency of certain maladaptive behaviors for individuals with TBI. The findings from this project contribute to the literature on best practices for IH behavior services to TBI patients. Applying the results from this study can assist TBI support services agencies in deciding whether to use PBS-based interventions for IH supports to their clients to better address maladaptive behaviors their clients present with. The findings of this study can also assist states with decisions about whether to support – and even require – the use of PBS-based interventions by agencies being funded for providing IH services for TBI care. This study makes an important contribution to the decision-making about this shift in care for a vulnerable population and, therefore, will be a significant factor in social change for the population.

This study was not intended to be generalized to other populations; however, such further application is open for future research. An example of such application could include at-risk youth whose presenting behavior challenges cause them difficulties with maintaining a safe living environment and for whom IH services may prove beneficial. Another potential use would be with memory care/dementia clients who can benefit from IH PBS-based interventions to help address potentially challenging behaviors. A third application is informing more traditional treatment facilities, like hospitals, institutions,

and nursing homes, about the benefits of using PBS-based interventions to assist TBI clients with behavioral needs.

Summary

Recent studies have stated that additional research into how best to address the behavior support needs of individuals with TBI in the IH setting is needed. In particular, there is a need for studies with larger samples beyond the single-case or small-sample examinations of PBS-based IH services for TBI-related behaviors that are found in the current literature. In this study, I focused on the association between IH PBS-based behavior interventions and TBI clients' reported noncompliance and verbal and physical aggression behaviors. The results of this study add to the current literature by providing results from a larger sample size, thereby offering stronger support for agency- and state-level decisions about whether to use these PBS methods in their IH TBI support services.

In Chapter 2, I provide a review of the literature relevant to this study. The chapter contains an introduction, literature search strategy, literature review of the theoretical foundations, and key variables. A summary and transition to the third chapter is provided to conclude Chapter 2.

Chapter 2: Literature Review

Introduction

The research reviewed for this study indicated some evidence for the efficacy of PBS-based services for TBI-related behavioral challenges; however, there was a noted need for additional research to continue the examinations of this mode of service for this population, specifically, the use of PBS-based interventions for IH TBI support services. In particular, there was a need for research on larger groups of service recipients because much of the data available at present were drawn from single-subject or small-sample studies. In this study, I examined whether there is an association between the use of PBS-based interventions and the frequency of certain maladaptive behaviors (i.e., noncompliance, verbal and physical aggression) when used by a community service agency providing IH supports for TBI clients. The findings of this study add to the general literature on PBS-based TBI services and IH supports as well as address questions about the generalizability of results seen with small-sample studies.

In this chapter, I explain the literature search strategy used in this study. The libraries and databases that were used and search terms identified as most effective for this study are detailed. The range and scope of literature sources are described. The theoretical foundations for this study are provided, including a description of relevant theories that guided the research. I then review the current literature relevant to the variables and concepts under examination in this study. The chapter concludes with a description of the questions to be answered in this study.

Literature Search Strategy

The strategy I used to search for literature focused, first, on accessing databases available through the Walden University Library. Specifically, I used the PsycARTICLES, PsycINFO, SocINDEX, and PsycBOOKS databases. In some cases, recent texts and print articles in my possession were used as appropriate. Sources that were published within the past 5 years were primarily chosen, with some older sources used when the material covered in them was more relevant, such as original works that covered theories or the PBS model being researched.

The search terms I identified as most effective for this study included *positive behavior support, positive behavior support in schools, positive behavior support system, positive behavior support intervention, traumatic brain injury, TBI, traumatic brain injury or brain injury or acquired brain injury, in home services, in home supports, in home care,* and *in-home behavioral health care*. Several studies were found that addressed some of the key questions, but only a small number were specifically focused on IH PBS-based supports for TBI challenging behaviors, and these were single-case or small-sample studies whose authors recommended further examinations that looked at larger samples.

Literature Review of Theoretical Foundations

The theoretical foundations for this study include behaviorism, CC theories, and SLT. Each of these theoretical foundations are described in this section.

Behaviorism

Locke proposed the idea of the person as a blank slate upon which experience *writes* and thereby learning takes place (Cadena, 2016; Catania, 2013; Edwards, 2016; Guercio, 2018). Later, the classic works of Skinner and colleagues built on this approach to learning and behaviors, and these became foundational to what would come to be called the behaviorism school of thought (Cadena, 2016; Catania, 2013; Edwards, 2016; Guercio, 2018; Moore, 2017; Skinner, 1938, 1953, 1966; Zilio, 2016). The tenets of behaviorism propose an interconnectedness between how a person chooses to act and the environment within which they do so (Baum, 2017; Burgos, 2016; Cadena, 2016; Catania, 2013; Edwards, 2016; Geller, 2015; Guercio, 2018; Leao, Laurenti, & Haydu, 2016; Miller & Pollack, 2018; Moore, 2017). Learning and behavioral change are external stimuli driven, the environment and others in it are the agents determining behavior choice and change; the individual is a passive participant in the process (Baum, 2017; Burgos, 2016; Cadena, 2016; Catania, 2013; Edwards, 2016; Geller, 2015; Guercio, 2018; Leao et al., 2016; Moore, 2017; Skinner, 1938, 1953, 1966; Zilio, 2016). There is a stimulus-response mechanism at the root of learning and individual behavior choice (Catania, 2013; Geller, 2015; Guercio, 2018; Moore, 2017; Zilio, 2016). The presence or absence of external stimuli either reinforce the choosing of desired behavior in the future (i.e., *rewards*) or reinforce the avoidance of those behaviors in the future (i.e., *punishments* that lessen the likelihood of choosing a behavior).

In this way, those working with clients to address maladaptive behaviors can help them learn to choose more appropriate behaviors by using rewards and punishments to

influence how they see their choice of future behaviors. Helping them see the connection between the external stimuli that are present (e.g., positive emotions from family or individuals they care about) and the behaviors they choose to engage in or avoid can influence future behavior choices. Clients' awareness of the connection between external stimuli and behaviors they can choose to engage in or avoid affects whether a behavior is learned and repeated in the future (Cadena, 2016; Catania, 2013; Geller, 2015; Moore, 2017; Zilio, 2016). Recognizing external stimuli, like rewarding responses from others, comfort or discomfort with how an individual's surroundings appear following a behavior, like visible pleasure or displeasure on the part of those in a person's environment, etc., help to influence future behavior choices. Through this process, staff can assist clients with behavior change to better meet the person's needs. A significant change in frequency of maladaptive behaviors following the implementation of PBS-based interventions may indicate that staff/caregivers were effective in exposing clients to the influence of external stimuli on them and their future behavior choices (Arco & Bishop, 2009; Catania, 2013; Geller, 2015; Moore, 2017; Zilio, 2016).

Cognitive Constructivism

In contrast to the external-driven impact that behaviorism holds to be key, CC theories hold that mental processes are the agents of learning and motivation (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016). The individuals' thoughts and beliefs actively work to determine what is learned versus being a passive recipient of influences that shape learning (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth,

2004; Weimer et al., 2016). Behaviors are the result of an individual's cognitive processes with information being taken in and processed through the lens of the person's beliefs and predispositions, and thereby, new opinions and attitudes being established from which behaviors are chosen (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016).

This intrinsically driven learning process is in line with what Piaget and colleagues argued for (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016). The learning process is driven by an individual's cognition and influenced by their developmental stage – i.e., a person's nature not a person's nurture (Lave, 1988; Lave & Wenger 1990; Piaget, 1936, 1957; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016). These thoughts and beliefs influence the individual's tendency to view some actions as favorable and others as less desirable, and through this deliberative process, the individual determines which behaviors should be chosen over others (Lave & Wenger 1990; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016).

