TRAINING ADULTS WITH ACQUIRED BRAIN INJURY

HOW TO HELP-SEEK WHEN LOST

by

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DISSERTATION ABSTRACT

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There is no research on the assessment or treatment of help-seeking behaviors for individuals with acquired brain injury (ABI). The current study evaluated the efficacy of a group treatment protocol, NICE (Noticing you have a problem, Identifying the information you need for help, Compensatory strategies, Evaluating progress), to train help-seeking for adults with ABI when lost. Theoretical and treatment components from two empirically validated interventions that target social problem solving and social competence were adapted to develop the NICE group treatment protocol. A single subject modified variant of a nonconcurrent and multiple probe multiple baseline across participant cohort design was used to examine sensitivity to treatment effects for seven persons with ABI. The overall findings suggest that the NICE group treatment has potential to improve help-seeking when wayfinding. This dissertation supports further investigation of the NICE group treatment to train help-seeking skills.

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Chapter 1: Introduction

Effective help-seeking is a critical skill essential for independent living, particularly in vulnerable populations such as people with acquired brain injury (ABI) who encounter challenges in task completion due to cognitive impairments (Evans, 2009; Sloan & Ponsford, 2013). Help-seeking relies on a composite of executive functions and social skills (Babbage et al., 2011; Rietdijk, Simpson, Togher, Power, & Gillett, 2013) and is defined "as any communication about a problem or troublesome event which is directed toward obtaining support, advice or assistance in times of distress" (Gourash, 1978, p. 414). People with ABI could ostensibly function more independently if they were able to request outside assistance when needed.

Help-seeking is frequently impaired in people with ABI due to their underlying deficits in social cognition. Adults with ABI may experience social cognition impairments that adversely affect social behaviors (Byom & Turkstra, 2012; Dahlberg et al., 2006; McDonald, Rushby, Kelly, & Sousa, 2014; Snow, 2013) and, thus prevent effective help-seeking. Social cognition is defined as "the capacities of individuals to understand the behavior of others and to react adequately in social situations" (Spikman, Timmerman, Milders, Veenstra & van der Naalt, 2012, p. 102). Overt changes in social cognition are considered to be a crucial component of social behavior, especially in adults with severe ABI (McDonald et al., 2008, 2014). Social cognition deficits may include socially inappropriate behavior (e.g., proximity to helper when asking for assistance), failure to initiate social contact (e.g., not getting the attention of the helper before asking questions), or insensitivity to others (e.g., being impolite), all relevant skills that may be needed to ask for assistance during help-seeking (Cho & Sohlberg, 2014, 2015). The inability to recognize inferred conversational meanings and recognize basic emotional expressions also affects social cognition, and thus help-seeking, which is dependent on social interaction.

Despite the importance of help-seeking, and its potential to increase independence and safety for people with cognitive impairments, it has not been studied in the ABI population. There are currently no models or treatment protocols of help-seeking for persons with acquired cognitive impairment. Models of social problem solving, however, may be useful for understanding help-seeking as a construct and developing help-seeking training protocols for persons with cognitive impairments because they share many of the same requisite components (D'Zurilla, Nezu, & Maydeu-Olivares, 2004; Wang, Raymond, Chan, & Shum, 2014). The current favored term, "social problem-solving" encompasses the process of problem solving as it occurs in the natural environment or real world (Channon & Crawford, 2010; Robertson & Knight, 2008). Several descriptive and predictive models of social problem solving have been developed to capture a range of interacting high-level cognitive, behavioral, social, and emotional difficulties commonly observed in persons with problem solving impairments (e.g., D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1982, 1990; D'Zurilla, Nezu, & Maydeu-Olivares, 2004). Models of social problem solving generally share four components: (a) *comprehension*, the ability to accurately understand information about a problem; (b) *planning and goal setting*, the strategies needed to solve the problem; (c) *behavioral skills*, the actual abilities needed to implement the strategy; and (d) *evaluation*, the capacity to self-monitor and evaluate performance (Robertson & Knight, 2008). These components are critical to help-seeking and logically could be mapped to help-seeking: (a) the ability to recognize the need to ask for help (*comprehension*); (b) asking the right questions to obtain the needed help (*planning and goal setting*); (c) social interaction skills that will likely elicit the help (*behavioral skills*); and (d) self-evaluation of communication exchange and initiation of repair communication strategies if needed (*evaluation).*

Social problem solving models adapted for clinical use focus on direct training of basic problem solving skills but these models do not emphasize training communication skills, a necessary skill for effective help-seeking (Cho & Sohlberg, 2014, 2015). Social exchanges require being able to take another's perspective, learning from past experiences and changing future behavior based on feedback. Recent social problem solving studies (Dahlberg et al., 2007; Hawley & Newman, 2010) emphasize this need to rehabilitate *social competence*, or "the cognitive, emotional and communication skills needed to interact successfully, as well as the ability to apply those skills in a variety of social situations" (Hawley & Newman, 2010, p. 1292). Social competence encompasses the social communication and social problem solving skills necessary for help-seeking. Social competence requires skills that are frequently impaired after a brain injury including initiation, awareness, problem solving and language (Dahlberg et al., 2007; Hawley & Newman, 2010). Social competence can be dissociated from non-social competence, suggesting it is possible for persons with ABI to be successful communicators in artificial environments but not successful *social* communicators in the real world (Hawley & Newman, 2010). Social problem solving and social competence provide a framework for understanding help-seeking as a social exchange. This provides potential direction for intervention as there are treatment protocols designed for managing social problem solving deficits and increasing social competence that may be adapted for help-seeking.

The treatment of social problem solving following brain injury offers two experimentally evaluated intervention models that may hold promise for the treatment of help-seeking in persons with ABI. One of the few social problem solving treatment protocols for persons with brain injury is the Problem Solving Group (PSG) Protocol (Sherr, Langenbahn, Simon, Rath & Diller, 2003). Results on an experimental group comparison evaluation suggested that PSG group

treatment focusing on the emotional aspects of social problem solving was more effective than a traditional cognitive remediation group treatment that focused on improving basic problem solving skills. A related protocol that addresses social problem solving is the Group Interactive Structured Treatment for Social Competence (GIST; Hawley & Newman, 2010). Similar to the PSG protocol (Sherr et al., 2003), the GIST uses a group therapy model that emphasizes rehabilitation of cognitive, affective, and behavioral impairments that affect social problem solving. The GIST treatment was evaluated using a randomized controlled trial and results showed that the treatment group improved on their general participation in conversation (Dahlberg et al., 2007).

Both the PSG and GIST were used as models to develop a protocol specific to training help-seeking in people with brain injury called NICE (***N***oticing you have a problem, ***I***dentifying the information you need for help, ***C***ompensatory strategies, ***E***valuating progress). The NICE protocol, which was evaluated in this dissertation, incorporated key aspects of social problem solving that have been shown to be critical and amenable to rehabilitation. Similar to the PSG and GIST, NICE instructs social problem solving using modeling, reflection, reinforcement and feedback (Cho & Sohlberg, 2014, 2015). Unlike previous studies, the NICE protocol was developed to train help-seeking within a particular activity domain, wayfinding. Preliminary pilot data evaluating the efficacy of the NICE protocol supports further investigation of this group intervention to improve help-seeking skills while wayfinding in adults with brain injury (see Appendix A).

Wayfinding is a necessary skill for independence (Davis, Therrien, & West, 2009), survival (Hund & Nazaeczuk, 2009), and quality of life (Lui et al., 2008). Getting lost may cause personal distress, particularly for people with cognitive impairment (Chiu et al., 2004). It is also

frequently disrupted in persons with ABI (Lemoncello, Sohlberg, & Fickas, 2010). An important part of wayfinding is to be able to troubleshoot and ask for help when a person is lost. One study showed that people with moderate ABI have a high vulnerability to getting lost when navigating on foot and require outside assistance for successful route completion when compared to unimpaired controls (Lemoncello et al., 2010). Given that wayfinding is an ecologically important skill frequently impaired in people with ABI and that it depends on help-seeking, it provides an excellent task domain within which to study help-seeking in this population.

Statement of Purpose

Help-seeking as a treatment target has not been evaluated in the brain injury rehabilitation literature. Wayfinding provides an ideal domain to train and evaluate help-seeking intervention because: (a) it is disrupted in people with brain injury due to a range of cognitive deficits (Sohlberg et al., 2007); (b) it is a critical life skill (Davis et al., 2009; Hund & Nazaeczuk, 2009; Lui et al., 2008; Spiers & Maguire, 2008); and (c) it depends upon help-seeking (Bergstrom et al., 2012; Cho & Sohlberg, 2014, 2015). Successful wayfinding requires use social problem solving and social competence when initiating help-seeking. This dissertation used the context of wayfinding to evaluate a group oriented help-seeking treatment, the NICE Protocol, designed to train adults with brain injury how to effectively ask for help with directions when lost.

Chapter II provides a literature review of three specific bodies of information including social cognition impairments common following ABI and investigations of wayfinding in the brain injury population. Additionally, a review of social problem solving interventions and the development of the NICE protocol are detailed. The research design and methodology are

described in detail in Chapter III. Results are summarized in Chapter IV with discussion of findings in Chapter V.

Chapter 2: Review of the Literature

Individuals require help when confronted with a problem that demands more resources than they alone can provide (Gourash, 1978). People with cognitive impairments, specifically those with acquired brain injury, are susceptible to problems in carrying out daily activities when failures in attention, memory, executive functions and problem solving interfere with their ability to carry out daily activities (Sohlberg & Turkstra, 2011). The ability to recognize when to ask others for assistance and to effectively communicate the need for help is critical when a person's own cognition is impaired and troubleshooting is often necessary (Cho & Sohlberg, 2014, 2015). Individuals with brain injury, however, may not recognize the need to ask for help due to diminished self-awareness of deficit (Cho & Sohlberg, 2014, 2015), a frequent complaint after ABI (Bach & David, 2006; Cheng & Man, 2006; Ham et al., 2014). Despite the need, there is no research that has focused on either the assessment or treatment of help-seeking behaviors for people with brain injury. The purpose of this dissertation study was to provide exploratory work to increase our understanding of how to improve help-seeking in the ABI population.

It has long been recognized that people with brain injury have difficulties with social interactions, but the approach for addressing these deficits is changing (McDonald et al., 2014). Earlier research focused on treating isolated components of communication (Bornhofen & McDonald, 2008b; Dahlberg et al., 2007; Hashimoto, Okamoto, Watanabe, & Ohashi, 2006; McDonald et al., 2008), with findings showing poor generalization of treatment effects to naturalistic contexts (Bornhofen & McDonald, 2008b). Snow (2013) states "communication, by its nature, is context bound" (p. 153) suggesting this lack of generalization may be attributed to learning discrete communication skills in decontextualized environments that do not approximate real life encounters. More recent research emphasizes the need for "learning meaningful skills in

meaningful contexts" because even under optimal conditions, generalization of treatment skills is poor (Snow, 2013; Ylvisaker, 2003).

Effective social interactions require more than just intact communication skills. Effective social interactions require *social problem solving*, the process of problem solving as it occurs in the natural environment with other people (Channon & Crawford, 2010; Robertson & Knight, 2008) and *social competence*, "the cognitive, emotional and communication skills needed to interact successfully, as well as the ability to apply those skills in a variety of social situations" (Hawley & Newman, 2010, p. 1292).

One activity of daily living (ADL) that requires both social problem solving and social competence is wayfinding. Successful wayfinding requires using social problem solving and social competence when the navigator must initiate help-seeking. Becoming lost while wayfinding is a common occurrence for people with brain injury, making it an ideal domain for studying help-seeking (Sohlberg, Fickas, Hung, & Fortier, 2007). To date, studies of wayfinding after brain injury have focused solely on route finding and ignored the issues of trouble shooting and help-seeking (Cho & Sohlberg, 2014, 2015). Prior to this dissertation, existing work in social problem solving and social competence was used to develop and pilot a group help-seeking curriculum called NICE (*N*oticing you have a problem, *I*dentifying the information you need for help, *C*ompensatory strategies, *E*valuating progress) to train help-seeking in the context of wayfinding (Cho & Sohlberg, 2014, 2015). This chapter reviews the literature related to social problem solving and the development of NICE.

The chapter is divided into four sections. The first section establishes the theoretical foundation of NICE and examines three bodies of literature beginning with a review of the theoretical constructs of social problem solving related to help-seeking behavior. This is

followed by a review of the typical deficits in social cognition responsible for impaired social problem solving in adults with brain injury. The scant literature on wayfinding deficits following acquired cognitive impairments is also reviewed in this section. The second section reviews the treatment literature relevant to training social problem solving in people with brain injury. The third section describes the development of the NICE treatment protocol and initial pilot findings. The chapter ends with a description of the research questions posed by this dissertation.

Theoretical Constructs Critical For Help-Seeking

Social Competence

Successful social interaction requires intact *social cognition* (McDonald et al., 2014; Turkstra, Williams, Tonks, & Frampton, 2008), or the "capacity to attend to, recognize and interpret interpersonal cues that enable us to understand and predict the behaviour of others, to share experiences and communicate effectively" (McDonald, Honan, Kelly, Byom, & Rushby, 2014, p. 119). Impairments in social cognition may prevent successful community reintegration (Coelho, Ylvisaker, & Turkstra, 2005) and lead to social isolation (Le, Mozeiko, & Coelho, 2011). In clinical settings, deficits in social cognition are often inferred on neuropsychological measures that test performance in domains such as processing speed, attention, working memory, long-term memory and executive functioning (McDonald et al., 2014); however, these tests fail to capture all social difficulties experienced during real life tasks (Bibby & McDonald, 2005; McDonald et at., 2008; Struchen et al., 2008), including help-seeking.

Social competence is the outcome of intact social cognition and is dependent on personal characteristics of the individual and the interactions between the individual and his or her social world (Yeates et al., 2007; Yeates et al., 2014). Social competence from this perspective is also viewed as time and context dependent. Social competence skills include both verbal and

nonverbal behaviors such as starting, sustaining, and/or ending conversations, observing social boundaries, taking turns and interacting assertively (Hawley & Newman, 2010). Individuals with impairments in social competence fail to effectively communicate in dyadic relationships and in groups (Bukowski, Rubin, & Parker, 2001; McDonald et al., 2014) and experience unfavorable social and vocational outcomes (Spikman et al., 2012).

Despite the prevalence of decreased social competence after brain injury (Hawley & Newman, 2010; McDonald et al., 2008; Yeates et al., 2007; Yeates et al., 2014), research has focused rather narrowly on evaluating and treating discrete social communication skills, which are only one component of social competence (Braden et al., 2010). Social communication abilities are "both verbal and nonverbal skills that allow one to be able to understand others and what others mean to communicate, as well as to express oneself to others in a manner that conveys the intended meaning" (Struchen, Pappadis, Sander, Burrows, & Myszka, 2011, p. 30). Unfortunately, this definition of social communication fails to include a critical aspect of social competence, the ability to achieve personal goals in social interactions (Yeates et al., 2007). This ability to achieve personal goals in social interactions requires effective *social problem solving*, or the ability to determine *how* to apply social communication skills in a variety of social situations (Hawley & Newman, 2010). A complex social interaction such as help-seeking requires both social communication and social problem solving (Cho & Sohlberg, 2014, 2015). Despite the need for a model that includes social problem solving, there is no model specifically designed to support persons with ABI. Without a model delineating the components and processes involved in social problem solving, it is difficult to develop theoretically grounded treatments. Models based on the behavior of uninjured, healthy populations can, however, inform the development of clinical models (Rath et al., 2003).

A Model of Social Problem Solving

Several investigators have argued that models of problem solving need to incorporate a cognitive component in addition to the necessary social behaviors (D'Zurilla & Goldfried, 1971; Kagan, 1984; McFall, 1982). Dewey (1911) was one of the earliest investigators to propose the existence of a problem solving model for uninjured neurologically intact persons with both social *and* cognitive contributions. In the context of education, Dewey's (1911) problem solving steps required: (1) *presentation*, problem occurrence; (2) *preparation*, observation and inspection of facts to solve the problem; (3) *comparison and generalization*, formulation of a hypothesis or possible solution; and (4) *application*, testing of the hypothesis or possible solution in new contexts. The missing link in this original framework, however, is the interconnection, the notion that problem solving can occur *between* individuals, not just *within* an individual (Wertsch, 1985).

Social problem solving encompasses the process of problem solving *between* individuals as it occurs in the natural environment or real world (Channon & Crawford, 2010; Robertson & Knight, 2008). A model of problem solving that has been revised over the years to incorporate a *socially meaningful* component is the Social Problem Solving Model (D'Zurilla, Nezu, & Maydeu-Olivares, 2004). Although the model was originally developed to describe processes in healthy individuals, it holds promise and is referenced in the ABI literature (Rath et al., 2003; Rath et al., 2011; Sherr et al., 2003). The seminal model of problem solving proposed by D'Zurilla and Goldfried (1971) is the basis for more current clinical models of social problem solving. These authors identified five stages critical to problem solving: (1) general orientation; (2) problem definition and formulation; (3) generation of alternatives; (4) decision making; and (5) verification. The *general orientation stage* has three hypotheses: (a) life is full of problems

and dealing with problems is part of life; (b) individuals have control over their lives and can successfully cope with problem situations; and (c) individuals can generate various solutions rather than respond with only the first available response (D'Zurilla & Goldfried, 1971). The *problem definition and formulation* stage, often the most difficult step, requires a person to gather relevant factual information about the problem and formulate the necessary actions required to solve the problem. The *generation of alternatives* stage requires brainstorming to generate as many alternative potential solutions as possible to maximize the likelihood that the "best" solution will be identified as an option. The *decision making* stage requires prediction of the consequences of each solution choice and prediction of the utility of the consequences in solving the problem. An additional aspect of the decision making stage involves making decisions based on "strategies" or "tactics". *Strategies* are defined as "policy" or "value" questions and *tactics* are defined as "fact" or "executive" questions to help in the problem solving process. In the final *verification* stage, outcomes are compared with goals. If an individual is dissatisfied with the outcome, the problem solving stages must be repeated; however, if an individual's solution matched or exceeded the expected outcome he/she moves onto the next problem (D'Zurilla & Goldfried, 1971).