For the purposes of PBS interventions, CC processes include efforts by staff to assist clients with understanding the meaning behind social behavioral rules, interpersonal expectations and norms, the importance of compliance with rules and expectations, etc. (Lave & Wenger 1990; von Glasersfeld, 1974; Wadsworth, 2004; Weimer et al., 2016). In this way, staff assist TBI support services clients with better understanding the interconnection between what they experience and what behaviors they would benefit from choosing in the future. Assisting with this learning is an integral part

of the staff/client process for behavior supports services (APBS, 2014; Arco & Bishop, 2009; Hamlet et al., 2016; Hassiotis, 2018; Jamolowicz & Tetreault, 2015). A significant change in frequency of maladaptive behaviors following the implementation of PBS-based interventions may indicate that staff were effective in helping clients learn that their perceptions about the consequences of their behaviors can improve their future behavior choices (APBS, 2014; Davies, John-Evans, 2016; Davies, Mallows, 2016; Hamlet et al., 2016; Hassiotis, 2018; Jamolowicz & Tetreault, 2015; Kyzar & Strickland-Cohen, 2017; Sailor et al., 2009; Wehmeyer, 2013).

Social Learning Theory

The SLT accepts some of each of the two previously discussed schools of thought: behaviorism and CC theories (Bandura, 1977, 1986; Herrmann et al., 2007; Kunkel et al., 2006; Vygotsky, 1978, 1980). In SLT, it was posited that behaviors are learned through observing others' actions and attitudes and imitating them (Bandura, 1977, 1986; Herrmann et al., 2007; Kunkel et al., 2006; Vygotsky, 1978, 1980). If the outcomes of others' behaviors are desirable to the individual, they will be motivated to adopt that behavior. Conversely, an individual learns to avoid certain behaviors by choosing to not model the behavior after observing another individual acting in that way and not wanting similar outcomes. Therefore, SLT is an extension of behaviorist approaches to understanding motives and actions that emphasize the learning processes posited by classical and operant conditioning, but the theory also adds a social component (Bandura, 1977, 1986; Herrmann et al., 2007; Kunkel et al., 2006; Vygotsky, 1978, 1980). The continuous back-and-forth interaction among individuals – termed by some

to be a *reciprocal determinism* – maintains the learning process (Bandura, 1986; Herrmann et al., 2007). Internal processes that are central to the cognitivist approach play a role as do the external stimuli at the core of behaviorism, which leads many to consider SLT a melding of the principles of these two theoretical schools (Bandura, 1977, 1986; Herrmann et al., 2007; Kunkel et al., 2006; Vygotsky, 1978, 1980).

For the purposes of PBS interventions, staff members providing services play the part of a role model by demonstrating the impact that appropriate behaviors have, such as compliance, coping skills like patience, and calming techniques like relaxation exercises; in this way, they assist the individual in recognizing the social and cultural fit that these have in their environment. Staff also help the client improve their behaviors by pointing out examples of others in the environment doing the same. Where appropriate, examples of people acting in inappropriate ways can be pointed out as a teachable moment for the client. In these ways, they help influence the likelihood of the client repeating the behavior (see Bandura, 1986; Herrmann et al., 2007; Kunkel et al., 2006; Vygotsky, 1978, 1980). Similarly, they can help clients learn the reasons behind why certain behaviors are considered appropriate or inappropriate. PBS, like SLT, holds that learning is a collaborative process that occurs through a give-and-take between the individual's personal development and the social and cultural influences of their environment. A significant change in frequency of clients' maladaptive behaviors following the implementation of PBS-based interventions may indicate that staff were effective in helping clients learn the social reasons for and personal benefits of choosing more appropriate behaviors and avoiding maladaptive behavior choices.

Summary of Theoretical Foundations

This study was grounded upon a set of theoretical foundations that informed the concepts used in the examination of behavior supports. These included the behaviorist school of thought, CC approaches to understanding a person's actions, and the SLT treatment of behavioral change. Each of these theories informs the PBS framework of behavior therapy and plays a part in one or more of the components of this study of PBS model-based interventions for IH behavior supports to individuals with TBI. In the next section, I describe those components.

Literature Review of Key Concepts and Variables

I conducted the literature review for this study with three main areas of focus. First, I examined the condition of TBI in its various manifestations and what these suggested as far as treatment needs. Effective service planning and delivery for TBI clients requires that the clinicians and caregivers understand the type and severity of symptoms that present. The varying symptoms and challenges have direct implications for what support services are needed.

The second area of focus was on best practices for supporting individuals with TBI in managing these varied needs. Treating TBI-related needs IH was the main focus. I reviewed outcomes reported by IH support agencies serving individuals who present with varied mental and physical support needs, including the barriers and challenges identified in the providing of such supports. I found results from home health care for the elderly, those with dementia, social psychological disorders, and physical rehabilitation helped to inform the best IH treatment methods for use with TBI patients. I also

reviewed research examining the preference for IH services on the part of many individuals with TBI and how their attitude about service settings impacts the treatment process.

Finally, I examine the extant literature on the behavior support process, including on the PBS model that is an application of the broader applied behavior analysis approach. PBS methodology and studies that examined its use in a number of applications are described. I chose PBS based on prior research that indicated it is effective as an intervention for achieving behavior change and developing new behaviors/skills, in multiple applications including IH support services.

Traumatic Brain Injury

TBI has by definition a set of physical, mental, and emotional health deficits that negatively impact the individual's ability to perform daily living tasks and demonstrate normal life skills (APA, 2013; Bryson, Cramer, & Schmidt, 2017; Frazier, 2018; Hicks et al., 2017; Simpson, 2014; Wortzel & Arciniegas, 2014). In addition to evidence of trauma to the head, diagnosis of TBI requires the presence of at least one of four key features: loss of consciousness; posttraumatic amnesia; disorientation and confusion; or neurological signs, such as neuroimaging findings, seizures, visual field cuts, anosmia, or hemiparesis (APA, 2013; Davies, 2016; Wortzel & Arciniegas, 2014). These symptoms must also have occurred immediately after the injury event or after the person recovers consciousness following the event (and in that case must still be present following the acute post-injury period). Each of the individuals included in this study met these criteria for TBI diagnosis before having been approved for services by the agency involved.

Physical ailments like headache, dizziness, fatigue, and sleep disorders are common symptoms of TBI (Adams & Dahdah, 2016; APA, 2013; Gould et al., 2017; McGuire et al., 2017; Schmidt & Jones, 2016). Executive functioning difficulties are common (Frazier, 2018; McGuire et al., 2017; Sadeh et al., 2016; Schmidt & Jones, 2016). Cognitive deficits are widely reported (French et al., 2014; McGuire et al., 2017; Reddy et al., 2017; Schmidt & Jones, 2016; Turkstra, Politis, & Forsyth, 2015). Deficits in attention are typically co-occurring (Davies, 2016; McGuire et al., 2017; Michael et al., 2015; Schmidt & Jones, 2016). Memory-related difficulties are also often reported (Adams & Dahdah, 2016; Davies, 2016; McGuire et al., 2017; Schmidt & Jones, 2016; Turkstra et al., 2015).

Many TBI patients have described problems with emotion recognition (Gould et al., 2017; Kreutzer, Mills, & Marwitz, 2016; Schmidt & Jones, 2016). Emotional health problems like poor frustration tolerance, mood swings, apathy, or depression are often seen (Barnes et al., 2017; Gould et al., 2017; Gradus et al., 2015; Hicks et al., 2017; Kratz et al., 2017; Kreutzer et al., 2016; McGuire et al., 2017; Schmidt & Jones, 2016). Coping skills are often compromised (Adams & Dahdah, 2016; Barnes et al., 2017; Bryson et al., 2017; Davies, 2016; Kreutzer et al., 2016; McGuire et al., 2017; Simpson et al., 2014). In some extreme cases, depressive conditions have led to suicidal behavior (Barnes et al., 2017; Bryson et al., 2017; Gradus, et al., 2015).