Over the years, there has been an increasing interest in understanding the social contribution to higher-level cognitive processes such as problem solving. Thus the term, *social problem solving*, defined as the process of problem solving as it occurs in the natural environment or "real world", has replaced the term problem solving (D'Zurilla & Nezu, 1982). In social problem solving, a *problem* is defined as "any life situation or task that demands a response for adaptive functioning but no effective response is immediately apparent or available to the person or people confronted with the situation because of the presence of one or more

variables" (D'Zurilla, Nezu, & Maydeu-Olivares, 2004, p. 12) and a *solution* is defined as "a situation-specific coping response or response pattern that is the product or outcome of the problem-solving process when it is applied to a specific problematic situation" (D'Zurilla, Nezu, & Maydeu-Olivares, 2004, p. 13). D'Zurilla and Goldfried's (1971) original problem solving model was expanded for social problem solving with the addition of two components: (1) problem orientation and (2) problem-solving skills (D'Zurilla & Nezu, 1982, 1990), later renamed "problem solving style" (D'Zurilla, Nezu, & Maydeu-Olivares, 2004). *Problem orientation* refers to the metacognitive processes that represent an individual's general ability to perceive a problem; *problem solving style* refers to the cognitive and behavioral approach that an individual employs when recognizing and responding to problems. The revised model allows for the classification of different approaches to problem solving, including dysfunctional styles such as an impulsive/careless style or avoidance styles. *Impulsive/carelessness style* behavior is characterized by selection of the first idea that comes to mind and *avoidance style* behavior is characterized by procrastination, inaction, and dependency. Individuals with avoidance styles often shift the responsibility of problem solving to other people or may wait for problems to resolve on their own (D'Zurilla, Nezu, & Maydeu-Olivares, 2004). These two challenging problem solving styles are common in persons with ABI who frequently exhibit executive function impairment characterized by poor self-regulation (Rath et al., 2003; Rath et al., 2011).

Von Cramon, Matthes-von Cramon and Mai (1991) were the first researchers to apply D'Zurilla and Goldfried's (1971) model to cognitive group remediation by developing a problem-solving training (PST) protocol. The PST was implemented with 37 patients with ABI who were taught how to solve complex problems using D'Zurilla and Goldfried's (1971) five stages: (1) general orientation; (2) problem definition and formulation; (3) generation of

alternatives; (4) decision making; and (5) verification. Post-treatment data revealed significant improvement in planning, behavioral ratings, and some intelligence subtests. Rath and colleagues (2011), however, noted a critical and often overlooked finding in the von Cramon et al. (1991) investigation, with some patients' performance on problem solving tasks actually "worsening" post-treatment. One explanation for these findings is that some patients with lower post-treatment performance may have lost motivation because they perceived the tasks to be "boring and useless" (Von Cramon, Matthes-von Cramon & Mai, 1991, p. 61). Rath et al. (2011) offer another possibility suggesting that patients demonstrated poorer problem solving skills post treatment due to feeling "overwhelmed". To address this issue, Rath and colleagues (2003) propose a different problem solving treatment model to include *emotional self-regulation,* a prerequisite for *problem orientation,* the metacognitive processes that represent an individual's general ability to perceive a problem. Both von Cramon et al. (1991) and Rath et al. (2003) acknowledge that problem solving requires *problem orientation* but the latter group added the component of *emotional self-regulation* in their problem solving protocol.

There is a growing consensus that problem solving and emotion are directly related (Rath et al., 2003; Rath et al., 2011; Sherr et al., 2003). Emotions are managers of goals and can act as controls on cognition (Bell & D'Zurilla, 2009). Emotions may influence: (a) problem recognition, (b) motivation, (c) goal setting, (d) solution preferences, (e) evaluation of social outcomes, and (f) likelihood of future problem solving behavior (D'Zurilla, Nezu, & Maydeu-Olivares, 2004; D'Zurilla & Nezu, 2007). For these reasons, emotions may influence the efficiency of problem solving performance (D'Zurilla et al., 2004). Individuals naturally seek solutions that result in satisfaction and positive emotions and attempt to avoid dissatisfaction and negative emotions (Bandura, 1997). Negative emotion may be a result of negative problem

orientation, or an individual's perception of the ability to cope with a problem. Successful problem solving requires inclusion of not only rational problem solving skills, but also a positive orientation towards problem solving (D'Zurilla et al., 2004). Positive affect such as love, joy, and contentment may improve problem solving performance by facilitating more creative, flexible, and open thinking (Isen, 2000), facilitating effective self-regulation (Aspinwall, 1998) and establishing coping resources (Fredrickson, 2001). Therefore, problem solving therapies that address the associated emotional substrates may result in better treatment outcomes (Bell & D'Zurilla, 2009; Malouff, Thorsteinsson, & Schutte, 2007).

Help-seeking requires social competence, including adequate communication skills and the ability to engage in effective social problem solving (Cho & Sohlberg, 2014, 2015). Successful help-seeking requires employment of the verbal and nonverbal communication skills as a person attempts to enlist assistance. In terms of problem solving, help-seeking requires: (1) general orientation (e.g., I am lost); (2) problem definition and formulation (e.g., How can I ask for help?); (3) generation of alternatives (e.g., What are the possible solutions to this problem?); (4) decision making (e.g., What strategies should I use?); and (5) verification (e.g., Was the help-seeking attempt successful?), the same steps involved in social problem solving (Cho & Sohlberg, 2014, 2015).

Help-seeking performance is also affected by emotional constructs such as self-confidence. For example, in one wayfinding project, participants who lacked self-confidence (e.g., saying "I am stupid") were less successful in their wayfinding. People with ABI frequently have deficits in social cognition that affect their communication skills, social problem solving, and emotional regulation preventing them from successfully engaging in help-seeking, a critical skill for this vulnerable population (Cho & Sohlberg, 2014, 2015).

Deficits in Social Communication following ABI

People with acquired brain injuries can often "pass" traditional neuropsychological tests yet still suffer social communication deficits that negatively impact their community functioning (Channon, Crawford, Orlowska, Parikh, & Thoma, 2014; McDonald et al., 2014; McDonald, Honan, Kelly, Byom, & Rushby, 2014). Earlier literature used discourse analysis to identify impairments in isolated communication skills (Brinton & Fujiki, 1989; Coelho, Liles, & Duffy, 1991; Donahue, Pearl, & Bryan, 1980; Wozniak, Coelho, Duffy, & Liles, 1999). Discourse analysis is the study of the "the regularities within the flow of language that reflect the nature of social interactions" (Togher, McDonald, Coelho, & Byon, 2014, p. 90). Coelho, Youse and Le (2002) conducted a discourse analysis with people who had ABI and identified the following communication skills as impaired: topic initiation and appropriateness (e.g., provided more information than requested). Other studies have used discourse analysis to identify problems in content accuracy (Coelho, 2002; Coelho et al., 2005), organization (Chapman et al., 1992; Coelho, Liles, & Duffy, 1991), communication repairs (Brinton & Fujiki, 1989; Donahue et al., 1980) and turn-taking (Coelho et al., 2002; Wozniak et al., 1999).

Although discourse deficits associated with brain injury are heterogeneous, common patterns of impairment have been identified in two areas: (1) *cohesion*, the ability to use linguistic devices to sequentially link ideas (Liles, Coelho, Duffy, & Zalagens, 1989; Davis & Coelho, 2004; Mentis & Prutting, 1987; Jorgensen & Togher, 2009); and (2) *coherence*, the ability to extract the core meaning of information provided in an interaction (Chapman et al., 1992; Coelho, 2002; Coelho, Liles, & Duffy, 1995; Liles et al., 1989; Van Leer & Turkstra, 1999).

In one study, Mentis and Prutting (1987) found that three individuals with TBI (traumatic brain injury), in comparison to the matched controls, used less cohesion when generating stories despite preserved language abilities. Liles and colleagues (1989) replicated this study but found that cohesion was influenced largely by the method of elicitation (e.g., generating stories vs. retelling stories). Jorgensen and Togher (2009) also confirmed this finding that suggested cohesion is affected by the elicitation task. In a more recent study with ten participants with TBI who were matched with control participants for gender, age and education, Jorgensen and Togher (2009) found that individuals with TBI used less cohesion in a story generation task but not in a jointly-produced task in comparison to the matched with ten control participants. Older studies revealed that adults with ABI can vary the amount of cohesion dependent on the task (e.g., story generation vs. story retelling, jointly-produced; Jorgensen & Togher, 2009; Liles, Coelho, Duffy, & Zalagens, 1989; Mentis & Prutting, 1987); however, whether the quality of cohesion is affected by ABI is disputed. In some studies, participants with TBI have been shown to use less cohesion in comparison to matched controls (Davis & Coelho, 2004; Mentis & Prutting, 1987) but not in other studies (Coelho, 2002; Van Leer & Turkstra, 1999). One possible reason for these mixed findings may be attributed to the fact that there is no universally used measurement for cohesion in discourse analysis (Davis & Coelho, 2004).

Research examining coherence in discourse analysis reports mixed findings. For example individuals with ABI have been found to produce as much essential information as matched controls in some studies (Liles et al., 1989; Van Leer & Turkstra, 1999) but not in other studies (Chapman et al., 1992; Coelho, 2002; Coelho, Liles, & Duffy, 1995). Similar to the measurement problems that exist in discourse analysis research with cohesion, there is no universally accepted measurement of coherence. Without a universally adapted discourse analysis procedure, it is

difficult to compare across studies or develop clinical recommendations for people with ABI. Furthermore, the connection between discourse analysis and social communication is unclear with inconclusive evidence for discourse analysis on the two constructs of cohesion and coherence.

More recent literature suggests people with ABI display difficulties in social interactions due to: (a) emotional processing impairments (e.g., inaccurate emotional perception; Dimoska, McDonald, Pell, Tate, & James, 2010; McDonald & Saunders, 2005; Milders, Fuchs, & Crawford, 2003; Snow, 2013; Zupan, Neumann, Babbage, & Willer, 2009); or (b) impaired mental judgments (e.g., reduced *Theory of Mind*; Martin-Rodriguez & Leon-Carrion, 2010; McDonald et al., 2014; Snow, 2013). *Emotional processing* requires an individual to perceive and process a speaker's intended meaning based on changes in facial expressions and tone of voice (Snow, 2013). *Mental judgments* require Theory of Mind (ToM), or the capacity to attribute mental states such as thoughts, beliefs, desires, and intentions to others. ToM is critical to understanding and predicting the behavior of others and making sense of social interactions (Snow, 2013). Impairments in ToM are considered to be the cause of social cognition difficulties in adults with ABI (Martin-Rodriguez & Leon-Carrion, 2010; McDonald et al., 2014; Milders et al., 2003).

Deficits in recognizing emotion in facial expressions and voice often, but do not always, co-exist (McDonald et al., 2014). Tests of emotion recognition typically use static visual stimuli which fail to approximate normal facial expressions observed in naturalistic contexts (McDonald & Saunders, 2005). This is problematic because emotional processing is required when help-seeking in real world face-to-face interactions. Deficits in perception of voice are also apparent in people with ABI (Dimoska et al., 2010; Milders et al., 2003; Zupan et al., 2009) and may be

even more severe when co-existing with deficits in the ability to interpret facial expressions (McDonald & Saunders, 2005). Identification of emotions from facial expressions and voice are important because they provide the necessary situational cues when help-seeking (Cho & Sohlberg, 2014, 2015). For example, when a helper states "I think it is that way?" in a rising intonation with a confused facial expression, the help-seeker should be able to recognize that the help-seeking attempt was not a successful one. People with ABI often have difficulty deriving *implied* non-verbal meanings that are not explicitly stated (McDonald & Saunders, 2005). Despite the likelihood that social cognition and poor emotional processing are correlated with social communication difficulties, there has been very little research in this area (McDonald et al., 2014).

Some researchers consider deficits in ToM as the root cause of social cognition deficits in people with ABI (McDonald et al., 2014; Milders et al., 2003) and as a result, ToM is considered to be a good predictor of social cognition impairments (Martin-Rodriguez & Leon-Carrion, 2010). People with ABI have been described as egocentric and self-focused, often offering inappropriate levels of self-disclosure (Snow, 2013). Combined with deficits such as insensitivity to others and failure to demonstrate socially inappropriate behavior (McDonald et al., 2008), impairments in ToM may result in unsuccessful social problem solving (Channon & Crawford, 2010) and thus negatively impact help-seeking. For example, in one study, a participant chose to self-disclose too much personal information about his brain injury, rather than focus on generating concise questions directly related to the goal of asking for help, making the helper feel "uncomfortable" and eventually walk away from the participant (Cho & Sohlberg, 2014, 2015).

The Cognitive Rehabilitation Task Force of the American Congress of Rehabilitation Medicine Brain Injury Interdisciplinary Special Interest Group conducted a systematic review to update clinical recommendations for cognitive rehabilitation for people with TBI (Cicerone et al., 2011). Although most of the studies involved stroke interventions, a few studies were identified to have investigated interventions for social communication deficits secondary to TBI. In one study, McDonald and colleagues (2008) conducted a randomized control trial (RCT) comparing a social skills training group with a no treatment group. Fifty-one participants with ABI were randomly assigned to a social skills treatment group, a social activity group (e.g, cooking, board games), or a no treatment group. The social skills training consisted of a 12 week treatment program focusing on remediating social communication behaviors (e.g., starting a conversation, being assertive), social perception (e.g., decoding facial emotions), and social inferences (e.g., friendly) as well as psychotherapy for emotional adjustment (e.g., self-esteem, anxiety, depression). When compared with the social activity group and no treatment group, participants in the social skills treatment group demonstrated significant improvements in their ability to adapt to social requirements of others. For example, post treatment participants were more inclined to encourage their conversational partners to speak and less inclined to talk about themselves (McDonald et al., 2008).

Cicerone and colleagues (2011) identified two other studies that were conducted to treat communication disorders after TBI. Both studies included implementation of a communication intervention targeting social and emotional perceptions. Bornhofen and McDonald (2008a) conducted one of the first RCTs to remediate emotion perception deficits in individuals with TBI by training two techniques: *errorless learning*, or the repeated rehearsal of the correct information under explicit instruction and *self-instruction*, or verbalization of procedural steps in

complex tasks. The treatment group demonstrated an improved ability to accurately identify cues related to basic emotions (e.g, happiness, anger, anxiety) and drawing inferences on the basis of emotional cues (e.g., sarcastic, sincere, lying). In a subsequent investigation, Bornhofen and McDonald (2008b) replicated the previous findings and participants with TBI showed modest gains in their ability to accurately identify/perceive emotions following a treatment that incorporated errorless learning and self-instruction techniques. Furthermore, of the two remediation strategies in this study, self-instruction was a better strategy compared to errorless learning for individuals with TBI. Although the methodology used in these studies was strong, one potential limitation is that all three RCTs examine the construct of social competence only as a social communication impairment.

Complex real world tasks, such as wayfinding, may require both constructs of social competence: social communication *and* social problem solving, to effectively engage in help-seeking when lost, a common occurrence following brain injury (Sohlberg et al., 2007). Wayfinding provides an ideal domain to train and evaluate help-seeking intervention because it is disrupted in people with brain injury due to a range of cognitive deficits (Sohlberg et al., 2007), is a critical life skill (Davis et al., 2009; Hund & Nazaeczuk, 2009; Lui et al., 2008; Spiers & Maguire, 2008) and depends upon help-seeking (Bergstrom et al., 2012; Cho & Sohlberg, 2014, 2015).

Wayfinding deficits following acquired cognitive impairments

Wayfinding relies on help-seeking which, as discussed, requires social communication and social problem solving, abilities that are commonly impaired following brain injury (Sohlberg, Fickas, Hung, & Fortier, 2007). Wayfinding is an activity of daily living (ADL) that involves "finding one's way in spatially extended environments" (Spiers & Maguire, 2008, p.

232). Wayfinding is frequently disrupted following ABI and has been identified as critical for community reintegration, safety, and quality of life (Antonakos, 2004; Lui et al., 2008; Sohlberg et al., 2007). One study identified navigation profiles for community dwelling people with brain injuries and showed that people did not initiate venturing out of their apartments in part due to feeling vulnerable to becoming lost (Sohlberg, Todis, Fickas, Hung, & Lemoncello, 2006).

In spite of its importance, studies of wayfinding after brain injury have narrowly focused on route finding and have ignored issues of trouble shooting and help-seeking (Cho & Sohlberg, 2014, 2015). A literature search was conducted using the databases PsycINFO, Medline and MIT CogNet to retrieve articles using a combination of terms including *wayfinding, brain injury, help-seeking, social communication, social problem solving, route-finding, cognitive impairment* as key words. To be included in the initial literature search, studies had to meet the following eligibility criteria: (1) examine help-seeking behaviors when lost; (2) examine wayfinding strategies with or without cognitive impairment or brain injury; or (3) be published in English in a peer-reviewed journal between 2002- 2014. There was no restriction for manuscript inclusion based on type of research, subject characteristics, settings or measures due to the scant literature on wayfinding and help-seeking. Eleven articles related to wayfinding, navigation strategies and brain injury were identified. Specific to help-seeking when lost, two articles directly examined wayfinding strategies in children with developmental cognitive impairment (Bergstrom et al., 2012; Taylor et al., 2004). Six articles examined wayfinding strategies during navigation (Antonakos, 2004; Carlson, Holscher, Shipley, & Dalton, 2010; Kato & Takeuchi, 2003; MacFadden, Elias, & Saucier, 2003; Saucier, Green, Leason, MacFadden, Bell, & Elias, 2002; Spiers & Maguire, 2008) and two articles examined wayfinding for adults with cognitive impairment but did not address help-seeking (Sohlberg et al., 2006; Sohlberg et al., 2007).

There was only one article identified that evaluated help-seeking during wayfinding with people who have acquired brain injuries (Lemoncello, Sohlberg, & Fickas, 2010). Researchers compared wayfinding performance of 18 adults with ABI to matched controls. Participants followed written directions along an eight-step route in an unfamiliar neighborhood with three intentionally challenging choice-points. They used a cellular phone to request assistance if they became lost. Participants with ABI demonstrated significantly greater route wayfinding errors and hesitancy than the controls. They requested assistance over the phone more frequently, but had trouble using the help. The study established that people with brain injury experienced difficulty with wayfinding; however, the help-seeking mode of the phone was artificial because participants were encouraged and told to use it when lost. Hence, the study did not shed light on true help-seeking behavior while wayfinding.

Although no studies have examined naturalistic help-seeking behaviors of adults with brain injury when lost, researchers have examined help-seeking behaviors of children with autism when lost who, similar to adults with brain injury, have impairments in social communication and social problem solving (Bergstrom, Najdowski, & Tarbox, 2012). Bergstrom and colleagues (2012) trained three children with autism to ask for help from store employees when they were separated from the caregivers. The intervention consisted of a treatment package (rules, role play, and praise) delivered using a non-concurrent multiple baseline design in a natural environment. All probe and training trials were conducted during each participant's regularly scheduled therapy time, but in a naturalistic environment in different retail stores. Each help-seeking instance lasted approximately 5 min and occurred one to three times per day, once or twice per week. Participants were awarded one point for each of the following behaviors: (a) calling for "mom" or "dad" out loud when lost; (b) locating a store employee to request for help;

and (c) stating to the employee that he was lost. The mastery criterion for training was a score of three points for two consecutive trials. One or more confederates were present to collect data during each trial. Help-seeking behaviors improved and generalized to other settings for all participants after implementation of the treatment package. Similar to findings by Bergstrom and colleagues (2012), Taylor and colleagues (2004) trained teenagers with autism to help-seek when physically separated from their caregivers by using a vibrating pager to prompt use of communication card. Together both of these studies suggest that interventions that deliver direct training of social problem solving and social communication components in real life scenarios may be effective in improving help-seeking.

Behavioral interventions with a goal to indirectly improve wayfinding by treating impairments in awareness of space have been largely unsuccessful (Antonakos, 2004). Successful wayfinding requires use of effective compensatory strategies (Carlson et al., 2010; Spiers & Maguire, 2008) as well as help-seeking. Even when provided with compensatory strategies, naturalistic demands and contextual variability will result in a need for troubleshooting as the real world does not stay static. In real world environments, good navigators use different and more flexible compensatory strategies (Kato & Takeuchi, 2003; Saucier et al., 2002) and poor navigators use less flexible strategies, such as relying on verbal sequential lists of directions (MacFadden et al., 2003). The NICE protocol (Cho & Sohlberg, 2014, 2015) piloted in this study was developed to address the need to train adults with brain injury how to effectively ask for help with directions when lost using compensatory strategies.

The wayfinding literature examining individuals with cognitive impairments suggests that wayfinding is challenging when navigators have impairments in social cognition (Bergstrom et al., 2012; Cho & Sohlberg, 2014, 2015; Taylor et al., 2004). The scant literature available

encourages investigation of methods to improve help-seeking while wayfinding to increase the independence and safety of those with brain injury. The NICE protocol evaluated in this study attempts to improve help-seeking during wayfinding by targeting the construct of social problem solving.

Treatment of Social Problem Solving

One of the few social problem solving treatment protocols for persons with brain injury is the Problem Solving Group (PSG) Protocol (Sherr, Langenbahn, Simon, Rath, & Diller, 2003). PSG is a manualized curriculum for delivering group treatment that focuses on training logical reasoning and strategies to facilitate emotional self-regulation for effective social problem solving. Emotional self-regulation is conceptualized as a critical self-initiated process to avoid costly errors during problem solving. Theories of self-regulation argue that social problem solving requires more than mere knowledge, it also requires self-evaluation.

In an experimental evaluation of the efficacy of PSG, researchers randomly assigned sixty outpatients with mild TBI to either a conventional group that focused on traditional neurological rehabilitation or a PSG group that focused specifically on treatment of problem-solving deficits. Results suggested that the PSG group treatment that focused on the emotional aspects of social problem solving was more effective than a traditional cognitive remediation group treatment that focused only on improving basic problem solving skills as measured by improvement on the: (1) Wisconsin Card Sorting Test (WCST; Heaton et al., 1993) Perseverative Responses scores; (2) Problem Solving Inventory (PSI; Heppner, 1988) scores; (3) Problem Solving Questionnaire (PSQ; Sherr, Langenbahn, Simon, Rath, & Diller, 1996) Clear Thinking and Emotional Self-Regulations subscales; (4) Problem Solving Roleplay Test (PSRPT; Sherr, Langenbahn, Simon Rath, & Diller, 1996) scores; (5) Wechsler Memory Scale-

Third Edition (WMS-III; Wechsler, 1997) Visual Memory, Immediate Recall scores; and (6) Rosenberg Self-Esteem (RSES; Rosenberg, 1965) scores. The PSG group also had less attrition and maintained treatment effects at six months after study completion. Caregiver ratings of cognition and affect improved in the traditional cognitive remediation group but not in the PSG group. If outcome criteria were based solely on caregiver report, the traditional cognitive remediation group was more effective than the PSG group (Sherr, Langenbahn, Simon, Rath, & Diller, 2003).

A related protocol that was designed to improve social skills in people with TBI is the Group Interactive Structured Treatment for Social Competence (GIST; Hawley & Newman, 2010). The GIST program consists of five phases: engagement, awareness, goal setting, skills mastery and generalization. Development of the GIST protocol is based on established principles of cognitive behavior therapy, group therapy, and holistic neuro-rehabilitation. Similar to the PSG protocol (Sherr et al., 2003), the GIST uses a group therapy model that emphasizes rehabilitation of cognitive, affective, and behavioral impairments that affect social problem solving. The GIST emphasizes group process mediators, including "*universality*, the realization that one is not alone; *altruism*, the ability to be helpful to others; and *group cohesion*, a sense of belonging and group trust" (Hawley & Newman, 2010, pp. 1293-1294). Social self-confidence is facilitated in the group environment to promote generalization of treatment.

The GIST treatment was implemented using a randomized controlled trial and deferred treatment design with a volunteer sample of 52 persons with TBI who were at least one year post injury (Dahlberg et al., 2007). Results showed that GIST participants improved significantly on 9 out of 10 subscales on The Profile of Functional Impairment in Communication (PFIC), Social Communication Skills Questionnaire-Adapted (SCSQ-A), Goal Attainment Scale (GAS) and

Satisfaction with Life Scale (SWAL) after the first 12 weeks of the study. At the six-month follow-up, participants' scores showed significant improvement over performance at baseline for 6 out of 10 PFIC subscales, the SCSQ-A, GAS and SWLS. Most significantly, the treatment group improved on their general participation in conversation. Improvements were also noted in *external relation*, the listener's role in relating comments to the speaker's previous comments and in *internal relation*, the speaker's role to ensure ideas are cohesive, relevant and related. Social style, clarity of expression, and speech characteristics were also improved post-treatment. Treatment effects were maintained at follow up three, six, and nine months after study completion and ratings by significant others indicated a trend towards improvement. The second hypothesis that overall satisfaction with life would be improved was supported at three, six, and nine months follow up, but participant performance on the measures did not significantly improve immediately after the treatment. Improvement in social communication skills was also supported by both clinician ratings as well as participants' perceived skill rating.

The efficacy of the GIST treatment protocol was also supported in a feasibility study to improve social communication skills in 30 persons with TBI with comorbid neurological or psychiatric etiologies (Braden et al., 2010). Consistent with findings obtained by Dahlberg and colleagues (2007), researchers noted improvements in social communication skills and significant gains were also apparent on the same outcome measures, SCSQ-A, GAS and SWLS post treatment. The findings from the intervention research evaluating the PSG and GIST are encouraging and motivated the development of a similar protocol, NICE, specific for the training of help-seeking during wayfinding.

Development of the NICE Treatment Protocol

NICE incorporated elements of the aforementioned group social problem solving interventions, PSG (Sherr et al., 2003) and GIST (Hawley & Newman, 2010). These protocols were selected as they had all been evaluated using randomized controlled trials and they addressed social problem solving skills important for help-seeking. Permission was granted by Principal Investigators of the GIST and PSG studies to modify and use the protocols for development of NICE. Similar to the GIST and PSG, NICE instructs social problem solving using modeling, practice, reinforcement, and feedback. The specific training techniques were also drawn from the PSG and GIST, as well as from the larger social cognition literature.

NICE Training Approach

In general, social communication interventions tend to incorporate one of two instructional or training approaches: (1) Direct Instruction (DI; Engelmann & Carnine, 1982) and/or (2) cognitive-behavioral therapy (CBT; Dobson, 2002). Direct instruction is an explicit, systematic instruction based on modeling and guided practice and uses *general case programming* to identify the sequencing of instructional targets in a way to promote successful generalization of treatment effects (Albin & Horner, 1988; Becker, Engelmann, & Thomas; 1975; Engelmann & Carnine, 1982; Horner, Sprague, & Wilcox, 1982). A review examining instructional and training methods effective for people with acquired memory impairments revealed that systematic instruction was optimal, especially when DI was combined with strategy instruction (Ehlhardt et al., 2008). Specific to training social communication skills, elements of systematic instruction have been incorporated as part of training packages in a number of intervention studies that have had positive outcomes (Bornhofen & McDonald, 2008a; Helffenstein & Wechsler, 1982; McDonald et al., 2008).

The pediatric literature on social communication intervention for children with cognitive impairments provides further evidence for the efficacy of systematic instruction techniques to address social communication skills. Kroeger, Schultz and Newsom (2007) compared two group-delivered social skills programs for 25 children diagnosed with autism by a developmental pediatrician. The treatment condition consisted of DI of play and social skills and the control condition involved unstructured play. The treatment group included modeling instruction via video targeting social skills (e.g., turn taking, initiating play, pretend play, seeking play partners). Kroeger and colleagues (2007) found that DI was the better intervention as measured by number of initiating behaviors, frequency of responding to speakers, number of social interactions and overall level of pro-social behavior. In another study, Banda and Hart (2010) implemented a multiple baseline design across two participants to determine the effectiveness of DI to increase social behaviors (e.g., peer initiations, responses, sharing). After the DI intervention, peer initiations and sharing behaviors increased but responding did not increase for either participant. Banda and Hart (2010) note that responding behavior was highly variable even during baseline phases, indicating influences from extraneous variables other than DI, such as setting, persons, instructional material or motivation. Although this study is limited in generalizability due to the single subject research design, these results show promise of this instructional method for supporting individuals with social skills impairment.

Cognitive-behavioral therapy (CBT) focuses on teaching persons to think differently with the goal of changing behavior through increasing positive self-talk (Dobson, 2002). It has been successfully used to modify maladaptive thinking and coping behaviors to result in the desired treatment outcomes for people with brain injury (Hsieh et al., 2013; Silverberg et al., 2013; Soo & Tate, 2007) and is one of the most empirically validated instructional techniques used in

cognitive rehabilitation (Bradbury et al., 2008; Manly, Evans, Fish, Gracey, & Bateman, 2014). The components of CBT that have been used to address the emotional contributions to social communication and social problem solving include *self- reflection,* a self-initiated process to avoid costly errors during social problem solving and *emotional self-regulation*, the ability to respond to problems with emotions that are socially appropriate (Hawley & Newman, 2010; Sherr et al., 2003). CBT has been identified as the treatment of choice for the emotional sequelae following ABI (Bradbury et al., 2008; Silverberg et al., 2013). In one study, Bradbury and colleagues (2008) assigned 10 participants with ABI to a CBT treatment group and 10 participants to an educational control group and found that administration of eleven sessions of CBT, by telephone or in-person in a group setting, significantly improved emotional well-being and coping in persons with chronic ABI. CBT was found to be a promising instructional technique to treat emotional sequelae of ABI, which may promote motivation and engagement in rehabilitation. CBT is also used frequently for children with autism spectrum disorders (ASD), who similar to adults with ABI, have emotional issues that may interfere with social interactions (Reaven, Blakeley-Smith, Culhane-Shelburne, & Hepburn, 2012). Emotional distress may exacerbate core-deficits for both people with ABI (Bradbury et al., 2008) and ASD (Greenaway & Howlin, 2010). Reaven and colleagues (2012) found that a modified CBT group for children with ASD significantly reduced anxiety symptoms post treatment. Consistent with Sherr and colleagues (2003), the CBT components included emotional regulation as well as relaxation, deep breathing, and use of self-control. Reductions in anxiety were maintained at 3 and 6 months post intervention. Although this study was specific to children with ASD, there is an important implication to consider for the ABI population. Emotional constructs such as anxiety can be rehabilitated. This is consistent with findings by Rath and colleagues (2003) who found that

treatment focusing on using CBT to treat the emotional aspects of social problem solving was more effective than traditional cognitive remediation.

Interpersonal Recall (IPR: Helffenstein & Wechsler, 1982) is a training package designed to improve social communication in people with brain injury that incorporates components of both direct instruction and CBT. The DI components are implemented during the phase of the training when the individual is provided with opportunities to systematically practice the target skill. Consistent with principles of CBT, the program facilitates self-reflection while participants review social interactions via video or audiotape and receive coaching (Kagan 1980). The goal of the recall itself is not to teach a new skill, but rather to explore thoughts and feelings to change behavior and result in the desired social interaction. This is supplemented by opportunities to practice the behavior after replaying the original session. IPR was evaluated in a randomized controlled trial and found to have positive effects in increasing social skills in persons with brain injury (Helffenstein & Wechsler, 1982).

As will be described in the following section, the NICE protocol incorporated principles of DI with modeling and practice to teach the necessary social problems skills as well as CBT to improve emotional well-being and coping to facilitate problem solving completion using positive self-talk strategies. Elements of IPR, including video feedback and modeling, were used in later sessions to improve awareness of deficits and promote self-reflection for new learning.

NICE Training Protocol

NICE is an acronym for four components that are important for help-seeking when wayfinding. The first step of NICE, ***N****oticing you have a problem*, was modified from the PSG *Clear Thinking* worksheet, which requires participants to log experiences specific to problems encountered during wayfinding. Participants are trained to log what, why, and where the

breakdown occurred to encourage problem recognition. The second step of NICE, ***I****dentifying the information you need for help*, was adapted from the GIST session, *Skills of a Great Communicator*. Behaviors such as paying attention to the speaker, expressing the right idea, being polite, maintaining appropriate space, and having social confidence are practiced during the help-seeking process. The third step of NICE, ***C****ompensatory strategies*, adapted from the PSG, focuses on developing a personal strategy list to use during the problem solving process. The NICE protocol includes examples of specific strategy options that can be used when lost (e.g., write it down, say it out loud, ask if the person is heading in that direction, ask for repetition and/or clarification of information, draw). The last step of NICE, ***E****valuate Progress*, also adapted from the PSG, focuses on training participants to analyze their help-seeking behavior and generate plans for initiating future social problem solving when lost. The last step of NICE also encourages self-evaluation and self-correction when necessary (see Appendix B).

NICE Session Structure. Each of the six sessions follows roughly the same group structure employed in the GIST program where each session began with identifying the purpose of the session, followed by review of previous concepts, introduction to a new topic, role play practice, and homework assignment (see Appendix B). The importance of working in a group environment to facilitate learning, support, and feedback is discussed in the first session. The purpose of using the group format to implement NICE is to teach participants how to recognize when they are lost, generate a solution, and ask for help in a manner that is appropriate, effective, and efficient. Group treatment provides opportunities for members to learn from each other's successes and failures and also facilitates feelings of universality that may increase social confidence and motivation (Hawley & Newman, 2010).

Videotaped interactions are used to teach and reinforce social communication skills (Hawley & Newman, 2010; Helffenstein & Wechsler, 1982). Video feedback is a powerful tool for improving communication skills and allows patients to observe the present, analyze the past, and plan for the future (Rath, Simon, Langenbahn, Sherr, & Diller, 2003). Video feedback also encourages group members to practice new skills in a safe environment. Multiple viewpoints and consequences are discussed to improve cognitive flexibility and alternative solutions and behaviors.