A number of other mental health disorders are also cited in the TBI literature including impulsivity, anxiety, personality changes, irritability and aggressive tendencies (Adams & Dahdah, 2016; Gould et al., 2017; Hicks et al., 2017; James et al., 2014;

LoBlue et al., 2018; Ponsford et al., 2016; Schmidt & Jones, 2016). Other conditions commonly seen co-morbid with TBI include posttraumatic stress disorder (Haarbauer-Krupa, Taylor, Yue, Winkler, & Pirracchio, 2017; Schmidt & Jones, 2016; Simpson et al., 2014; Walker, Kaimalb, Gonzagab, Myers-Coffmanb, & DeGrabaa, 2016). Posttraumatic stress disorder often presents concurrently with personality changes and psychosocial difficulties. These conditions very often manifest as challenging maladaptive behaviors which require formal behavior supports.

Effective and ethical treatment for individuals with TBI requires an understanding of the type and severity of symptoms and the implications each has for service needs (APA, 2013; Barnes et al., 2017; Feeney & Achilich, 2014; Feeney & Ylvisaker, 2008; Griesbach, 2015; Libin et al., 2017; Morant et al., 2017; Schmidt & Jones, 2016; Tarapore et al., 2016). The specific needs identified in each individual client thus need to be considered when their plans of support are developed. Maladaptive behaviors typical of TBI clients generally fall under the categories of internal cognitive pathologies or externalized maladaptive behaviors. Internalized pathologies include cognitive functioning and mental health-related behaviors like withdrawal, isolation, dementia, and self-harming behaviors (Adams & Dahdah, 2016; Barnes et al., 2017; Bryson et al., 2017; Frazier, 2018; French et al., 2014; Gradus, et al., 2015; LoBlue et al., 2018; Turkstra et al., 2015). Externalized maladaptive behaviors like communication problems, verbal aggression, noncompliance with reasonable expectations, and conduct disorders such as physical aggression are commonly reported (Gould et al., 2017; Hicks et al., 2017; James

et al., 2014; Ponsford et al., 2016; Sadeh et al., 2016; Schmidt & Jones, 2016; Simpson et al., 2014**)**.

A number of assessment tools for determining maladaptive behavior needs are found in the literature such as the Behavior Problems Inventory (Rojahn et al., 2001; Sturmey, Fink, & Sevin, 1993), Scales of Independent Behavior-Revised (Maccow, 2006), Carer-Head Injury Neurobehavioral Assessment Scale (Deb, Bryant, Morris, Prior, Lewis, & Haque, 2007), King's Outcome Scale for Childhood Head Injury (Calvert et al., 2008), or the Instrumental Activities of Daily Living Profile to gauge executive functions in individuals suffering from TBI (Bottari, Dassa, Rainville, & Dutil, 2009). The Adaptive Behavior and Community Competency Scale and Frontal Systems Behaviour Scale can help assess adaptive behavior skills and community integration skills following the TBI event (Giles, 2007; Reid-Arndt, Nehl, & Hinkebein, 2007). The Personality Assessment Inventory and Millon Clinical Multiaxial Inventory-III can also help inform clients and clinicians about behavioral and mental health needs (Ruocco, Swirsky-Sacchetti, & Choca, 2007; Till, Christensen, & Green, 2009). Safety-related behaviors like aggression or SIB or property destruction are generally treated as high priority, with noncompliance and inappropriate verbal and social behaviors also included in most clients' treatment plans (Adams & Dahdah, 2016; Barnes et al., 2017; Hamlet et al., 2016; Libin et al., 2017; Morant et al., 2017; Schmidt & Jones, 2016; Tarapore et al., 2016).

Treatment Options

Rehabilitative support services that can address each of these treatment needs

generally seen with TBI are available in a number of settings like hospitals, clinics, veterans' centers, vocational training programs, schools, residential facilities or nursing homes (Feeney & Ylvisaker, 2008; Moretti, 2017; Spagnuolo, 2016; Tarapore et al., 2016; Taylor et al., 2017; Turner et al., 2010). IH support services are an option beyond these traditional service settings that many patients are now choosing (Bromer & Korfmacher, 2017; Farag et al., 2016; Feeney & Achilich, 2014; Stubbs & Achat, 2016; Turner et al., 2010; van Dijken, Stams, & de Winter, 2016). This availability of IH services for individuals with TBI is in large part driven by recent successes with utilizing IH supports for individuals whose needs were previously supported in traditional institutional settings like child care, elder care, nursing homes, dementia care, and residential services (Bromer & Korfmacher, 2017; Rivard, Morin, Dionne, Mello, & Gagnon, 2015; Stubbs & Achat, 2016; van Dijken et al., 2016).

IH supports for individuals with mental health disorders, intellectual challenges, and developmental disabilities have grown in breadth and number in recent years as the move toward deinstitutionalization has proceeded vigorously (Bartels & Van Critters, 2005; Hudson, 2016; Krieg, 2001; McGuire et al., 2017; Mitchell, 2006; Morant et al., 2017; Nøttestad & Linaker, 1999; Olmstead, 1999; Spagnuolo, 2016). In some cases, these supports are provided by the person's social network, such as family or friends (Adams & Dahdah, 2016; Hopman, 2012; Marshall & Mirenda, 2002; Rivard et al., 2015). IH care from family and friends was at times not adequate to meet the full range of the clients' needs, though, and they were left with a decision about whether to opt for the traditional clinical settings to get needed care or hiring paid caregivers to come into

the home (Abrams, 2017; Bartels & Van Critters, 2005; Hobson-Williams, 2017; Hopman, 2012; Morant et al., 2017; Spagnuolo, 2016; Stubbs & Achat, 2016). Community agencies providing IH services helped address this and allowed clients to remain at home during their prolonged recovery and/or maintain their safety while they adapt to permanent physical and mental health challenges (Hobson-Williams, 2012; Hopman, 2012; Morant et al., 2017; Stubbs & Achat, 2016).

IH TBI support services can build off of these practices tried and tested in other areas of IH support services (Bromer & Korfmacher, 2017; Feeney & Achilich, 2014; Feeney & Ylvisaker, 2008; Hobson-Williams, 2012; Hudson, 2016; Kratz et al., 2017; McGuire et al., 2017; Saban et al., 2016; Tarapore et al., 2016). IH nursing and residential care for children, veterans, and other adults with TBI have been effective (Bromer & Korfmacher, 2017; Hobson-Williams, 2012; McGuire et al., 2017; Moretti, 2017; Stubbs & Achat, 2016; Turner et al., 2010). Other IH TBI services that have shown success include behavioral therapy and crisis services programs (Barnes et al., 2017; Feeney & Achilich, 2014; Kalb et al., 2016; Meixner et al., 2013; Morant et al., 2017; NY State Office of Mental Health, 2009; Ponsford et al., 2016). Vocational rehabilitation and other community-reintegration programs also transfer well to the field of IH TBI support services (Graham et al., 2016; Kowlakowsky-Hayner & Stejskal, 2012; Libin et al., 2017; Moorea & Friedman, 2017; Moretti, 2017; Moriarty et al., 2016). With modifications as necessary to address the specific needs presented by TBI clients, research on these other service industries can inform IH TBI support practices by applying appropriate lessons about best practices for providing effective overall IH

support services; this study focused on one such application of past research, the behavior support aspect of IH services.

Positive Behavior Support

This study examined PBS-based IH support services provided to a group of individuals with TBI. Evaluating the efficacy of these behavioral interventions requires an understanding of the PBS model they are based upon. As such, a primary focus of the literature review that I conducted was the methods to be used according to the PBS treatment model.