All sessions also include practice role plays of help-seeking attempts. Role play can be an effective treatment technique to teach specific social behaviors (Rath, Simon, Langenbahn, Sherr, & Diller, 2003) because it allows the patient to actually "do" rather than "talk" about real life social scenarios. NICE sessions include practice role plays during the group treatment time as well as opportunities for individual videotaped role plays with unfamiliar confederates immediately after the session to promote generalization of skills. Consistent with the PSG (Rath et al., 2003), the purpose of the NICE role play is to help participants learn, master, and generalize concepts to new contexts. One modification made with the NICE protocol is to combine Interpersonal Recall (IPR; Helffenstein & Wechsler, 1982) with the individual role play scenarios in Sessions 5 and 6 to provide participants with opportunities to learn how to provide and accept feedback from other group members, rather than from the clinician.

Measurement of Wayfinding. One of the challenges with using wayfinding as a treatment domain is the lack of objective measurement methods making it difficult to evaluate impact of treatment. There are no existing measurements of help-seeking in the context of wayfinding thus for this project, several measurements were developed and piloted as described in the next section. The first measurement was an extension of an existing route finding measure,

the Executive Function Route-Finding Task (EFRT; Boyd & Sautter, 1985). The EFRT is an ecological measure of wayfinding behavior originally designed to evaluate the integrity of executive functions following brain injury (Boyd & Sautter, 1985; Chaytor & Schmitter-Edgecombe, 2003; Manchester, Priestley, & Jackson, 2004). The examiner observes the participant navigating to an unfamiliar destination and rates performance on the following domains: (a) task understanding, (b) information seeking, (c) retaining directions, (d) error detection, (e) error correction, and (f) on-task behavior. This results in the EFRT Total Score. Wayfinding behaviors and use of strategies are also documented in a narrative. Concurrent validity of the instrument has been established (Kizony, Demayo-Dayan, Sinoff, & Josman, 2011; Webber & Charlton, 2001), and it has been validated in original (Boyd & Sautter, 1983) and modified forms (Bamdad, Ryan, & Warden, 2003; Kizony et al., 2011; Spikman, Deelman, & van Zomeren, 2000; Webber & Charlton, 2001).

An earlier study increased the objectivity of the EFRT by adding a footstep ratio (FSR) to measure efficiency of wayfinding (EFRT-R: FSR; Cho, Sohlberg, & Boyd, 2012). FSR is calculated by dividing the participant's actual number of footsteps by the examiner's fewest number of footsteps using a pedometer on routes that have been calibrated. The use of the EFRT-R allowed the author to determine the potential impact of a help-seeking training protocol such as NICE on wayfinding performance because a lower footstep ratio indicates that fewer footsteps were taken to the goal destination, suggesting greater efficiency in wayfinding.

A second measure of help-seeking using structured role plays was developed with the goal of providing a repeated measure that would directly evaluate generalization of the NICE components in social interaction. Five role play scenarios with live confederate helpers available to assist the participant in attempting to find a destination were developed: (a) the helper speaks

too fast without adequate time to remember information; (b) the helper is rude; (c) the helper gives poor directions; (d) the helper shares information, but clearly states that she did not know the goal destination; and (e) the helper distracts the participant with irrelevant information and/or questions. A four-point social behavior rating scale (total 21 points) was used to rate seven performance parameters during the role plays that were directly taught as part of the NICE protocol: (a) getting attention of the helper (e.g., excuse me), (b) paying attention to the helper (e.g., maintaining eye contact with the helper), (c) expressing an idea (e.g., asking the navigation/destination question concisely), (d) using compensatory strategies to remember information relayed by the helper (e.g., requesting for clarification), (e) maintaining appropriate space (e.g., respecting personal space with the helper), (f) having social confidence (e.g., using affirmation statement and/or positive self-talk), and (g) being polite (e.g., tone). Points were received on each of the seven performance parameters when strategies were implemented (e.g., no strategy used= 0; strategy use attempted but not successful= 1; strategy use attempted and somewhat successful= 2; strategy use attempted and goal achieved= 3).

The role play measures were piloted to establish reliability and validity (Cho & Sohlberg, 2014). Prior to initiating the pilot study, reliability was established by two speech-language pathologists who rated live role plays acted out by two graduate school clinicians using the same five scenarios used with participants in the project (see Appendix C). Inter-observer agreement for the 21-point social behavior rating scale was 94%. The approximation of real-life tasks is a foundation of ecological validity but traditional standardized executive measures often lack ecological validity (Kizony et al., 2011; Spikman et al., 2000). The author attempted to address the need to use an ecologically valid measure for the role plays by using scenarios from real life help-seeking encounters experienced by participants in a prior investigation (Cho et al., 2012).

In a pilot study (Cho & Sohlberg, 2014, 2015) three participants exhibiting diverse cognitive and social profiles and successfully completed the six week NICE treatment. Post-treatment measures suggested participants were more efficient in their wayfinding after being taught help-seeking skills. Specific to wayfinding behavior, there was a reduction in the EFRT-R footstep ratios. In addition, improvements on the EFRT-R Total Score suggested participants were more effective in their social interactions. Specific to help-seeking behavior, each of the three participants demonstrated improvements during the in-session role plays. Improvement in role play was evidenced by score gains on the social behavior rating scale specifically developed for use in the pilot study. These preliminary results support the further development and evaluation of the NICE protocol to train help-seeking in this dissertation study.

Research Questions

The pilot investigation was a descriptive study evaluating the potential efficacy of NICE using a small convenience sample of three male participants recruited from the same local brain injury residential facility. The purpose of this dissertation was to experimentally investigate the efficacy of the NICE protocol. This study maintained the NICE training protocol described above, including the session structure, training techniques, and frequency/ duration of treatment. An experimentally controlled methodology and a single subject multiple baseline was used to evaluate the efficacy of NICE.

Participant inclusion criteria were more detailed to improve the external validity of the dissertation. The pilot study used a convenience sample and had limited background information on the participants; however, the dissertation study recruited participants with measurable impairments in social communication and wayfinding. The Saint Louis University Mental Status examination (SLUMS; Tariq, Tumosa, Chibnall, Perry, & Morley, 2006) was used as a screening

tool to assess orientation, attention, memory and executive function. The SLUMS is an appropriate and sensitive measure to use as a screening tool for adults with cognitive impairment (Feliciano et al., 2013). As stated in the inclusion criteria, participants need to score less than or equal to 20 points on the SLUMS to qualify for the study.

The Awareness of Social Inference Test Revised (TASIT-R; Flanagan, McDonald, & Rollins, 2011) was added as a pre- and post-test outcome measure to document potential change in the social cognition profiles of potential participants. The TASIT-R has been identified as a measure that is sensitive to everyday social difficulties experienced by people with ABI and significant correlations to social problem solving have been reported in an earlier task version of the TASIT (Channon & Crawford, 2010). Participants were required to score at least one standard deviation below the mean of controls on at least one subtest of the TASIT-R to qualify for the dissertation study.

The EFRT-R (Cho et al., 2012) was administered as described in the NICE pilot investigation. Also, the EFRT-R was used as a weekly probe to document time, footstep ratio and destinations success to the goal destination for 10 new hospital routes that were counterbalanced and randomized to control for practice effects and route equivalence. The weekly help-seeking probes for the dissertation study used the same 21-point social behavior rating scale; however, the structured role plays acted out by student confederates were replaced by real life social encounters with trained helpers to improve ecological validity.

The Social Problem-Solving Inventory-Revised (SPSI-R; D'Zurilla, Nezu, & Maydeu-Olivares, 2002) was added as a pre- and post-treatment measure to document awareness and emotional responses to the demands of help-seeking. The SPSI-R provides norms for different age groups, has strong internal consistency and is stable over time with strong structural,

concurrent, predictive, convergent and discriminant validity. Lastly, the Problem Solving Inventory (PSI; Heppner & Petersen, 1982) was administered pre- and post- treatment. The PSI is based on the original D'Zurilla and Goldfried (1971) social problem solving model. The PSI assesses an individual's self-perceptions of his or her own problem solving behaviors and attitudes.

This dissertation addressed the following research questions:

1. Is there a functional relationship between implementation of the NICE protocol and improvement in help-seeking as measured by change in social behaviors?

2. Is there a functional relationship between implementation of the NICE protocol and improvement in wayfinding for adults with ABI as measured by route finding efficiency and accuracy?

Chapter 3: Methodology

This chapter describes the research methodology that was used in the dissertation. First, the single subject experimental design is described. In the next section, a description of the participant characteristics is detailed followed by a description of research procedures, treatment, measurement and analyses.

Experimental Design

A single subject modified variant of nonconcurrent and multiple probe multiple baseline (MBL) across participant cohort design was used in this dissertation study to evaluate the NICE group therapy protocol structure (Kennedy, 2005). Single subject experimental research uses repeated measures of participants' behaviors over time to document a functional causal relation and emphasizes use of dependent variables with high social importance and clinical need (Horner et al., 2005). A MBL allowed introduction of the NICE treatment sequentially across baselines on different tiers, to control for threats to external validity. The MBL design also controlled for most threats to internal validity, such as test-retest sensitivity and instrumentation changes (Kennedy, 2005). Three different groups of participants (n = 2- 3 in each group) for a total of seven participants allowed demonstration of systematic replication at least three times in this modified variant of nonconcurrent and multiple probe MBL. The rationale for 2-3 participants in each group was to maintain the group dynamics critical to the NICE protocol and to maintain a dyad, the minimum needed for group process, in the event of attrition. A major threat to the internal validity of this design was practice effects. By counterbalancing and randomizing routes for each participant, the modified MBL also accounted for practice effects across phases to ensure experimental manipulation of the independent variable.

Participants

Seven participants with ABI were recruited on basis of current level of functioning, rather than severity of brain injury using the below inclusion and exclusion criteria from New York University Langone Medical Center and the Traumatic Brain Injury Model Systems Centers.

Inclusion criteria:

1. sufficient English fluency/literacy to participate in group therapy
2. documented acquired brain injury by a medical doctor
3. documented social cognition impairment on at least one subtest of The Awareness of Social Inference Test Revised (TASIT-R; Flanagan, McDonald, & Rollins, 2011) as indicated by a score of one standard deviation below the mean of controls
4. documented cognitive impairment on the Saint Louis University Mental Status examination (SLUMS; Tariq, Tumosa, Chibnall, Perry, & Morley, 2006) with a score of less than or equal to 20 points
5. wayfinding impairments as documented by a "fear of getting lost" and lack of confidence in independent community wayfinding
6. adequate hearing and visual acuity
7. access to transportation to the research clinic and availability for six treatment sessions and two testing sessions

Exclusion criteria:

1. no presence of current psychiatric disorder(s) as indicated by medical record
2. no active substance abuse according to the medical record
3. no motor limitations, sensory, or other neurological limitations that would preclude the ability to participate in the training or wayfinding

4. no language impairments preventing comprehension of the NICE protocol

There was no enrollment restriction based on gender, race or ethnicity. A proposed age range from 18-65 years was based on clinical knowledge of persons with brain injury accessing services for rehabilitation at the dissertation study site. Table 1 details the participants' characteristics.

Table 1

Participant Characteristics

Participant	Age	Sex	Ethnicity	Education	Occupation at Onset	Etiology	Months Since Onset	Living Arrangement
1	52	Female	African-American	22	Physician	TBI	40	Alone
2	34	Female	African-American	12	Security Guard	TBI	24	Child
3	57	Female	African-American	12	Cashier	TBI	10	Grandchild
4	64	Female	Caucasian	12	Administrative Assistant	L CVA	14	Alone
5	62	Female	African-American	16	Administrative Assistant	L CVA	18	Alone
6	20	Female	African-American	12	Student	Brain Tumor	36	Parent
7	64	Female	Asian	16	Accountant	TBI	22	Spouse

Note. TBI = traumatic brain injury; L CVA = left cerebrovascular accident.

Procedures

Participants were required to attend six 1-hour NICE treatment groups and complete approximately 2-3 hrs of pre- and post-treatment testing. All sessions were conducted at the Rusk Institute of Rehabilitation Medicine (RIRM), New York University Langone Medical

Center (NYULMC), in a conference room in groups of 2-3 participants. I completed all recruitment, consent, testing and implementation of treatment. I administered the weekly probes and completed scoring with a second rater, a trained postdoctoral research psychology fellow, who was not involved in the treatment procedures. Prior to the study, 10 hospital routes were equated for distance, number of turns (e.g., 5) and floor level change (e.g., 5 locations start on a top floor and end on a lower floor; 5 locations start on a lower floor and end on a top floor). A second rater who was not involved in the study verified the final measurements (e.g., number of steps) and an average was taken across four trials. Routes were randomized and counterbalanced to control for possible practice effects. All routes at RIRM: NYULMC were inside the building during active medical center business hours on floors 1-22, with at least one helper visible to a participant within 10 feet of the start location. Participants were paid $150 upon completion of the project.

Recruitment and Consent. Participants were recruited via flyers distributed at the NYULMC site. There were six participants who did not meet selection criteria (n = 2 due to screen failures and n = 4 due to comorbid etiologies). Also, seven participants were referred to the study but did not feel they needed the training (n = 3) or were not interested in study participation (n = 4). Seven participants were identified who met criteria and completed the treatment. I, a licensed speech-language pathologist and faculty in the department of rehabilitation medicine at a university medical center working with persons with brain injury, obtained consent in a face to face meeting using a checklist to ensure clear understanding of project activities. During the informed consent process, participants were informed of their right to discontinue and retract participation without any negative consequences. Participants were also informed of their right to decline responding to any questions at the outset of the test battery

and interview process. To protect vulnerable participants, only participants who had the capacity to consent independently were included. This study included individuals who navigate in the community; therefore, individuals who were anticipated to have extensive cognitive impairment, precluding the capacity to provide informed consent, were not included.

Screening. Two screening instruments were administered to assess basic attention, memory and social cognition to ensure that participants could benefit from the NICE training protocol. The Saint Louis University Mental Status examination (SLUMS) was used as a screening tool. The SLUMS is a 30-point, 11 question screening measure that tests cognitive functions including orientation, attention, memory and executive function. The SLUMS is clinician administered and takes approximately 7-10 minutes to complete. The SLUMS identifies persons with mild neurocognitive disorder based on the education level of the patient (Tariq, Tumosa, Chibnall, Perry, & Morley, 2006). The SLUMS is an appropriate and sensitive measure to use as a screening tool for adults with cognitive impairment (Feliciano et al., 2013). As stated in the inclusion criteria, participants needed to score less than or equal to 20 points on the SLUMS to qualify for the study. Table 2 details the participants' SLUMS scores.

Table 2

St. Louis University Mental Status Examination (SLUMS Exam)

Participant	SLUMS Exam Total Score
1	20
2	15
3	18
4	17
5	16
6	20
7	18

The Awareness of Social Inference Test-Revised (TASIT-R; Flanagan, McDonald & Rollins, 2011) has been identified as a measure that is sensitive to everyday social difficulties

experienced by people with ABI and significant correlations to social problem solving have been reported in an earlier task version of the TASIT (Channon & Crawford, 2010). The TASIT-R comprises of three parts: (1) Emotion Evaluation Test; (2) Test of Social Inference - Minimal; and (3) Test of Social Inference – Enriched. The first subtest, Emotion Evaluation Test, examines a person's ability to identify basic emotions and has actors exhibiting one of seven emotional states- happy, sad, angry, anxious, surprised, revolted or neutral for 28 scenes (15-60 s), four examples of each emotion. The second subtest, Test of Social Inference – Minimal, examines a person's ability to perceive social inferences, specifically sarcasm. This second subtest comprises a video of 15 short scenes (20-60 s) of actors interacting in everyday interactions. After each scene, participants must answer four questions for five sincere scenes and 10 sarcastic scenes. The third subtest, Test of Social Inference – Enriched, examines a person's ability to perceive social inferences involved when telling lies and in use of sarcasm in 16 short scenes (15-60 s). After each scene, participants must answer four questions for eight scenes depicting a lie and eight scenes depicting sarcasm. Participants needed to score one standard deviation below the mean of controls on at least one of the three subtests to be considered for the study.

Probe schedule and description. Repeated measures consisted of probes for help-seeking using the Social Behavior Rating Scale (Cho & Sohlberg, 2014, 2015) and probes for wayfinding using the Executive Function Route-Finding Task-Revised (EFRT-R; Cho et al., 2012). Development of both measures was described in detail in Chapter 2 and the Appendix which details the pilot study. Identical help-seeking and wayfinding probes were administered before each session with all participants. Help-seeking and wayfinding probes required a participant to find a specific destination in the shortest number of footsteps to one location in the

hospital, asking at least one helper for assistance. The help-seeking probe was scored using the same 21- point social behavior rating scale specifically developed and validated in the pilot study (Cho & Sohlberg, 2014, 2015). The wayfinding probe was scored using the EFRT-R footstep ratio and total score. Total time to goal destination and destination success was also documented. The same help-seeking and wayfinding probes were measured repeatedly across baseline and intervention phases of this dissertation study with the same instructions for task completion. No feedback was given about participant performance during or after the help-seeking probes.

Baseline phase. Five baseline probes for each participant were collected 1x/week before initiation of the NICE protocol. This represents the "control condition" and data were assessed for level, trend and variability to ensure stability and accuracy of data for each participant (Horner et al., 2005).