PBS methodology is based largely on understanding the individual's presenting needs and how these have been influenced by stimuli (APBS, 2014; Davies, John-Evans, 2016; Feeney & Achilich, 2014; Hamlet et al., 2016; Horner & Sugai, 2015; Jamolowicz & Tetreault, 2015; Kyzar & Strickland-Cohen, 2017; Sailor et al., 2009; Shawler, et al., 2018; Wehmeyer, 2013). Next, it is important for the clinician to see clients' choices as being a result of their motives to meet those needs plus their plan for how to achieve that within the particular setting they are in (APBS, 2014; Arco & Bishop, 2009; Davies, John-Evans, 2016; Feeney & Achilich, 2014; Hamlet et al., 2016; Horner & Sugai, 2015; Jamolowicz & Tetreault, 2015; Kyzar & Strickland-Cohen, 2017; Sailor et al., 2009; Shawler, et al., 2018). A functional analysis informs clinicians about what ends the client intends to achieve and what they typically do to achieve them; from there alternate behaviors can be recommended and reinforced which meet those needs in more appropriate ways (APBS, 2014; Arco & Bishop, 2009; Davies, John-Evans, 2016;

Dunlap et al., 2013; Freeman et al., 2002; Hamlet et al., 2016; Jamolowicz & Tetreault, 2015; Sailor et al., 2009; Shawler, et al., 2018; Wehmeyer, 2013).

PBS clinicians then build from this understanding of function and develop a behavior support plan that focuses on how to help the client effect behavioral change (APBS, 2014; Arco & Bishop, 2009; Freeman et al., 2002; Hamlet et al., 2016; Horner & Sugai, 2015; Jamolowicz & Tetreault, 2015; Sailor et al., 2009). The support plans are proactive in approach, i.e., finds ways to satisfy a client's needs before situations arise where they may act to satisfy them in potentially inappropriate ways, and they use natural versus artificial consequences – ones which naturally follow behaviors, such as harm to oneself, damage to social relationships, financial difficulties if vocational problems arise, etc. (APBS, 2014; Freeman et al., 2002; Hamlet et al., 2016; Horner & Sugai, 2015; Jamolowicz & Tetreault, 2015; Sailor et al., 2009).

PBS interventions based on these functional analysis-driven behavior support plans are widely supported in the literature for addressing functional skill deficits, including those suffered by individuals with TBI-related deficits (APBS, 2014; Arco & Bishop, 2009; Hamlet et al., 2016; Hicks et al., 2017; Jamolowicz & Tetreault, 2015; Sailor et al., 2009). Several studies recommended the use of interventions which first focus on rehabilitation from physical impairments caused by TBI, the 'medical first' approach that is a basic component of the PBS model (APBS, 2014; Griesbach, 2015; Hamlet et al., 2016; Hicks et al., 2017; Jamolowicz & Tetreault, 2015; Pagan et al., 2015; Sailor et al., 2009). The rationale is that behavior support interventions are far less likely to be successful if medical issues are causing the individual to suffer from impairments or

other negative influences on the behavioral interventions – only after medical causes are ruled out can the focus on functional analysis and replacement behavior reinforcement be effective (Adams, & Dahdah, 2016; APBS, 2014; Dunlap et al., 2013; Hamlet et al., 2016; Hassiotis; Hicks et al., 2017; Jamolowicz & Tetreault, 2015).

Next, functional skill rehabilitation is the focus of PBS-based TBI interventions. Functional skill deficits are identified in the functional analysis process and, with a strengths-based approach, a plan is developed for addressing those needs (APBS, 2014; Arco & Bishop, 2009; Davies, John-Evans, 2016; Davies, Mallows, 2016; Hamlet et al., 2016; Horner, Sugai, Todd, & Lewis-Palmer, 2000; Jamolowicz & Tetreault, 2015; Sailor et al., 2009; Wehmeyer, 2013). Then, where the functional analysis indicates that there are social, interpersonal, etc., behavior-related needs, a plan is generated which focuses on addressing the client's maladaptive behaviors (APBS, 2014; Arco & Bishop, 2009; Davies, John-Evans, 2016; Hamlet et al., 2016; Jamolowicz & Tetreault, 2015; Sailor et al., 2009; Wehmeyer, 2013).

Summary

I reviewed research that has shown the benefits available from IH support services to individuals with various types and degrees of mental and physical health needs. This included home health care for the elderly and those with dementia, individuals with social psychological disorders, and clients in need of physical rehabilitation. Next, I reviewed studies supporting the use of PBS-based interventions for developing new behaviors and improving skills. Research showing the effectiveness of PBS supports in the treatment of behavior challenges in several settings including school, community services, and IH was

described. Specifically, studies that examined the effectiveness of PBS in the treatment of TBI-related behavior challenges were discussed. It was noted that there has been a relatively small amount of research focusing on cases having all of these three components, PBS-based support services to TBI patients provided IH. Studies that examined this have been single-case or small-subject studies. Here, PBS has been shown effective in treating TBI clients' needs in natural settings like their homes, but the authors note that it is not known whether these services are effective in the larger scale. This study fills the gap in the literature by examining the association between certain maladaptive behaviors and PBS-based IH services for TBI clients on a larger, community service agency level.

The next chapter analyzed whether PBS-based IH support services from a TBI community services agency were associated with the frequency of certain maladaptive behaviors by their clients. Results from this examination add to the literature concerning the efficacy of PBS-based services for TBI patients by expanding the sample beyond single-case and small-group studies that have been reported thus far. The results are important in understanding whether PBS-based IH services on a larger scale are associated with a difference in maladaptive behaviors and should be recommended for use by TBI services agencies. This study can inform decisions by individual community support agencies and the relevant state and federal oversight bodies about how best to provide IH services to TBI clients, an important social question about the best practices for serving this growing population.

Chapter 3: Research Method

Introduction

The purpose of this quantitative study was to examine whether PBS-based IH behavior support services to individuals with TBI were associated with changes in the frequency of certain maladaptive behaviors. The findings of this study can provide a foundation for future research on the effectiveness of larger-scale, agency-level PBS-based IH support services for individuals with TBI. The results can also be used to inform decisions by state and local oversight bodies to recommend that agencies use PBS-based IH interventions when working with the growing population of TBI clients who require behavior support services.

In Chapter 3, I explain the methodology used in this study, including the rationale for the research method, the population that was examined, the instruments used for evaluating the interventions, the sampling strategy, and an overview of the statistical analyses that were conducted. Threats to validity and ethical considerations are also discussed. I provide a summary at the close of the chapter.

Research Design and Rationale

Research examining the effectiveness of IH behavior support services using PBS-based interventions is limited. Previous researchers of this topic used single-case study designs or had small sample sizes, and studies with a greater number and breadth of subjects is needed. In this study, I examined the association between the use of PBS-based IH services and three types of maladaptive behavior displayed by TBI clients (i.e., physical and verbal aggression and noncompliance) in a larger, agency-level sample.

In this study, I used an ex post facto quasi-experimental research design (see Heiman, 2000; Heppner, Kivlighan, & Wampold, 1992; Shadish et al., 2002). The data used in this study were gathered from archived reports on services provided to clients during previous operations, within the 3-year period selected for examination, collected by the participating agency from clinicians' records. Only the aggregate totals of reported behaviors for the whole sample were reported to me. I used the data to evaluate the association between PBS-based services and the occurrence of the behaviors of interest among the clients in the sample. The ex post facto research design was appropriate because it is used to examine groups with qualities that already exist (in this study, individuals with TBI who received IH behavior support services) and compares their level of dependent variables (i.e., the three types of maladaptive behaviors) after having received the independent variable of PBS-based services (see Heiman, 2000; Heppner et al., 1992; Shadish et al., 2002). This type of study was appropriate since the data of interest are archival data that were produced by the agency for purposes other than this research. The ex post facto design is considered quasi-experimental because the population being examined was not randomly assigned, instead, it was aggregate data from the group of clients who received services from the same agency (see Heiman, 2000; Shadish et al., 2002).