Intervention phase. The NICE treatment (independent variable) was initiated after at least five consecutive unsuccessful help-seeking and wayfinding attempts were documented at baseline upon visual inspection of the data. The first treatment probe was collected after NICE Group Session 2, immediately before the session. Treatment probes were then collected 1 hour immediately before the next scheduled group session, at the same time and day of the week.

Treatment

The NICE protocol has been described in detail in chapter 2 and is attached as Appendix B. Each of the six sessions followed the same group format: identify the purpose of the session, review previous concepts, introduce a new topic, practice, and discuss the following week homework assignment. See Table 3 for detailed topic, content and research based models for each session. The purpose of using the group format to implement NICE was to provide

opportunities for members to learn from each other's successes and failures and also to increase social confidence and motivation (Hawley & Newman, 2010).

All sessions also included practice role plays of help-seeking attempts. Role play is an effective treatment technique to teach specific social behaviors (Rath, Simon, Langenbahn, Sherr, & Diller, 2003) because it allows the patient to actually "do" rather than "talk" about real life social scenarios. NICE sessions include practice role plays during the group treatment time. Consistent with the PSG (Rath et al., 2003), the purpose of the NICE role play is to help participants learn, master, and generalize concepts to new contexts. The practice role plays in sessions 5 and 6 are videotaped to provide participants with opportunities to learn how to provide and accept feedback from other group members. These videotaped interactions were used to teach and reinforce social communication skills (Hawley & Newman, 2010; Helffenstein & Wechsler, 1982). Video feedback is a powerful tool for improving communication skills and allows patients to observe the present, analyze the past, and plan for the future (Rath et al., 2003). Multiple viewpoints and consequences were discussed to improve cognitive flexibility and alternative solutions and behaviors.

Table 3

Development of NICE

Session	NICE	Session Content	Research Based Model
Session 1: Orientation	Give overview of NICE program and introduce group participants Teach step 1 of ***N***ICE-***N***oticing you have a problem	Purpose of the group What is communication and why do we need good communication for help-seeking when lost Behaviors necessary for good communication	Adapted from the PSG: *Clear Thinking worksheets*
Sessions 2 & 3: Skills of a Great Communicator	Practice how to ask for help Teach step 2 of N***I***CE-***I***dentifying the information you need for help	Characteristics of a great communicator Why is communication important when you are lost and need to ask for help How to be a great communicator when asking for help	Adapted from the GIST: *Skills of a Great Communicator*
Session 4: Developing Social Confidence with Positive Self-Talk	Identify confidence and self-talk Teach step 3 of NI***C***E-***C***ompensatory strategies	Discuss social confidence and feelings when lost Identify how to use positive self-talk and change negative self-talk	Adapted from the PSG: *Personal Strategy List* Adapted from the GIST: *Developing Social Confidence with Positive Self-Talk*
Sessions 5 & 6: Video Taping and Evaluation	Learn to give and accept feedback Teach step 4 of NIC***E***- ***E***valuating progress	Watch videos with the group Discuss rationale and rules for giving video feedback for practice role played scenarios Share and accept feedback from others	Adapted from the PSG: *Observing behavior in the present and analyzing past behavior for future planning* Adapted from the GIST: *Video-Taping and Social Problem Solving* Adapted modified version of IPR: *Group Video feedback*

Note. PSG = Problem Solving Group Protocol; GIST = Group Interactive Structured Treatment for Social Competence; IPR = Interpersonal Recall.

Frequency and duration. The NICE protocol was implemented 1x/ week for 6 weeks. Participants were required to provide their own transportation to the study site as stated in the inclusion criteria.

Outcome Measures

Primary outcome: Help-seeking. Each week before the scheduled NICE group treatment session, participants were individually asked to help-seek to a new goal destination, asking at least one helper for assistance. This probe differs from the original pilot investigation (Cho & Sohlberg, 2014, 2015) which required participants to help-seek from trained student confederates. The controlled environment in the NICE pilot investigation helped validate the 21-point social behavior scale but this dissertation intended to improve the ecological validity of the measure by using real life help-seeking encounters at the medical center. A detailed narrative of each help-seeking attempt was also recorded.

Help-seeking was scored on the 21- point social behavior rating scale for the following behaviors: (a) getting attention of the helper (e.g., excuse me), (b) paying attention to the helper (e.g., maintaining eye contact with the helper), (c) expressing an idea (e.g., asking the navigation/destination question concisely), (d) using compensatory strategies to remember information relayed by the helper (e.g., requesting for clarification), (e) maintaining appropriate space (e.g., respecting personal space with the helper), (f) having social confidence (e.g., using affirmation statement and/or positive self-talk), and (g) being polite (e.g., tone). Points were given on each of the seven performance parameters when strategies were implemented. The development of this social behavior rating scale was detailed in chapter 2.

Data scoring for help-seeking remained unchanged from the NICE pilot investigation described in chapter 2; however, in this dissertation study, participants were given a maximum time of 15 minutes to find the goal destination. If a participant was unable to complete the task in the designated time, it was documented as an unsuccessful help-seeking attempt. Interobserver agreement (IOA) was calculated for 60 % of baseline and treatment probes for each participant.

Percent agreement, calculated by [(Frequency of observations with agreement/ total number of observations) x 100%] was 95.2% for both baseline and treatment probes with Cohen's (1960) kappa = .82, indicating strong level of agreement (McHugh, 2012). The inter-rater, a trained postdoctoral research psychology fellow, and I independently scored all help-seeking attempts to ensure fidelity of data collection.

Secondary outcome: Wayfinding. The weekly EFRT-R probes were also used as a repeated measure. In addition to the EFRT-R Total Score and EFRT-R footstep ratio (FSR), total time to destination and destination success were also documented. I observed each participant navigate to an unfamiliar destination pre- and post- NICE treatment and rated performance using the EFRT-R (Cho et al., 2012) protocol which assessed the following domains: (a) task understanding, (b) information seeking, (c) retaining directions, (d) error detection, (e) error correction, and (f) on-task behavior. This resulted in the EFRT-R Total Score. Wayfinding behaviors and use of strategies were documented in a detailed narrative. The EFRT-R: FSR was also used to measure efficiency of wayfinding. FSR is calculated by dividing the participant's actual number of footsteps by the examiner's fewest number of footsteps using a pedometer on routes that have been calibrated. The use of the EFRT-R allowed me to determine the potential impact of the NICE help-seeking protocol on wayfinding performance. Interobserver agreement (IOA) was calculated for 60 % of baseline and treatment probes for each participant. Percent agreement, calculated by [(Frequency of observations with agreement/ total number of observations) x 100%] was 90.5% for baseline and 95.2% for treatment probes with respective Cohen's (1960) kappa values = .80 and .82, indicating strong level of agreement (McHugh, 2012). The inter-rater, a trained postdoctoral research psychology fellow, and I independently scored all help-seeking and wayfinding attempts to ensure fidelity of data collection.

Secondary outcome: pre- and post- treatment problem solving. The Awareness of Social Inference Test Revised (TASIT-R; Flanagan, McDonald, & Rollins, 2011) described earlier under screening measures was also administered as a pre- and post- treatment outcome measure to document potential change in the social cognition profiles of participants. The TASIT-R has been documented to be sensitive to social cognition remediation (Bornhofen & McDonald, 2008a, 2008b).

The Social Problem-Solving Inventory-Revised Short Form (SPSI-R: S; D'Zurilla, Nezu & Maydeu-Olivares, 2002) was used as a pre- and post- treatment measure to document mood state as an indicator of treatment effect. This measure is a self-perception inventory that asks the respondent to reflect on aspects of the social interaction that they engaged in. It was used to document awareness and emotional responses to the demands of help-seeking. The SPSI-R: S is a 25 item self-report measure that preserves the theoretical integrity of the original problem solving dimensions but was more appropriate for use for persons with brain injury. The test developers noted there is little difference in context effects between the longer 52- item SPSI-R: L form and shorter 25- item SPSI-R: S form used for this study (e.g., participants would respond the same to questions asked in the 52-item version as compared to the subset of 25 questions). One modification that was made to the SPSI-R: S was that I read each question out loud to the participant to assist in task completion. The SPSI-R: S is sensitive to the effects of treatment of problem solving skills (D'Zurilla, Nezu, & Maydeu-Olivares, 2007).

Also, the Problem Solving Inventory (PSI; Heppner & Petersen, 1982) was administered pre- and post- treatment. The PSI is based on the original D'Zurilla and Goldfried (1971) social problem solving model and assesses an individual's perceptions of his or her own problem solving behaviors and attitudes. PSI is a 35-item Likert scale inventory which measures three

factors: (1) problem solving confidence (PSC; 11 items); (2) personal control (PC; 5 items); and (3) approach-avoidance style (AAS; 16 items). PSC and PC are intended to approximate problem solving orientation and AAS is intended to approximate problem solving skills from the original social problem solving model (D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1990).

Analyses

Analyses for the two research questions are detailed in the following section.

Evaluation of a functional relationship between implementation of the NICE protocol and improvement in help-seeking as measured by change in social behaviors (research question 1). Visual analysis was used to determine a functional relation using six variables: (1) level; (2) trend; (3) variability; (4) overlap; (5) immediacy of effect; and (6) consistency of data pattern in similar phases (Kennedy, 2005) to assess help-seeking. To measure help-seeking, social behavior rating score data were graphically depicted allowing formative and summative analyses of study outcomes. Visual analysis was supplemented by the Tau-*U*, a nonparametric technique, well suited for small datasets (Parker, Vannest, Davis, & Sauber, 2011; Rispoli et al., 2013). There are two major advantages of the Tau-*U* test. First, the Tau-*U* accounts for changes in level and monotonic trend by combining non-overlap between phases with trend from within the treatment phase, while controlling for trend in the baseline phase (Ross & Begeny, 2014). Second, the Tau-*U* is distribution free and compatible with visual analyses (Rakap, Snyder, & Pasia, 2014). For the purposes of this dissertation, the web-based calculator for Tau-*U* was used from http://www.singlecaseresearch.org/calculators/tau-u.

The Wilcoxon Signed Rank Test was used as a non-parametric alternative to the repeated measures t-test to analyze the social problem solving pre- and post-treatment dataset for the Social Problem-Solving Inventory-Revised Short Form (SPSI-R: S; D'Zurilla, Nezu & Maydeu-

Olivares, 2002), Problem Solving Inventory (PSI; Heppner & Petersen, 1982) and The Awareness of Social Inference Test Revised (TASIT-R; Flanagan, McDonald, & Rollins, 2011). The effect size was determined using Cohen's (1988) criteria of 0.2 = small effect, 0.5 = medium effect and 0.8 = large effect.

Evaluation of a functional relationship between implementation of the NICE protocol and improvement in wayfinding for adults with ABI as measured by route finding efficacy and accuracy (research question 2). Visual analysis was used to determine a functional relation using six variables: (1) level; (2) trend; (3) variability; (4) overlap; (5) immediacy of effect; and (6) consistency of data pattern in similar phases (Kennedy, 2005) to assess route finding efficacy and accuracy using the EFRT-R Total Score and EFRT-R: Footstep ratio (FSR) data. EFRT-R Total Score and EFRT-R: FSR data were graphically depicted allowing formative and summative analyses of study outcomes and visual analysis was supplemented by the Tau-*U* (Parker, Vannest, Davis, & Sauber, 2011). Total duration of time to complete each route was documented as well as a narrative of each wayfinding attempt.

Chapter 4: Results

This chapter begins by presenting data from the three tiers (e.g., groups) required for replication to demonstrate a group treatment effect for the primary outcome measures of help-seeking and secondary outcome measure of wayfinding. Next, results are presented for pre- and post- treatment comparison data measuring social problem solving.

Primary Outcome: Help-Seeking

Following completion of the NICE group treatment, all three groups of participants improved on the repeated measure of help-seeking used to directly evaluate potential changes in social interaction when asking for help based on visual analysis of data. Figure 1 illustrates help-seeking behavior across baseline and treatment. Participants were enrolled on basis of scheduling restrictions and availability. For all three group tiers, treatment was introduced after establishment of a stable baseline. Consistent with a nonconcurrent MBL, baseline was extended for each tier (e.g., tier 1= 2 weeks, tier 2= 4 weeks, tier 3= 6 weeks) to allow systematic experimental analysis and control for most threats to internal validity. Consistent with a multiple probe MBL, data points were collected at strategic time points (e.g., 1 hr immediately before next treatment session).

To supplement visual analysis, the Tau-*U* was calculated to quantify sensitivity to treatment effects. Tau-*U* scores were interpreted using the following criteria: .65 or lower: weak or small effect; between .66 and .92: medium to high effect; and .93 to 1: large or strong effect (Parker & Vannest, 2009; Rispoli et al., 2013). No participants required baseline correction. All participants demonstrated rapid immediacy of effect to treatment and low variability upon visual analysis of the data. Participants 2 and 3 each missed one group session due to illness and all sessions had at least a dyad in attendance. Tau-*U* phase scores of 1 (p = .009) indicate large or

strong effects for all participants on the outcome measure of help-seeking. Individual Tau- *U* trend and baseline values are detailed in Table 4.

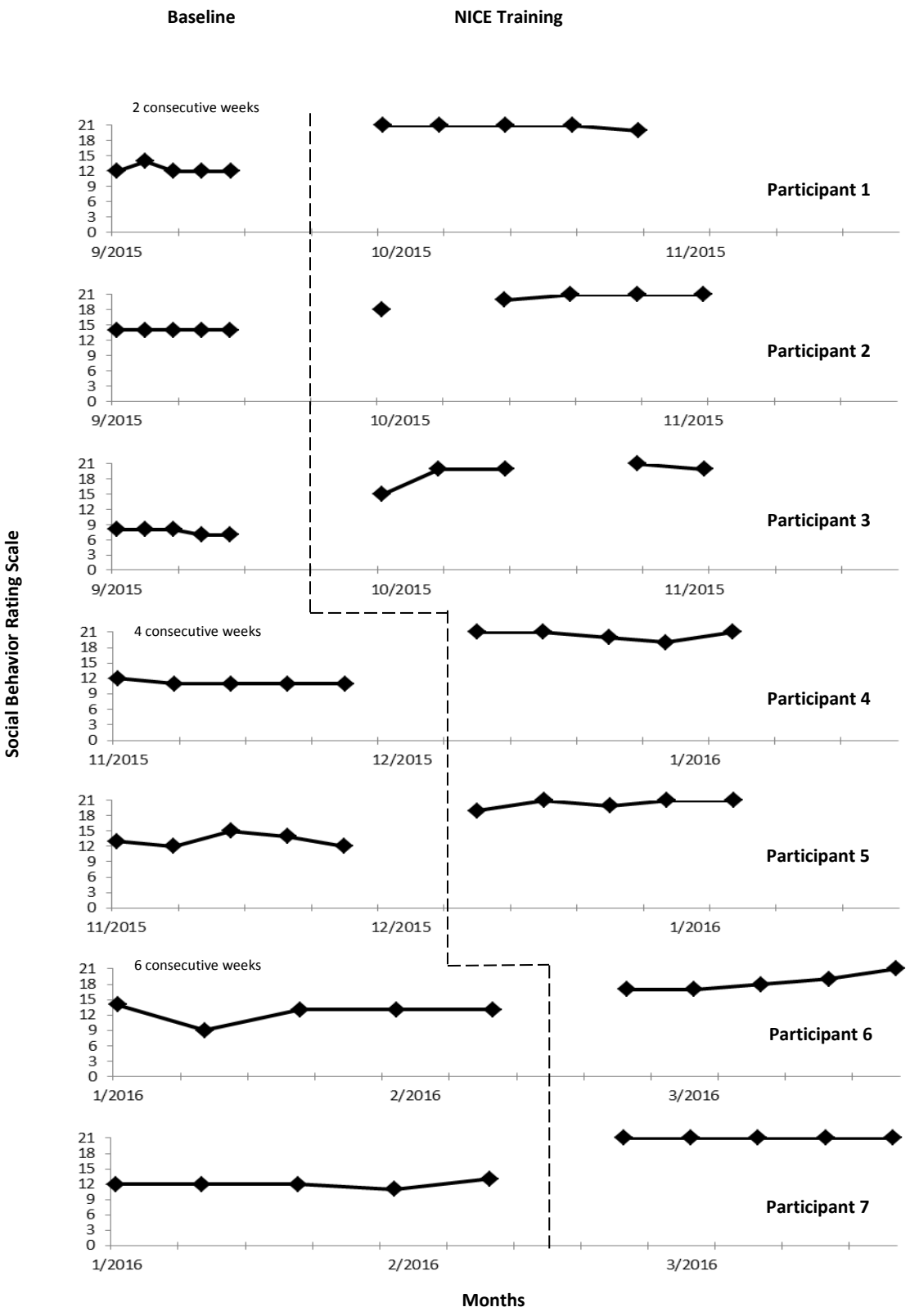

Figure 1. Help-Seeking across baseline and treatment

Table 4

Tau-U Trend and Phase Analyses for Help-Seeking

Participant	Trend		Phase	
	Tau-*U*	*p* value	Tau-*U*	*p* value
1	−.2	.624	1	.009
2	0	1	1	.009
3	−.6	.142	1	.009
4	−.4	.327	1	.009
5	−.1	.807	1	.009
6	−.1	.807	1	.009
7	.1	.807	1	.009

Note. *Trend is corrected for baseline values with Tau-*U* ≥ .4. Phase Tau-*U* values of .65 or lower = weak or small effect; between .66 and .92 = medium to high effect and .93 to 1 = large or strong effect.