The sample size for this research project was the 62 clients who received IH behavior services from a local TBI services agency during the period from which archival data were able to be drawn. Target behaviors chosen for this study were selected in order to be able to use the full data set available because noncompliance and aggression were

tracked in all cases. This number met the requirements of the Central Limit Theorem, which has a minimum of 30 participants (see Rouaud, 2017; VanVoorhis & Levonian Morgan, 2006). Researchers have proposed a minimum of five subjects per variable being examined, while others suggested a minimum of 10 (see Hair, Black, Balin, & Anderson, 2010; Rouaud, 2017); in each case, the sample size meets their requirements. The 62-subject sample for this study met the requirements for being statistically sound.

I completed a G*power analysis for this study. The chi square test family and the goodness-of-fit (contingency tables) statistical test was selected, with the a priori type of power analysis. The effect size of 0.30 and alpha value of 0.05 was chosen, with the power of 0.8 and 2 degrees of freedom (for the 2x3 contingency table to be used). The results determined that the suggested sample size for this research design was 108. Since the agency was not able to provide that number of clients, I took this into account in the interpretation of findings for this study.

The research questions and corresponding hypotheses that guided this study are as follows:

RQ1: Is there a difference in frequency of physical aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services?

H$_0$1: There is no difference in frequency of physical aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services.

*H*A1: There is a difference in frequency of physical aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services.

RQ2: Is there a difference in frequency of verbal aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services?

*H*02: There is no difference in frequency of verbal aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services.

*H*A2: There is a difference in frequency of verbal aggression behaviors for persons after they have received PBS-based IH services compared with before they received such services.

RQ3: Is there a difference in frequency of noncompliance behaviors for persons after they have received PBS-based IH services compared with before they received such receiving PBS-based IH services compared with persons receiving no services?

*H*03: There is no difference in frequency of noncompliance behaviors for persons after they have received PBS-based IH services compared with before they received such receiving PBS-based IH services compared with persons receiving no services.

*H*A3: There is a difference in frequency of noncompliance behaviors for persons after they have received PBS-based IH services compared with

before they received such receiving PBS-based IH services compared with persons receiving no services.

The results from this study advance the knowledge within the TBI behavior support services discipline by increasing awareness of whether PBS-based IH interventions are associated with decreased maladaptive behaviors. I did not conduct any interventions during this study. There were no expected time or resource constraints for this study.

Methodology

The target population for this study was a group of adults diagnosed with TBI who received behavior support services at their homes. I conducted this study with a local community services agency whose clinicians provided IH TBI support services. (The IRB approval number for this study was 01-03-20-0091627.) Aggregate categorical data were collected from work done by these clinicians with 62 clients whose target behaviors for treatment included physical aggression, verbal aggression, and noncompliance.

Procedures for Recruitment and Participation

I proposed this study to a community services agency whose clinicians oversaw services to individuals with TBI receiving IH supports. The agency was identified as a potential collaborator on this project in part because of my familiarity with them having previously served as a consulting clinician. The agency's consultants oversaw PBS-based IH support services during the period of time identified for this project. Participation in this study was voluntary on the part of the clinicians. Archival data was

used in this study, and aggregate totals were provided for the frequencies of the three target behaviors reported for the group of clients the clinicians worked with during a 1-month period prior to and a 1-month period 1 year after receipt of PBS-based services. No identifying information about the clients in the sample group was provided.

Data Collection

Behavioral Data

As part of the TBI Waiver Program, each agency is required to collect and report on behavior data related to the services being delivered to the TBI clients; specifically, they are required to monitor the frequency of each maladaptive behavior that the client's service plan is intended to address. These data are recorded on behavior data sheets (described in the "Instrumentations" subsection later in this section) by the clients' assigned staff. These are reviewed by the clients' assigned clinician, totaled, and reported on by that clinician. As part of this research project, administrators of the agency gathered the archival data recording the frequency of target maladaptive behaviors (i.e., noncompliance and verbal and physical aggression) from past tracking of services provided to the clients comprising the sample. The aggregate total of each of the three behavior categories for all clients within the designated time periods was calculated and forwarded to me. In this way, data related to the research questions was provided from archival records.

Data Demographics

Demographic data were not gathered for the sample given the nature of this project and the potential issues relating to use of identifying individual data from a

vulnerable population. In the future, it may be beneficial to repeat this study with certain demographic factors documented, such as age, gender, length of time receiving support services, and years with the participating agency. These variables may be found to be associated with frequencies of some or all of the target behaviors being examined.

Instrumentation of Constructs

The standard agency-based tracking system for measuring the efficacy of IH supports was the source of data utilized during this study. Support services staff at the agency are responsible for completing a behavior data tracking sheet for each client on each shift. These staff are direct support professionals who have a required combination of education and work experience in this field and who have been trained by the agency to provide behavior support services to individuals with TBI and accurately report on them. Staff report on whether the target behaviors identified in each client's service plan were observed during their shift. Staff have been trained on the definition of the clients' specified target maladaptive behaviors (e.g., aggression or noncompliance) and when behaviors are observed that meet these definitions on their shift. This is tallied for that shift, a total for each shift that month is made, and a report of monthly frequency (i.e., counts) is generated. The frequency of each target behavior is utilized as a measure of progress in the client's treatment. As these tracking sheets are an embedded part of the agency's approved reporting system for the purposes of behavior monitoring (by the state governing body and insurance reimbursement processes), the data generated from them were appropriate for this research. As noted earlier, the aggregate totals of the reported

frequencies of the three types of behaviors for the whole sample were used to address the research questions.

Data Analysis

I used the Statistical Package for the Social Sciences (SPSS) software, Version 24 (Field, 2016) for statistical analysis of the data provided. Variables used in this study included the frequency of each target behavior displayed by the participating clients as reported by agency staff (i.e., verbal aggression, physical aggression, and noncompliance; criteria for which was defined in each client's service plan for utilization by support staff working with them). The sets of data used to measure these variables are described in the following subsections.

Target Behaviors

The behaviors for which the agency has formal data gathering carried out by their staff for each client is their set of target behaviors. The frequency at which each target behavior is observed during a staff's shift is reported for that client's target behaviors for that shift. The frequency reported during the period of time selected for this study was the focus of analysis in this research project. The frequency of behaviors reported in the month prior to the receipt of PBS-based services was compared with the frequency of these behaviors in the month 1 year after the receipt of PBS-based interventions. I used changes in rates after the group of clients received a year of PBS-based services to evaluate whether there is an association between receipt of these services and the frequency of behaviors for that client to address the research questions.

It is important to note that the DV of maladaptive behaviors was measured as three separate types of behavior because they differ enough to often be seen independent of each other. A client will often display only noncompliance or only aggressive behaviors, but they can demonstrate these concurrently as well. For example, noncompliance often leads to verbal aggression after staff continue to encourage the client to fulfill expectations, such as household chores, work-related activities, proper interpersonal behaviors, etc. Verbal aggression often precedes episodes of physical aggression as the client's agitation escalates. Examining the reported rates of each of these behaviors allowed for more focused analysis of the association between each of the behaviors and those PBS-based interventions.

Analysis

I conducted an analysis of quantitative data that compared the frequency of three maladaptive behaviors – physical aggression, verbal aggression, and noncompliance – reported for clients for 1 month prior to and the month 1 year after receiving PBS-based services. A pretest-posttest design was used to compare the frequency of reported behaviors for the sample of clients. As these were categorical data, the chi-square procedure was used to determine whether the independent and dependent variables were associated with each other. Chi-square contingency tables were generated with two columns for the independent variable (the use or non-use of PBS interventions) and three rows for the dependent variables (the three types of maladaptive behavior being examined). A nonparametric test was chosen because the conditions required for validity in a parametric test were not met with the data set used in this study – it cannot be

asserted that the sample followed a normal distribution and sample variances were homogenous. Nonparametric tests do not rely on any distribution so they can be used even if parametric conditions of validity are not met. The categorical data that I used for this study align with the use of this nonparametric tool as well.