All participants improved on help-seeking behaviors as measured by the Social Behavior Rating Scale (Cho & Sohlberg, 2014, 2015). See Table 5 for specific help-seeking by parameter data. Pre-treatment, 6/7 participants had difficulty getting attention of a helper (e.g., saying excuse me), 5/7 participants had difficulty paying attention to the helper (e.g., making eye contact) and 2/7 participants exhibited impolite behavior when asking for help (e.g., rude tone of voice, inappropriate language, walking away from helper when still talking) on at least one route. Prior to treatment, all seven participants also had difficulty expressing the destination question concisely (e.g., providing only relevant information related to goal destination vs. talking about having a brain injury), using compensatory strategies to remember information relayed by the helper (e.g., requesting for clarification or repetition), and using negative self-talk (e.g., I am stupid) on at least one route. For all post-treatment routes, 7/7 participants received full points for the parameter of getting and paying attention to the helper and 5/7 participants received full points for the parameter of expressing the destination question concisely. Two of the seven participants maintained their score gains on the parameter of using compensatory strategies post-

treatment. All seven participants used appropriate space when asking for help pre-treatment and maintained this behavior across all post-treatment routes. Of the 7/7 participants who demonstrated pre-treatment difficulty with social confidence, 4/7 scored full points on this parameter for all post-treatment routes. Of the 2/7 participants who exhibited pre-treatment impolite behavior when asking for help, one participant continued to display this behavior on one post-treatment route.

Table 5

Social Behavior Rating Scale Scores by Parameter

Participant	Route (Parameter: Getting Attention of the Helper)									
	1	2	3	4	5	6	7	8	9	10
1	2	3	2	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3	3	3
3	3	0	0	0	1	3	3	3	3	3
4	3	2	0	0	0	3	3	3	3	3
5	2	0	3	3	0	3	3	3	3	3
6	3	1	3	3	3	3	3	3	3	3
7	3	3	3	2	3	3	3	3	3	3
Participant	Route (Parameter: Paying Attention to the Helper)									
	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	3	3	3	3	3
2	3	3	3	3	3	3	3	3	3	3
3	2	2	2	2	1	3	3	3	3	3
4	2	2	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3
6	3	1	2	2	2	3	3	3	3	3
7	2	2	2	2	2	3	3	3	3	3
Participant	Route (Parameter: Expressing an Idea)									
	1	2	3	4	5	6	7	8	9	10
1	2	2	2	1	1	3	3	3	3	3
2	2	2	2	2	2	3	3	3	3	3
3	2	2	1	1	1	1	3	3	3	3
4	1	1	1	1	1	3	3	3	3	3
5	1	3	3	2	2	3	3	3	3	3
6	2	1	2	2	2	2	2	3	3	3
7	1	1	1	1	2	3	3	3	3	3
Participant	Route (Parameter: Using Compensatory Strategies)									
	1	2	3	4	5	6	7	8	9	10
1	1	2	1	1	1	3	3	3	3	3
2	0	0	0	0	0	0	0	2	3	3
3	0	0	1	1	1	2	2	2	3	2
4	0	0	1	1	1	3	2	1	3	3
5	0	0	0	0	1	2	3	2	3	3
6	0	0	0	0	0	0	0	0	1	3
7	0	0	0	0	0	3	3	3	3	3
Participant	Route (Parameter: Maintaining Appropriate Space)									
	1	2	3	4	5	6	7	8	9	10
1	3	3	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3
4	3	3	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3
6	3	3	3	3	3	3	3	3	3	3
7	3	3	3	3	3	3	3	3	3	3
Participant	Route (Parameter: Having Social Confidence)									
	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	3	3	3	3	3
2	0	0	0	0	0	0	0	3	3	3
3	0	0	0	0	0	0	3	3	3	3
4	0	0	0	0	0	3	3	3	3	3
5	1	0	0	0	0	2	3	3	3	3
6	0	0	0	0	0	3	3	3	3	3
7	0	0	0	0	0	3	3	3	3	3
Participant	Route (Parameter: Being Polite)									
	1	2	3	4	5	6	7	8	9	10
1	3	3	3	3	3	3	3	3	3	3
2	3	1	3	3	3	1	3	3	3	3
3	1	1	1	0	0	3	3	3	3	3
4	3	3	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3
6	3	3	3	3	3	3	3	3	3	3
7	3	3	3	3	3	3	3	3	3	3

Note. Raw scores reported for Social Behavior Rating Scale Scores. Routes 1-5 = pre- treatment probes; routes 6-10 = post-treatment probes. No strategy used= 0; Strategy use attempted but not successful= 1; Strategy use attempted and somewhat successful= 2; Strategy use attempted and goal achieved= 3

Secondary Outcome: Wayfinding

The Executive Route Finding Task Revised- EFRT-R (Cho et al., 2012) was used to measure efficiency and accuracy of wayfinding behavior. All participants exhibited a reduction in EFRT-R footstep ratio (EFRT-R: FSR) indicating fewer steps were being taken to reach the goal destination and demonstrated rapid immediacy of effect to treatment as well as low variability upon visual analysis of the data. FSR was calculated by dividing the participant's actual number of footsteps by the examiner's fewest number of footsteps, using a pedometer on routes that have been calibrated. Participants 1, 3 and 5 required Tau-*U* correction to correct for baseline trend. Tau-*U* phase scores of − 1 (p = .009) indicate large or strong effect for all participants on the outcome measure of EFRT-R: FSR. Individual Tau-*U* trend and baseline values are detailed in Table 6.

Table 6

Tau-U Trend and Phase Analyses for EFRT-R: FSR

Participant	Trend		Phase	
	Tau-*U*	*p* value	Tau-*U*	*p* value
1	.4*	.327	- 1	.009
2	.2	.624	- 1	.009
3	.4*	.327	- 1	.009
4	.2	.624	- 1	.009
5	.6*	.142	- 1	.009
6	− .1	.807	- 1	.009
7	.1	.807	- 1	.009

Note. * Trend is corrected for baseline values with Tau-*U* ≥ .4. Phase Tau-*U* values of .65 or lower = weak or small effect; between .66 and .92 = medium to high effect and .93 to 1 = large or strong effect.

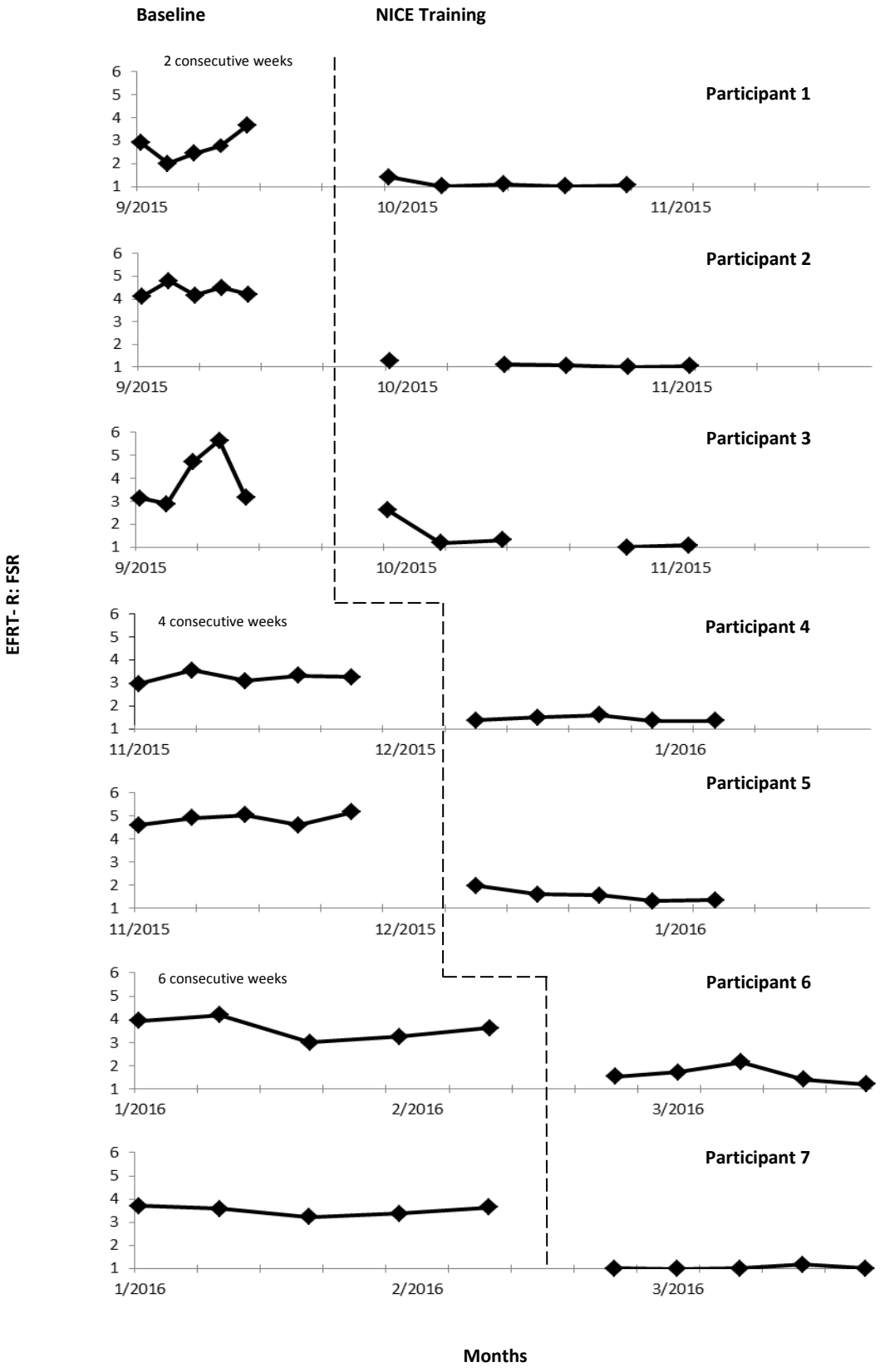

Figure 2. Executive Function Route Finding Task- Footstep Ratio across baseline and treatment

Wayfinding performance was also evaluated using the EFRT-R Rating Score. See Table 8 for Executive Function Route Finding Task Score by Parameter data. Pre-treatment, 7/7 participants had difficulty information seeking when wayfinding, resulting in behaviors such as aimless wandering to the goal destination. All participants also expressed difficulty retaining helper directions and the goal destination, requiring examiner cues for recall. For all post-treatment routes, 5/7 participants received full points for the parameter of task understanding, 6/7 participants received full points for the parameter of information seeking and 4/7 participants received full points for the parameters of error detection and error correction. Three of the seven participants maintained their score gains on the parameter of retaining directions on all post-treatment routes. Of the 3/7 participants who demonstrated pre-treatment difficulty with on task behavior, all three scored full points on this parameter post-treatment.

Participants 3, 6 and 7 required Tau-*U* correction for baseline trend. Individual Tau-*U* trend and baseline values are detailed in Table 7 and EFRT-R Total Score data on Figure 3.

Table 7

Tau-U Trend and Phase Analyses for EFRT-R: Total Score

Participant	Trend		Phase	
	Tau-*U*	*p* value	Tau-*U*	*p* value
1	−.7	.086	1	.009
2	−.2	.624	1	.009
3	.5*	.221	1	.009
4	−.4	.327	1	.009
5	.3	.462	1	.009
6	.5*	.221	.800	.037
7	.7*	.086	.720	.060

Note. * Trend is corrected for baseline values with Tau-$U \geq .4$. Phase Tau-*U* values of .65 or lower = weak or small effect; between .66 and .92 = medium to high effect and .93 to 1 = large or strong effect.

Table 8

Executive Function Route Finding Task Score by Parameter

Participant	Route (Parameter: Task Understanding)									
	1	2	3	4	5	6	7	8	9	10
1	2	4	2	2	2	4	4	4	4	4
2	3	4	2	4	2	4	4	4	4	4
3	1	2	3	3	3	3	4	4	4	4
4	3	2	3	3	4	4	4	4	3	4
5	3	4	4	4	4	4	4	4	4	4
6	4	3	3	3	3	4	4	4	4	4
7	3	3	4	4	3	4	4	4	4	4

Participant	Route (Parameter: Information Seeking)									
	1	2	3	4	5	6	7	8	9	10
1	2	3	1	1	1	4	4	4	4	4
2	1	2	1	2	1	4	4	4	4	4
3	1	1	1	1	1	4	4	4	4	4
4	3	2	3	3	2	4	4	4	4	4
5	1	1	2	2	2	4	4	4	4	4
6	1	1	2	3	2	3	3	2	3	4
7	2	2	2	2	2	4	4	4	4	4

Participant	Route (Parameter: Retaining Directions)									
	1	2	3	4	5	6	7	8	9	10
1	3	3	3	1	1	4	4	4	4	3
2	3	3	3	3	2	4	4	4	4	4
3	3	3	2	3	3	3	3	3	4	3
4	3	3	3	3	3	4	4	4	4	4
5	1	2	3	2	2	3	4	3	4	4
6	1	1	1	1	1	1	1	4	4	4
7	1	1	2	3	1	4	4	4	4	4

Participant	Route (Parameter: Error Detection)									
	1	2	3	4	5	6	7	8	9	10
1	3	3	3	3	3	4	4	4	4	4
2	2	2	2	2	2	4	4	4	4	4
3	2	2	2	2	2	2	4	4	4	4
4	3	2	3	2	2	4	4	3	4	4
5	1	2	3	2	2	4	4	4	4	4
6	1	1	1	2	1	2	3	2	2	4
7	1	2	1	3	3	4	4	4	4	4

Participant	Route (Parameter: Error Correction)									
	1	2	3	4	5	6	7	8	9	10
1	3	3	2	2	2	4	4	4	4	4
2	2	2	2	2	2	4	4	4	4	4
3	2	2	2	2	2	2	4	4	4	4
4	3	2	2	2	2	4	4	4	4	4
5	1	2	2	1	1	3	4	4	4	4
6	1	1	1	2	2	2	3	2	3	4
7	2	2	1	2	2	4	4	4	4	4

Participant	Route (Parameter: On Task Behavior)									
	1	2	3	4	5	6	7	8	9	10
1	4	4	4	4	4	4	4	4	4	4
2	4	4	4	4	4	4	4	4	4	4
3	4	4	4	4	4	4	4	4	4	4
4	3	2	3	3	4	4	4	4	3	4
5	4	4	4	4	4	4	4	4	4	4
6	4	1	4	4	4	4	4	4	4	4
7	4	4	4	4	3	4	4	4	4	4

Note. Raw Scores reported for Executive Function Route Finding Task Score. Routes 1-5 = pre- treatment probes; routes 6-10 = post-treatment probes.

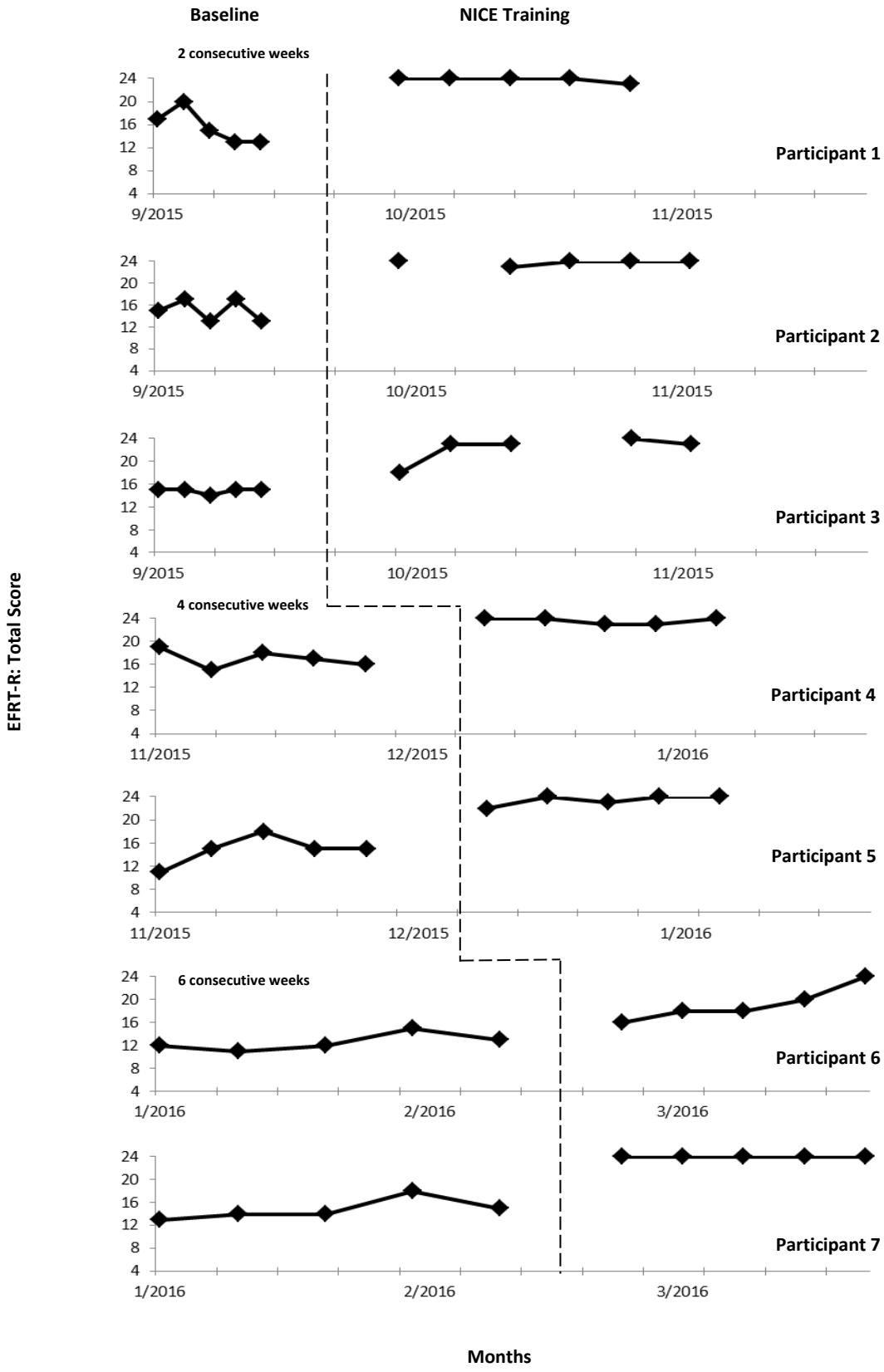

Figure 3. Executive Function Route Finding Task Total Score across baseline and treatment

All participants were able to demonstrate on-task behavior and successfully complete the wayfinding tasks within the 15 minute time limit. See Figure 4 for total duration of time to complete the 10 routes (5 = pre- treatment; 5= post- treatment).