The significance level of 0.05 was used to test the null hypotheses (see Hair et al., 2010; Heppner et al., 1992; Pearl & Bareinboim, 2014; Shadish et al., 2002). Analysis focused on whether the behavior counts among the clients in the sample during the first month of observation (prior to intervention) fit with the observed counts in the same group of clients a year after the intervention had been applied – i.e., whether there was a goodness of fit between the initial count and the later observed behavior counts if the intervention had no effect (see Hair et al., 2010; Heppner et al., 1992; Pearl & Bareinboim, 2014; Shadish et al., 2002). Significant changes in frequency (counts per month) of each selected maladaptive behavior following the use of PBS-based intervention was taken as an indication that the use of PBS-based supports is associated with clients' maladaptive behavior rates.

Threats to Validity

External Validity

External validity refers to the degree to which the research results are generalizable across persons, settings, and times (Heppner et al., 1992; Pearl & Bareinboim, 2014; Shadish et al., 2002). Threats are presented to external validity when results of a study are generalized to situations or subjects that were not specifically the focus of that study (Pearl & Bareinboim, 2014). In the case of this study, care was taken

to limit the findings to the specific question of efficacy for TBI clients receiving IH PBS-based services. The results do not directly apply to patients receiving IH supports for conditions beyond TBI, nor is it directly applicable to TBI clients receiving PBS services outside the home environment.

Internal Validity

Internal validity refers to the confidence that can be placed in the inferring that an effect was present among the variables being tested while at the same time ruling out rival hypotheses (Heppner et al., 1992; Pearl & Bareinboim, 2014; Shadish et al., 2002). In the case of this study this involves focusing on whether the use of PBS-based interventions was associated with the frequency of the clients' behaviors. Relevant threats to this internal validity are described in this section.

The first threat to validity that was considered was history, or the possibility that an event occurred during the time when the interventions were provided that may have affected the outcomes for clients (Heppner et al., 1992; Shadish et al., 2002). An example for this study might be a significant change in staffing or an event occurring within the agency that impacted service delivery in a significant way. Variations in the delivery of PBS-based interventions might impact the frequency of behaviors seen. While this threat could not be completely controlled for, it is important to note that the clinicians involved reported no such significant event during the research time period.

Next, regression to the mean, or the threat of statistical regression, needed to be accounted for (Heppner et al., 1992; Shadish et al., 2002). The likelihood that subjects who measured relatively low on frequencies of some target behaviors had reportedly

higher counts on the next measurement, and conversely that subjects who scored high initially scored lower at the second measurement, needed to be accounted for in the data analysis. Since aggregate data across all clients was used in this study, not individual client records, this threat to validity could not be entirely ruled out; however, including in the subject pool data from all of the agency's clients who met the criteria of having received services for all three target maladaptive behaviors helped to reduce the likelihood of this threat.

The threat of maturation, or normal developmental changes during the course of the examination period (see Heppner et al., 1992; Shadish et al., 2002), was not considered substantial because the window of time that I examined was not extensive and the clients involved were adults who had received IH support services for some time at the start of this study. Similarly, the threat of attrition, or the effect of having subjects drop out of this study, was not an issue because the group being examined participated in services throughout the period of time that was examined. There was no ambiguity about the direction of causal influence in this study, so that threat was not an issue. All subjects were given the same treatment (use of PBS-based IH support service interventions) so there was no threat of diffusion.

Construct Validity

Construct validity refers to how well the dependent and independent variables that were used in this study represented the constructs that the study intended to measure (see Heppner et al., 1992; Shadish et al., 2002). In this study the independent variable – PBS interventions – is a clear construct and well defined in terms of treatments that had been

delivered. Similarly, the dependent variable – clients' behavioral outcomes – were clearly defined and measured in a determined way by the agency and thus construct validity is not felt to be a concern.

Ethical Procedures

The human subject guidelines put forth by the Walden University Institutional Review Board were followed in this study (IRB approval number 01-03-20-0091627.) During the course of the research all APA ethical guidelines were followed including those referring to researcher conduct and the treatment of subjects (APA, 2013). No incentives were given to subjects for participating in this study (APA, 2013).

No data utilized in this study were additional to that already gathered by the participating agency. Data collected for this study were protected to ensure the safety of client confidentiality. Data gathered by staff in the normal course of work functions (including data used in this study) were protected using agency-mandated confidentiality measures. Data collected were likewise protected under the agency's confidentiality requirements and processes. My committee members and I have access to the data collected for this study. The data are stored in my home office computer which is protected by a personal password that is regularly changed. The data will be available to me for 3 years and then destroyed. I relied solely on statistical analysis and no other interpretation of any data. This study was not conducted in my work environment.

Summary

The literature is strong regarding the effectiveness of PBS-based interventions for maladaptive behaviors in individuals with intellectual disabilities, emotional

disturbances, and related pathologies; this suggests that transferring these behavior support strategies to the TBI population may be effective. Research has shown positive outcomes from IH supports for individuals with daily living skills deficits, physical injuries, advanced age, and mental health needs such as from Alzheimer's and developmental disabilities. Studies have shown that this modality of care can effectively assist clients with TBI in their attempt to remain in their communities versus placement in residential or hospital treatment facilities. However, research on the efficacy of PBS-based interventions for individuals with TBI receiving supports IH is inadequate at present.

While intuitively it appears that such behavioral interventions should be effective in this application, it is important to more fully evaluate this. Such an evaluation should include determining that this type of service does work in this setting. Given the large, and continually growing number of persons with TBI, and the importance of effective community-based supports for them, research on IH PBS services for TBI clients is important for helping health care and social support programs understand how best to provide supports for these individuals.

This study I conducted contributes to this need by examining the association between PBS-based IH interventions and TBI clients' challenging maladaptive behaviors. The sample was provided by clinicians from a community services agency from archival data from work with TBI clients, gathered from their existing records. Aggregate data were pooled for 62 clients, with no personal identifying information included.

In the next Chapter I provided a description of the results obtained from the examination of data that were provided. It includes an introduction, data collection description, results of the analysis conducted, and summary of results.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to examine whether there is an association between TBI clients' maladaptive behaviors and community agencies' use of PBS-based IH support services. Specifically, I examined behavioral outcomes in three areas (i.e., noncompliant behavior, verbal aggression, and physical aggression) prior to and after PBS-based IH supports were provided by a TBI community services agency. In this chapter, I describe the data that were provided from clinicians' behavioral reports for clients in the sample, and the significant findings that resulted from the chi square statistical methods applied to the data. The relation of those findings to the theoretical framework of this study is described. The relevance of the research to future TBI support services is discussed as it relates to the research questions and associated hypotheses that follow:

RQ1: Is there a difference in frequency of physical aggression behaviors for persons receiving PBS-based IH services compared with persons receiving no services?

$H_0$1: There is no difference in frequency of physical aggression behaviors for persons receiving PBS-based IH services compared with persons receiving no services.

H_A1: There is a difference in frequency of physical aggression behaviors for persons receiving PBS-based IH services compared with persons receiving no services.

RQ2: Is there a difference in frequency of verbal aggression behaviors for persons receiving PBS-based IH services compared with persons receiving no services?

$H_0$2: There is no difference in frequency of verbal aggression behaviors for persons receiving PBS-based IH services compared with persons receiving no services.

H_A2: There is difference in frequency of verbal aggression behaviors for persons receiving PBS-based IH services compared with persons receiving no services.

RQ3: Is there a difference in frequency of noncompliance behaviors for persons receiving PBS-based IH services compared with persons receiving no services?

$H_0$3: There is no difference in frequency of noncompliance behaviors for persons receiving PBS-based IH services compared with persons receiving no services.

H_A3: There is difference in frequency of noncompliance behaviors for persons receiving PBS-based IH services compared with persons receiving no services.

Research Methods and Data Collection

The archival data used in this study were provided by a community services agency from clinicians' reports on maladaptive behaviors displayed by their IH TBI services clients. For each of the clients included in the sample, the frequency of reported noncompliance, verbal aggression, and physical aggression were the data of interest. Specifically, the number of shifts per month that staff reported the client had displayed

that behavior. The month prior to the client receiving PBS-based services was the first data point taken (referred to as "M_{pre}" or "pre-PBS services"), and the month 1 year after they had received the services was the second data point ("M_{post}," or 1 year "post-PBS services").

I used different 1-year periods of service delivery within the 3 year range selected for the examination for different clients because the start dates for each were not always consistent. In each case, the first year of service delivery for each client was used to help protect validity. In order to adjust for months having varied numbers of days, 30 days of data were considered regardless of the calendar month that services began. Since no clients began services in March (i.e., no data from February months was involved), this was acceptable.

The clients in the sample were individuals with TBI who received services from the agency during the selected 3-year period of previous operations. All clients in the data set were adults. Other age- and gender-related demographics were not requested for the project. The intended sample size of 110 was not met. This was due to the limited participation by several local agencies, and then, after repeated attempts to expand the data set outside of the local area and inquire elsewhere in the state, by several other agencies across the state. The sample size met the minimum requirement noted in Chapter 3 (i.e., 30), so this study continued as planned. Considerations called for by the lower sample size are addressed later in this chapter.

The number of shifts that each client displayed the three behaviors of interest (i.e., physical aggression, verbal aggression, and noncompliance) in the month prior to (M_{pre})

and after (M_{post}) receiving PBS-based IH services were summed to yield an aggregate score for the sample both pre and post service delivery. This aggregate score was generated for each of the three behavior types being examined. These totals across the sample were the data provided to me by the agency administrator. There were no discrepancies between the plan described in Chapter 3 and the data that were provided. Table 1 displays these data.

Table 1

Number of Shifts With Reported Behaviors

	Month prior to receipt of PBS services (M_{pre})	Month following 1 year of PBS services (M_{post})
Noncompliance (NC)	3,092	2,656
Verbal aggression (VA)	1,977	1,649
Physical aggression (PA)	144	112

Results of Analysis

I conducted chi square tests as described in Chapter 3, using the coded variables listed in Table 1 (NC-M_{pre}, VA-M_{pre}, PA-M_{pre}, NC-M_{post}, VA-M_{post}, and PA-M_{post}). The sample size met the minimum requirement noted in Chapter 3 (i.e., 30). Though not ideal, the sample size was large enough to determine statistically significant associations between the observed and expected frequencies of each variable.

Table 2 presents the results of chi square analysis and shows that the aggregate total of reported behaviors in each category (i.e., physical aggression, verbal aggression,

and noncompliance) were lower after 1 year of receipt of PBS-based services. The amount of change seen in each category varied.

Table 2

Chi Square Analysis of Target Behavior Frequencies After 1 Year of PBS

	Observed frequency	Expected frequency	Residual (O-E)	$\frac{(O-E)^2}{E}$
Noncompliance	2,656	3,092	436	61.48
Verbal aggression	1,649	1,977	328	54.42
Physical aggression	112	144	32	7.11
Chi square (x^2)				123.01

Differences in Number of Reported Physical Aggression Behaviors

In this section, I address the first research question: Was there a difference in observed and expected frequencies of physical aggression behaviors after persons received a year of PBS-based IH services compared with the same persons before receiving such services? Table 2 presented the results of chi square tests to examine the relation between reported physical aggression behaviors and the receipt of PBS-based support services. There was a significant relationship between these variables, X^2 (2, N = 62) = 7.11, p = .028581. Based on these findings, I can assert that TBI clients were less likely to demonstrate physical aggression behaviors as a result of receiving 1 year of PBS-based IH support services.

Sufficient statistical evidence was provided to reject Null Hypothesis 1 that there would be no differences between the physical aggression behaviors demonstrated by

clients after they received PBS-based IH services and before they did. Significant ($p <$ .05) differences were identified between the expected and the reported frequency of these behaviors in the month 1 year after receipt of IH PBS-based services.

Differences in Number of Reported Verbal Aggression Behaviors

In this section, I address the second research question: Was there a difference in observed and expected frequencies of verbal aggression behaviors after persons received PBS-based IH services compared with the same persons before receiving such services? Table 2 presented the results of chi square tests to examine the relation between reported noncompliance behaviors and the receipt of PBS-based support services. There was a significant relationship between these variables, X_2 (2, N = 62) = 54.42, $p < .001$. Based on these findings, I can assert that TBI clients were less likely to demonstrate verbal aggression behaviors as a result of receiving 1 year of PBS-based IH support services.

Sufficient statistical evidence was provided to reject Null Hypothesis 2 that there would be no differences between the verbal aggression behaviors demonstrated by clients after they received PBS-based IH services and before they did. Significant ($p < .05$) differences were identified between the expected and the reported frequency of these behaviors in the month 1 year after receipt of IH PBS-based services.

Differences in Number of Reported Noncompliance Behaviors

In this section, I address the third research question: Was there a difference in observed and expected frequencies of noncompliance after persons received PBS-based IH services compared with the same persons before receiving such services? Table 2

presented the results of chi square tests to examine whether there was an association between reported noncompliance behaviors and the receipt of PBS-based support services. There was a significant relationship between these variables, X_2 (2, N = 62) = 61.48, $p < .001$. Based on these findings, I can assert that TBI clients were less likely to demonstrate noncompliance behaviors as a result of receiving 1 year of PBS-based IH support services.

Sufficient statistical evidence was provided to reject Null Hypothesis 3 that there would be no differences between the noncompliant behaviors demonstrated by clients after they received PBS-based IH services and before they did. Significant ($p < .05$) differences were identified between the expected and the reported frequency of these behaviors in the month 1 year after receipt of IH PBS-based services.

Summary

I conducted inferential statistical analysis to determine if the receipt of PBS-based support services was associated with the frequency at which clients demonstrated three types of maladaptive behavior (i.e., noncompliance, verbal aggression, and physical aggression). The archival data used in this project were provided by a community services agency whose clinicians oversaw IH behavioral health services to individuals with TBI. The archival data described the aggregate total behavior data of 62 clients receiving IH support services for their TBI-related needs. The results indicated that the number of shifts with reported noncompliance, reported verbal aggression, and reported physical aggression were significantly associated with receipt of PBS-based IH services.

In the next chapter, I present an interpretation of the findings and their implications in the context of the literature. An analysis related to theoretical framework is also provided. The limitations of this study are discussed and implications from this study and recommendations for future research are considered. I end this study with a final conclusion.

Chapter 5: Summary, Conclusions, and Recommendations

Summary

The purpose of this quantitative study was to examine whether there is an association between the receipt of PBS-based IH support services by TBI clients and the frequency of certain maladaptive behaviors (i.e., noncompliance, verbal aggression, and physical aggression). The findings of this study contribute to literature related to the benefit of using PBS-based services to support the needs of adult individuals with TBI receiving IH treatment. The results showed that PBS-based IH support services were associated with a reduction of the maladaptive behaviors under examination.

In this study, I examined behavioral outcomes prior to and after PBS-based IH services were provided to the individuals in the sample. The specific maladaptive behaviors targeted in this examination were chosen because they are the most commonly seen by clinicians providing IH supports to TBI clients. The purpose was to use a larger sample size than what the current literature offered in order to better assess the benefits of using IH PBS-based services for TBI clients at the agency-wide level. This study is an important contribution to the literature as well as to the industry because it gives added information for deciding whether TBI community service agencies should use IH PBS-based interventions. The results indicated that there was an association between PBS services and the three maladaptive behaviors examined, suggesting that this mode of behavior support services is effective for these clients.

Interpretation of Findings

This study contributes to the literature by furthering the evidence for the efficacy of IH PBS-based support services in treating TBI-related challenging behaviors. Previous research has shown the benefit of using this model of behavior supports to address challenging TBI-related behaviors within single-case studies or studies with small sample sizes, and researchers had indicated the need for extension to larger-sample studies. This project addressed that need by examining the use of PBS-based IH TBI support services at the agency level. By analyzing aggregate data for adults receiving TBI support services from a community agency, I was able to extend knowledge about use of this model for this population by looking at a larger sample of clients receiving IH support services.