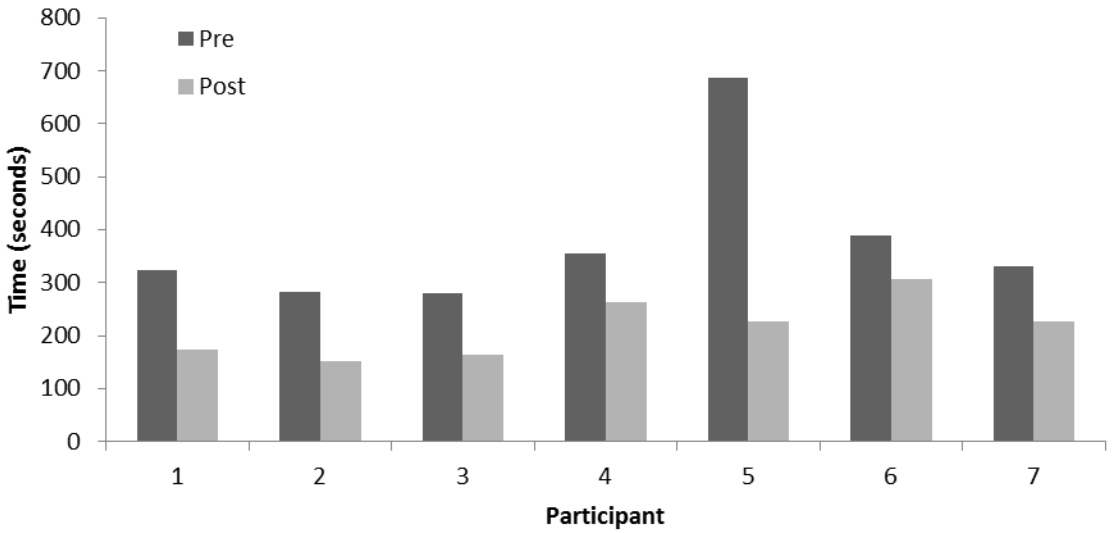

Figure 4. Average time to complete pre and post- treatment routes for each participant

Secondary Outcome: Social Problem Solving

The Wilcoxon Signed Rank Test was used to analyze the social problem solving pre- and post- treatment dataset for the Social Problem-Solving Inventory-Revised Short Form (SPSI-R: S; D'Zurilla, Nezu & Maydeu-Olivares, 2002), Problem Solving Inventory (PSI; Heppner & Petersen, 1982) and The Awareness of Social Inference Test Revised (TASIT-R; Flanagan, McDonald, & Rollins, 2011). Results were statistically significant for the SPSI-R ($Z = -2.197$, $p = .028$) and PSI ($Z = -2.366$, $p = .018$). The effect size was determined using Cohen's (1988) criteria of 0.2 = small effect, 0.5 = medium effect and 0.8 = large effect. The SPSI-R and PSI had large effects and the TASIT-R subtests had no or small effects. See Table 9.

Table 9

Wilcoxon Signed Ranks Test Results

Outcome Measure	Pre Mdn	Post Mdn	*Z*	*p* value	Effect Size
SPSI-R	88	102	−2.197	.028*	.830
PSI	104	81	−2.366	.018*	.894
TASIT-R: Part 1	19	17	.000	1.000	0
TASIT-R: Part 2	49	49	−1.261	.207	.477
TASIT-R: Part 3	47	46	−1.016	.310	.384

Note. SPSI-R = Social Problem-Solving Inventory-Revised, PSI = Problem Solving Inventory, TASIT-R = The Awareness of Social Inference Test Revised. Standard scores reported for SPSI-R and raw scores reported for PSI and TASIT-R. * indicates statistical significance at $p < .05$, two tailed.

Individual performance: Social Problem Solving Inventory- Revised (SPSI-R).

Participants' individual pre and post- treatment standard scores are detailed in Table 10. With the exception of Participant 6, all participants improved on the SPSI-R. High total SPSI-R scores indicate "good" social problem solving ability, whereas low scores indicate "poor" social problem solving ability (D'Zurilla, Nezu, & Maydeu-Olivares, 2004). Raw scores from each of the five subscales were converted to standard scores resulting in a total SPSI-R score. Each scale and subscale score has $M = 100$ and $SD = 15$. The SPSI-R pre- treatment $M = 87.29$ ($SD = 10.44$) and post- treatment $M = 109.57$ ($SD = 13.08$).

Table 10

Pre and Post treatment Scores on Social Problem Solving Inventory-Revised (SPSI-R)

Participant	Pre- treatment SPSI-R	Post- treatment SPSI-R
1	88	130
2	88	102
3	86	98
4	72	126
5	82	109
6	107	101
7	88	101

Note. Standard scores reported for SPSI-R.

Individual performance: Problem Solving Inventory (PSI). Participants' raw scores for the PSI are presented in Table 11. The PSI total score is the sum of three scale scores for problem solving confidence, approach- avoidance style and personal control. Low total PSI scores indicate "good" problem solving ability. All seven participants performed better from pre to post-treatment on the PSI ($Z = -2.366$, $p = .018$). The PSI pre- treatment $M = 101.14$ ($SD = 12.43$) and post- treatment $M = 80$ ($SD = 15.20$).

Table 11

Pre and Post treatment Scores on Problem Solving Inventory (PSI)

Participant	Pre- treatment PSI	Post- treatment PSI
1	79	51
2	117	85
3	108	94
4	91	81
5	103	77
6	106	97
7	104	75

Note. Raw scores reported for PSI.

Individual performance: The Awareness of Social Inference Test Revised (TASIT-R). Participants' raw scores for the PSI are presented in Table 12. The TASIT-R generates three separate subscale scores for: (1) Part 1: Emotion Evaluation Test; (2) Part 2: Test of Social Inference - Minimal; and (3) Part 3: Test of Social Inference – Enriched. Higher scores indicate better performance. No significant improvement was noted for pre and post- treatment comparisons for TASIT-R: Part 1 ($Z = .000$, $p = 1.000$) and small treatment effects were noted for TASIT-R: Part 2 ($Z = -1.261$, $p = .207$) and TASIT-R: Part 3: ($Z = -1.016$, $p = .310$). The TASIT-R: Part 1 pre- treatment $M = 17.57$ ($SD = 2.64$) and post- treatment $M = 17.57$ ($SD = 4.61$). The TASIT-R: Part 2 pre- treatment $M = 46.29$ ($SD = 5.53$) and post- treatment $M = 41.71$

(*SD* = 10.31). The TASIT-R: Part 3 pre- treatment *M* = 45.00 (*SD* = 6.16) and post- treatment *M* = 47.14 (*SD* = 7.47).

Table 12

Pre and Post treatment Scores on The Awareness of Social Inference Test Revised (TASIT-R)

Participant	TASIT-R Part 1		TASIT-R Part 2		TASIT-R Part 3	
	Pre	Post	Pre	Post	Pre	Post
1	17	16	52	38	48	42
2	14	17	49	57	52	60
3	19	19	40	40	47	46
4	14	9	52	44	46	44
5	19	23	43	52	38	46
6	20	17	39	27	35	38
7	20	22	49	34	49	54

Note. Raw scores reported for TASIT-R.

Chapter V: Discussion

The current study examined the efficacy of a social problem solving intervention to increase help-seeking behavior within the context of wayfinding for adults with acquired brain injury. Previous studies of wayfinding after brain injury have focused on route finding (Sohlberg et al., 2006; Sohlberg et al., 2007) but did not address help-seeking (Cho & Sohlberg, 2014, 2015). This study recognized the centrality of help-seeking to wayfinding (Bergstrom et al., 2012; Taylor et al., 2004) and previously established components to the treatment of help-seeking (Cho & Sohlberg, 2014, 2015). I hypothesized the NICE group treatment would improve help-seeking behaviors, functional behaviors related to wayfinding and social problem solving.

In this chapter, interpretations of the results are summarized for the primary outcome measure of help-seeking and secondary outcome measures of wayfinding and social problem solving. Study limitations and directions for future research are discussed.

Changes in Help-Seeking

Help-seeking appears to be amenable to change using a group therapy aimed at training the social behaviors necessary to ask for help when lost. The current study used a non-concurrent multiple baseline across participant design with seven participants to document a functional causal relation and demonstrate systematic replication. Three different groups of participants maintained the group dynamics critical to the NICE protocol and the three different tiers allowed for seven demonstrations of effect at three different points in time.

Results indicated that all seven participants improved on help-seeking as measured by the Social Behavior Rating Scale (Cho & Sohlberg, 2014, 2015) post-treatment upon visual analysis of the data and Tau-*U* analyses, which was used to quantify sensitivity to treatment effects. All participants demonstrated immediate level change in help-seeking, suggesting the actual help-

seeking skills were mastered early in the treatment. Behaviors necessary for effective help-seeking were targeted each session in a manualized curriculum and compensatory strategies were individualized for each participant. The small group size (n = 2-3 participants per tier) allowed participants to learn from each other while having the opportunity to give personal support and feedback. This is consistent with Hawley and Newman's (2010) findings that suggest feelings of universality may increase social confidence and motivation in a group setting.

Possible NICE key components for help-seeking. While speculative, there are a few therapy components that appeared to be particularly important to the robost outcomes. The NICE protocol was developed using two instructional and training approaches, Direct Instruction (DI; Engelman & Carnine, 1982) and cognitive- behavioral therapy (CBT; Dobson, 2002). Consistent with these approaches, this investigation programmed generalization from the beginning of treatment because patients "will not learn a generalized lesson unless a generalized lesson is taught" (Baer, 1999; Horner, Sprague & Wilcox, 1982). Individuals were required each week to participate in role plays to demonstrate and practice help-seeking behaviors in real life contexts to promote generalization of skills. Consistent with findings by Rath and colleagues (2003), role plays likely helped participants learn and generalize concepts to new contexts. In NICE Sessions 5 and 6, consistent with Interpersonal Recall (IPR; Helffenstein & Wechsler, 1982), I videotaped the individual role plays to provide participants with opportunities to learn how to provide and accept feedback from other group members. Participants role played an unsuccessful help-seeking attempt, followed by what they "would do differently next time" in each video, based on real-life encounters experienced during the NICE treatment. The NICE group treatment included real life help-seeking encounters to improve ecological validity.

Second, the NICE protocol not only trained participants the necessary help-seeking skills to use when lost, but also incorporated improvements in self-efficacy (e.g., how do you feel when lost, confidence, self-talk). Consistent with Rath et al. (2003), the NICE treatment also targeted emotional self-regulation, a prerequisite for *problem orientation*, the metacognitive processes that represent an individual's general ability to perceive a problem. Specifically, the pattern of behaviors observed in Participants 2, 3, 4, 5 and 7, who self-reported improvements in emotional self-regulation, indicated when negative emotions are replaced with positive emotions, performance for help-seeking improved. This is consistent with previous findings that found emotion to influence the efficiency of problem solving performance (D'Zurilla et al., 2004). Positive emotions may have affected problem solving performance by facilitating more creative, flexible, and open thinking (Isen, 2000), effective self-regulation (Aspinwall, 1998) and coping resources (Fredrickson, 2001). Therefore, this study, which addressed the associated emotional substrates may have resulted in a better treatment outcome (Bell & D'Zurilla, 2009; Malouff, Thorsteinsson, & Schutte, 2007).

One pattern that was surprising was the immediate effects of change on help-seeking as measured by the Social Behavior Rating Scale (Cho & Sohlberg, 2014, 2015). It was anticipated that there would be a gradual improvement in learning the help-seeking skills over time. A possible explanation is that with inclusion of the emotional substrates, the NICE treatment not only trained problem solving "skills" (e.g., how to problem solve through NICE help-seeking steps when wayfinding) but also improved problem solving orientation (e.g., self-efficacy). This study had a primary goal of training adults with brain injury how to help-seeking when lost and this help-seeking skill was learned and practiced early in the treatment. It is hypothesized the possible improvement in problem solving orientation, related to group discussions of self-

efficacy, may have helped facilitate rapid acquisition of the actual help-seeking skills and thus wayfinding. This hypothesis is consistent with the original social problem solving RCT in which Rath et al. (2003) found that a treatment group focusing on the emotional aspects of social problem solving was more effective than a treatment group focusing only on improving basic problem solving skills.

Participant self-perceptions of help-seeking. There was no formal structured interview to assess participant self-perceptions of help-seeking behavior outside of the treatment room; however, the informal participant self-reports were positive about both the treatment and perceived changes. During the last group session, participants self-reported changes they perceived after completing the NICE treatment. Participant 1 self-reported that she gives better wayfinding directions post-treatment and felt more "confident" with her social encounters when asking for help. Participants 2 and 3 both self-reported they selected "better" helpers (e.g., someone who does not appear to be in a hurry during rush hour, employee with a badge) and did not get "anxious" when initial help-seeking attempts did not result in desired wayfinding outcomes. This is consistent with findings by Walkowiak, Foulsham and Eardley (2015) who found navigation performance to be significantly influenced by "wayfinding anxiety". Participants 2 and 3 also self-reported a perceived association between how they felt on a particular day and daily wayfinding performance. For example, Participant 2 stated when she was angry due to a personal circumstance she felt her behaviors and tone of voice reflected this emotion and as a result, made helpers "uncomfortable" when she asked for help. This difficulty self-regulating cognitive and linguistic processes is a common deficit observed in persons with brain injury (Kennedy & Coelho, 2005) and may even cause frustration and personal distress during wayfinding (Chiu et al., 2004; Lemoncello et al., 2010). Participants 4, 5 and 7 indicated

that post-treatment, they not only learned the necessary help-seeking skills to use when lost, but felt more confident overall when interacting with helpers. Participant 4 self-reported she also felt more confident when asking her medical doctor questions post-treatment and Participant 5 self-reported she corrected a helper on the subway who was giving out "bad directions". Participant 7 self-reported that she asked her spouse to meet her several days later on a trip to wayfind a hiking route unassisted "because I know I can do it now". These descriptive data support the real life changes that occurred as a result of the NICE intervention.

The lack of expressed disappointments or negative comments about outcomes or the NICE group therapy may be a function of how questions were asked or a result of the fact that I was the only therapist leading the groups. Also, a therapeutic alliance had been established and participants may not have felt comfortable sharing this information in a group setting. Therefore, these positive participant self-perceptions may not represent the full perceived outcomes.

Changes in Wayfinding

Results indicated that all seven participants improved on the functional skill of wayfinding as measured by the Executive Route Finding Task Revised- EFRT-R (Cho et al., 2012) post-treatment upon visual analysis of the data and Tau-*U* analyses, which was used to quantify sensitivity of treatment effects. All participants demonstrated an immediate level change in wayfinding for both EFRT-R Total Score (e.g., wayfinding accuracy) and EFRT-R Footstep Ratio (e.g., wayfinding efficiency) upon initiation of treatment.

Possible NICE key components for wayfinding. Wayfinding is an ecologically important skill frequency impaired in people with ABI and it depends on help-seeking. The current study research methodology, a non-concurrent multiple baseline across participant design, controlled for practice effects through counterbalancing and randomization of the 10 hospital

routes. The functional behavior of actually "doing" a route was critical to the NICE intervention because it helped participants demonstrate understanding of the skills learned in the group sessions each week. This finding supports previous research suggesting it is possible for persons with ABI to be successful communicators in artificial environments but not successful social communicators in the real world (Hawley & Newman, 2010).