The findings of this study are consistent with what had been shown in smaller-sample case studies of IH PBS services to clients with TBI (see Arco & Bishop, 2009; Feeney & Achilich, 2014; Hicks et al., 2017; Jones-Berry, 2016; Moretti, 2017; Saban et al., 2016). Several studies showed PBS-based support services were effective in assisting individuals with managing TBI-related challenging behaviors with the help of family caregivers who were trained in this model of supports; others, including this study, showed that positive results were found when services were provided by staff trained in PBS. Data provided for this study showed that clinicians saw a significant decrease in noncompliance and verbal aggression and physical aggression on the part of their adult TBI clients after the receipt of 1 year of PBS-based IH support services. These findings built upon what was found in earlier small-sample studies by showing that PBS-based

services were effective at the agency-wide level for providing IH behavior supports to TBI clients. This study addressed the noted gap in the literature: the lack of studies on larger cases beyond the single-case study or small sample size research that were conducted previously. This study is important in practice because it demonstrates the benefits of using this model of behavior supports by agencies providing IH support services to individuals with TBI. This benefit can be extended beyond the organizational level to the policy level where it can inform state regulatory bodies in deciding which agency services should receive their support and funding.

Limitations of the Study

I identified some limitations relating to the research methods used in this study. The recruitment of agencies as participants in this study proved more difficult than planned. The agency initially sought as the source of data did not end up as a participant due to their failure to communicate, correspond, and supply the needed data. Several other TBI community services agencies in the area that were contacted subsequent to this were also unable to provide the required data. In part, this was due to limited or no communication on the part of their administrators, and in some cases, this was due to the agencies not having records that would allow for collection of the data intended for use in this study. Eventually, I was able to find a set of data that met the criteria needed for this study and that agency provided the information used in this study. The result of the limited participation by agencies in this study was a slightly lower sample size than initially hoped for. The minimal sample size was met; however, some considerations about the power level needed to be taken in rejecting the null hypotheses about the

behaviors being examined. The strength of the association between PBS-based services and the dependent variables was interpreted with care.

The results of this study needed to be interpreted with an understanding that the sample was generated from data collected by staff at a single agency. Generalizability to other agencies and other areas across the state (and, by extension, across other areas outside the state) should be asserted with care. Furthermore, there are some limitations on the generalizability of results because aggregate data were provided versus client-specific data. The data set demonstrates the general association between receipt of PBS services and changes in behavior tendencies in adults with TBI, but more specific relationships cannot be asserted from this analysis. Points of potential interest, such as variation in rates on different days of the week or periods within the month with different ages or gender or other demographic data like severity of injury or time since the traumatic event, etc., could not be examined.

Individuals in the sample shared some socioeconomic characteristics because they had to meet requirements for participation in the TBI Waiver Program, which sets limits based on financial situations. However, this cannot be taken as absolute because some individuals will have more or less family-based economic support than others with TBI who are eligible for the waiver. No exclusion criteria were able to be used because of the nature of the data source (i.e., aggregate data compiled by administrators from reports filed by clinicians at a community services agency).

Another consideration is that the data provided does not distinguish rates of behaviors seen for individual clients. Therefore, the variation in frequencies among

clients included in the sample was not accounted for. For example, clients who showed relatively little noncompliance, verbal aggression, and/or physical aggression were not distinguished from those with relatively high frequencies, and the impact of receiving PBS-services across different types of TBI clients could not be examined. This is an area for potential further examination.

Another important potential consideration is the nature of the maladaptive behaviors themselves. Behaviors were not distinguished by who they were directed at (i.e., staff or other caregivers who were present when the staff were not there, peers, neighbors, clinicians, the clients themselves, etc.). This is another area of potential future examination.

Lastly, the fact that the data provided are based on numbers of shifts having at least one episode of the behavior versus numbers of episodes observed is a limiting factor. The number of episodes within a shift are not specified, and as such, the true frequency of each behavior type was not parsed out. There could have been a single instance or numerous episodes of each behavior within a shift and, in both cases, it counted as one shift (i.e., a "Yes"). From the data provided, I could not know the true totals for episodes of each behavior, and this limited further analysis of the association between the service model and frequency of behaviors. Parsing out these frequencies and examining the difference in outcomes for the set of behaviors in general and each behavior separately is an area of potential future examination.

Recommendations

In this study, I found that PBS-based IH behavior services are associated with the frequency of observed noncompliant, verbally aggressive, and physically aggressive behaviors among adults with TBI. Providing further evidence for the value of using this type of treatment for this population is a strength of this study. The findings suggest that this type of service model be used by agencies providing IH behavior supports to clients with TBI. With respect to improving the understanding of the benefits of PBS-based interventions for this population, recommendations can be made for further research based upon the limitations identified in the preceding section. In this way, this study can be used to guide other research that can allow for more confident assertion of PBS-based services as a best practice for IH treatment for TBI-related behaviors.

As noted in the preceding section, there are several limitations related to the data set provided for this study. These limitations suggest the focus for possible future research. First, I recommend that this study be conducted again with more agencies as participants so that the sample size is larger and broader. This would also allow for use of data generated by more than a single group of staff, addressing another limitation. Using more varied staff as sources would provide data that better reflects differences in approaches to service delivery, years of experience, type and amount of training received, and other staff characteristics.

It is also recommended that future studies be conducted that utilize more specific data than the current sample provided. Points of potential interest include data for different days of the week or periods within the month, client ages or gender or other demographic data, severity of injury or time since the traumatic event, and total counts

for behaviors instead of using counts of shifts with reported episodes. More specific data might allow researchers to understand whether PBS services are associated with certain behaviors across the population or if, instead, there is an association only for certain clients, such as those who showed relatively low or high rates of the behaviors.

Future research can also examine the specific nature of the maladaptive behaviors themselves. In the data set provided for this study, the three behavior types are not distinguished by who they were directed at (i.e., staff or other caregivers present when staff are not there, peers, neighbors, clinicians, the client themselves, etc.). I also recommend that future research looks at the association between PBS and TBI-related behaviors for periods beyond 1 year. Researchers can look at whether the association between PBS and these behaviors remains significant after the service has been provided for a longer time or if it differs depending upon where in the treatment process the client is.

Implications for Positive Social Change

The results of this study could be instrumental in creating positive social change for individuals, families, organizations, and public policy. The findings from this study contribute to the literature on best practices for IH behavior services to TBI patients. Given the growing number of persons with TBI-related behavior support needs and the appeal to many of receiving supports IH versus traditional clinical settings, like hospitals and similar institutions, the move to effective IH behavior support services for these individuals is an important social change to the way the national health care system supports TBI patients. On an individual and family level, the improvements to IH

support services that clients receive when their provider agency shifts to the use of PBS-based interventions is a positive social change.

On an organizational level, the results from this study can assist TBI support service agencies in deciding whether to use PBS-based interventions for IH supports and better address their clients' challenging behaviors. On the societal level, the findings from this study can assist states with decisions about whether to recommend – or even require – the use of PBS-based interventions by agencies being funded for providing IH services for TBI care. The findings will be an important contribution to decision-making about this shift in care for a vulnerable population and will, therefore, be a significant factor in positive social change.

Conclusion

With this study, I addressed the need for a larger-sample examination of the effectiveness of PBS-based IH services for TBI patients. The findings of this quantitative study showed an association between PBS services and certain maladaptive behaviors. Because the IH option has grown in appeal to individuals with TBI and their families, efforts to examine the best practices for providing IH supports for TBI-related behavioral needs becomes more important in this effort for positive social change. This study contributes to the literature on best practices and helps inform agencies and state oversight bodies about whether to use PBS-based interventions in IH supports for these individuals across the state.

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