Participant self-perceptions of wayfinding. Similar to help-seeking, there was also no structured interview for wayfinding; however, informal participant reports were positive about improvements to transportation and perceived changes. Post NICE treatment, participants self-reported changes to transportation methods and wayfinding to new and untrained routes. For example, pre-treatment, Participant 1 traveled to the hospital using Access-A-Ride, a method of transportation for people with disabilities who are unable to use public bus or subway systems in NYC, but post-treatment she canceled the service. Also, pre-treatment, Participant 1 frequently labeled herself a "perfectionist" and did not want others to "view her as stupid so never asked for help" but post-treatment, Participant 1 self-reported feeling more "comfortable" asking for directions. Prior to the study, Participants 2 and 3 stated their emotions often interfered with their help-seeking when wayfinding. For example, Participant 2 stated she was angry when helpers gave her "bad" directions and became confrontational during the social exchange (e.g., say "you don't like me, do you?). Participant 3 would often get "so nervous and anxious" and begin to cry. During the NICE training, Participants 2 and 3 learned to change their communication behaviors when asking helpers for directions. This is consistent with the last step of NICE, *Evaluate Progress*, the capacity to self-monitor and evaluate performance (Robertson & Knight, 2008), which is necessary to rehabilitate social competence, or "the cognitive, emotional and communication skills needed to interact successfully, as well as the ability to apply those skills in

a variety of social situations" (Hawley & Newman, 2010, p. 1292). NICE was developed with the principles of social competence to encompass the social communications skills necessary for help-seeking when lost. Social competence requires these language skills that are frequently impaired after a brain injury (Dahlberg et al., 2007; Hawley & Newman, 2010). Both Participants 2 and 3 self-reported that they no longer were "emotional" during help-seeking post-treatment because they had the necessary skills to complete the wayfinding tasks. On several post-treatment routes, Participant 2 started a task stating outloud "From the things I've learned from you [examiner] I think this is what I should do first" and began to ask other helpers (e.g., therapists with doors open) for assistance, not just the receptionists on each floor. On Post-treatment route 7, Participant 3 stated "Before, I thought I couldn't do it but today, I feel confident. I feel really good. I can do it".

Post-treatment, Participant 4 self-reported that she used better compensatory strategies when lost (e.g., no longer goes all the way back to start location when lost). Participant 5 not only improved on help-seeking during wayfinding but self-reported changes in other daily help-seeking behaviors. For example, she reported that she no longer got lost on the subway and felt she was a better help-seeker at the grocery store when asking for directions to find items. Similar to Participants 2 and 3, Participants 4 and 5 self-reported they no longer experienced emotions of being "mad, anxious or scared" when lost. Participant 6 stated that post-treatment, she no longer required her parent to commute with her to all travel locations. Participant 6's parent self-reported that she left Participant 6 alone in a subway and observed Participant 6 successfully travel to her sister's home, unattended. Participant 7 often self-reported "panic attacks" when lost but post-treatment stated, "It's all about the mood… nothing can stop me now". As a personal goal, Participant 7 planned a trip alone before joining her family, to "try things on my own to

prove that I can do it". These descriptive data support the real life changes that occurred as a result of the NICE intervention.

Again, the lack of expressed disappointments or negative comments about the outcomes or NICE group treatment was surprising. In addition to the established therapeutic alliance and group setting, it is possible participants also felt the "presence of an audience" when wayfinding, since all 10 hospital route probes occurred during active hours of operation. Also, without a structured interview, it is possible I may have not given participants an opportunity to openly share disappointments and thus, the lack of negative comments may not be an accurate representation of participant perceptions for the current study.

Changes in Social Problem Solving

Social Problem Solving Inventory- Revised (SPSI-R). For this study, the SPSI-R was selected as a pre- and post- treatment measure to document awareness and emotional demands of help-seeking. Training individuals to become more effective social problem solvers has been identified to be an appropriate goal for clinical intervention (D'Zurilla & Nezu, 1999; Rath et al., 2003). The NICE treatment trained adults with brain injury how to social problem solve in the domain of help-seeking when wayfinding.

Evaluation of progress when help-seeking during wayfinding required participants to demonstrate awareness of personal strengths and challenges. Skills such as awareness and problem solving are frequently impaired after a brain injury (Dahlberg et al., 2007; Hawley & Newman, 2010) and as a result, individuals with brain injury may not recognize the need to ask for help due to this diminished self-awareness of deficit (Cho & Sohlberg, 2014, 2015). Improved self-awareness of deficit was embedded into the development of NICE with inclusion of interpersonal process recall (IPR; Helffenstein & Wechsler, 1982), including video feedback

and modeling. Participants reported that "seeing myself" helped to target specific behaviors required to change for a successful social exchange during help-seeking when lost. This finding is consistent with improvements in self-concept, one's overall perception of self, in the original study by Helffenstein and Wechsler (1982) which incorporated IPR into their individual treatment.

Despite the gain in scores to support improvement in self-ratings, it is important to note self-awareness deficits, although not fully understood, may affect individuals with brain injury by leading to reduced ability to take another person's perspective (Binova et al., 2014), respond to error detection and correction (Ham et al., 2014) and in this study, possibly overestimate their own social problem solving abilities. There is no normative data specifically for the etiologies that represent the sample used in this study; however, in comparison to the normal control data reported by the SPSI-R test developers, 6/7 participants in this study rated their pre-treatment baseline SPSI-R scores in the normal range, with one participant self-rating herself 2 *SD* above the mean of controls. Regardless of the fact that there was normative data for the current study acquired brain injury population, the pattern of scores (e.g., higher scores) indicated improvement post- treatment. Kennedy and Coelho (2005) offer one possible explanation to this overestimation of abilities using a phenomenon called *discounting*, which occurs in persons with brain injury because they "remember less [and] end up rating their confidence [performance] number higher than lower" (p. 245). This pattern of overestimation is also observed with the PSI (Heppner & Petersen, 1982), the second measure of social problem solving, discussed in the next section.

Problem Solving Inventory (PSI). The PSI (Heppner & Petersen, 1982) was selected to assess an individual's self-perceptions of his or her own problem solving behaviors and attitudes.

Similar to the SPSI-R, the PSI documents mood state as an indicator of treatment effect. All seven participants improved on the PSI total score. With the exception of one participant for the one dimension of approach- avoidance style, the distribution of improvement was consistent across all participants for the three subdomains of problem solving confidence, approach-avoidance style and personal control. The pre- and post- treatment means of this study are consistent with other problem solving interventions (e.g., Rath et al., 2003) and consistent with patterns of improvement, the same participant who rated herself 2 *SD* above the mean of controls on the SPSI-R rated herself almost 2 SD above the group study mean post-NICE treatment.

It is important to also note that the current study had strict inclusion and exclusion criteria and as a result, candidacy may have influenced group selection. I hypothesized that awareness was not a unitary construct, perhaps overlapping with other constructs such as motivation. More specifically, participants may have needed to possess a minimal level of awareness prior to the treatment, since essentially all individuals "self-selected" themselves to participate in this study. For example, not all individuals identified, by their therapist or medical doctor, to benefit from the NICE treatment chose to become a participant because they did not feel they needed or lacked the help-seeking skill.

The Awareness of Social Inference Test Revised (TASIT-R). The Awareness of Social Inference Test Revised (TASIT-R; Flanagan, McDonald, & Rollins, 2011) was added as both a screen and a pre- and post- treatment outcome measure to document potential change in the social cognition profiles of participants and social problem solving. Results indicate this measure did not document change pre- and post- NICE treatment. One possible explanation is that the constructs measured in the TASIT-R are not relevant to help-seeking. The TASIT-R assesses emotion recognition and ability to interpret conversational remarks literally (e.g., sincere vs. lie)

and non-literally (e.g., sarcasm), skills possibly not necessary for effective help-seeking. Furthermore, it is important to note the specific constructs of emotional recognition and ability to interpret conversational remarks was not directly taught in the NICE training. The TASIT-R was originally selected because the test developers stated the video format was intended to be a "social problem solving task" to identify and define interpersonal problems and generate solutions (McDonald et al., 2006).

Several participants self-reported difficulty with the video format and administration length of the TASIT-R which may have also affected pre- and post- treatment data. I am hypothesizing this may have impacted the results since the TASIT-R was the only test not found to be sensitive to treatment effects. To address this concern, Honan, McDonald, Sufani, Hine and Kumfor (2016), present a possibility of using a shortened version of the TASIT called TASIT-S, for adults with acquired brain injury. Also, there may have been a cultural and language difference in testing. In the current study, some participants commented that all the TASIT-R actors "spoke with an accent", not common to the participants and several participants asked to replace the word "revolted" with "disgusted" when evaluating emotions for TASIT-R Part 1. This finding differs from previous studies that report sensitivity to detect impairments in other English-speaking countries including the USA (Honan et al., 2015). No individual participant differences were noted for identification of positive vs. negative emotions and no pattern was evident on the three TASIT-R subtests.

Study Limitations

The current study was based on theoretical evidence and face validity linking help-seeking, wayfinding and social problem solving. The NICE protocol was developed using components of empirically validated interventions that target social problem solving and

communication skills including the GIST (Hawley & Newman, 2010) and PSG (Sherr et al., 2003), the only two well validated studies of social problem solving. In addition to these limitations related to NICE protocol development, there are other potential limitations to the current study. Notably, caution should still be applied to interpretation of the findings outside the context of the current study due to the small sample size, consisting of all females, all from the same hospital. This limits the generalizability of the results and requires the study to be replicated in a larger clinical population. This gender limitation was not expected with a population traditionally identified demographically to be mostly men (Ownsworth & Haslam, 2016) and a pilot study (Cho & Sohlberg, 2014, 2015) that consisted of all males.

It is difficult to make statements about candidacy with a small N. There is likely a necessary cognitive profile with minimal levels of self-awareness, insight, memory, and motivation that participants required, to benefit from this specific type of group therapy targeting help-seeking. Unfortunately, there is little information in the literature about candidacy and therefore, I acknowledge that this study did not allow discernment of possible key participant variables that may have influenced the positive outcomes. Given the robust effects, it is also hypothesized that perhaps gender was a mediator in treatment response with women being characteristically more responsive to peer communication and having better attendance as per clinical reports.

Another limitation was the lack of normative data for the help-seeking measures used in this study. Availability of normative data may facilitate validation and future use of the Social Behavior Rating Scale (Cho & Sohlberg, 2014, 2015) that was developed specifically for measurement of help-seeking in this study. Also, an important methodological limitation was that I implemented all screening and treatment. Thus, researcher bias cannot be ruled out. This

may have also influenced the lack of expressed disappointments or negative comments about NICE treatment outcomes since I was the only researcher leading the groups. Without a structured interview by a separate researcher, it is possible I may have not given participants an opportunity to openly share information about disappointments or negative comments. Furthermore, there was no measurement of treatment fidelity to ensure accurate and consistent delivery of the NICE protocol. The NICE protocol was extensively piloted and used a manualized curriculum; however, treatment fidelity could have been stronger with an independent observer evaluating adherence to the NICE treatment protocol.

Also, since the treatment was delivered as a "package", interpretation should be made with caution. It is unclear what elements of the NICE treatment were important without a component analysis to capture specific active components of this complex construct. The immediacy of effects was hypothesized to be facilitated by improvement in self-efficacy; however, I did not have a separate repeated measure to assess treatment of problem solving self-efficacy to capture measurement of this construct. This pattern of immediacy of effect encourages the examination of the content of the first two group sessions. Given the population consisting of persons with brain injury, I did not expect rapid learning of help-seeking skills. The magnitude and immediacy of effects suggest that participants perhaps already had foundations of these skills and the treatment "re-activated" use of pre-existing skills. Other possible hypotheses for the immediacy of effect can be attributed to the structured skills training with opportunities for group problem solving to heighten attention to challenges during the actual wayfinding task. The current study had a strict inclusion and exclusion criteria and since all participants essentially "self-selected" themselves to participate in this study, interpretation of immediacy of

effects is limited to the current group profile. A future investigation would be needed to further examine this construct in the NICE treatment.

It is important to note that this study environment was limited to indoor routes in one medical building in NYC. Generalization refers to stimulus control, not behavior (Horner, Bellamy, & Colvin, 1984, p. 293). Therefore, it is possible for a participant to have already learned that a particular inappropriate behavior pattern is functional. For this reason, 10 different hospital routes were selected to eliminate the possibility that responding could occur until control of irrelevant stimuli. Generalization requires both training and effective programming with a high level of precision; however, I only trained help-seeking when wayfinding at RIRM: NYULMC. Albin and Horner (1988) note that the technology of generalization must do more than just teach skills to be executed in a nontrained condition and thus, the current results should be interpreted with caution.

There were also several methodological limitations. Despite the encouraging results, this study is based on only seven participants in three group tiers, which limits inferences about the generalizability of treatment effects. A true MBL requires functional independence of each of the tiers, documenting rigorous experimental control with introduction of treatment. This study controlled for "time in baseline" but data collection was limited to five probes for each participant. Most participants traveled approximately 2-3 hours to the medical center for appointments so it was not feasible to increase the frequency of treatment each week without attrition. Thus, this study meets the temporal requirement but with limited data probes (e.g., five for baseline; five for treatment). Without variation in the number of baseline probes in the sequential tiers, interpretation is limited. This study, with limited data points collected at strategic time points during the experiment, allowed documentation of a functional relationship

but with less sensitivity to possible abrupt or cyclic levels of behavior. Also, stability of behavior should be interpreted with caution with only five data points, especially in a clinical population with brain injury.

In addition to methodological concerns due to the clinical population, it should be noted that a nonconcurrent MBL is a variant of a traditional MBL and while each tier was separated temporally, this feature also is a weakness of the nonconcurrent MBL design. The nonconcurrent MBL design allowed implementation of the NICE treatment systematically to a clinical population for experimental analysis; however, it did not control for internal validity treats to history effects, thus meeting professional standards only "with reservation". Implementation of the NICE treatment was consistent across the three tiers of the design but the baseline of the nonconcurrent MBL did not occur contemporaneously. Therefore, this design did not account for history effects that may have occurred coincidentally with the NICE treatment.

Lastly, the current study employed a modified variant of nonconcurrent and multiple probe MBL across participant groups without a follow up to evaluate the NICE treatment protocol for help-seeking when wayfinding. With the limited collection of probes post-treatment, assessment of sustained effects is also limited. It is of clinical importance whether treatment effects or strategies generalize to untrained tasks or contexts and are maintained over time. Despite the positive post-treatment outcomes, it is unclear if the frequency of treatment (e.g., one time each week) would have been sufficient to maintain these treatment effects post NICE treatment. Furthermore, given the immediacy of treatment effect, it is unclear if the treatment dosage was appropriate (e.g., total number of sessions) since most participants learned the help-seeking skills within the first two sessions, before completion of the full six session NICE protocol. It is hoped these limitations of the current study will help guide future research.

Contributions

Despite the limitations, the study makes an important contribution by evaluating a treatment for a critical functional skill, help-seeking, that has been ignored in the brain injury literature. The overall findings suggest the NICE group treatment has potential to improve help-seeking as applied to wayfinding. Using the Single- Case Experimental Design (SCED; Tate et al., 2008) Scale, a measure to rate methodological quality of single subject designs, the current study received a score of 10/11, indicating the study had the required elements of describing history, target behavior, design, baseline, behavior during treatment, raw data, inter-rater reliability, statistical analysis, replication and generalization. One point was deducted for researcher bias since no other professional implemented screening or treatment. The NICE investigation adds to a literature base suggesting efficacy of a multicomponent group treatment, addressing elements of social problem solving, can improve functional behaviors for help-seeking when wayfinding as well as emotional self-regulation for adults with ABI. This is one of the first studies to evaluate an intervention for help-seeking to improve wayfinding for persons with ABI. Previous findings documented poor generalization of treatment effects when training occurred in decontextualized environments (Bornhofen & McDonald, 2008b, Snow, 2013) so I attempted to teach "meaningful skills in meaningful contexts" (Snow, 2013; Ylvisaker, 2003) by selecting wayfinding as the functional domain to evaluate help-seeking.

Future Directions

The current results encourage future investigations. It is hoped the manualized group intervention will allow other researchers to evaluate the NICE protocol. This dissertation project offers a paradigm for training, studying and evaluating help-seeking as applied to wayfinding. It is hoped the positive findings and the prescribed intervention and measurement will support

other investigations to examine the construct of help-seeking as a treatment target and goal. It is also hoped other researchers will replicate the study with a larger and more diverse sample of participants with inclusion of other etiologies (e.g., Alzheimer's Dementia, aging, stroke) that may benefit from the NICE group treatment. Furthermore, inclusion of a component analysis may allow future researchers to identify which components of NICE are active and important for treatment and generalization. Lastly, an emotional self-regulation training component may improve understanding of the positive anecdotal self-perceptions reported in the current study to facilitate generalization of the help-seeking behavior to other domains beyond wayfinding.

Appendix A

A pilot study was implemented with a convenience sample of three participants to evaluate the NICE protocol (Cho & Sohlberg, 2014, 2015).

Participants

Participants were recruited from a local assisted living facility for people with brain injury. Facility staff were presented with the goals of the study and the criteria for participation and asked to refer residents they thought would benefit from assistance with help-seeking when wayfinding. Inclusion criteria included: (a) sufficient English fluency/literacy, (b) documented brain injury by a medical doctor, (c) desire to improve navigation skills, (d) motivation to participate, (e) adequate hearing and visual acuity, and (f) access to transportation to the research clinic. Exclusion criteria included the presence of: (a) psychiatric disorder(s); (b) active substance abuse; (c) motor limitations, sensory, or other neurological limitations affecting the ability to participate in the training or wayfinding, and (d) language impairments preventing comprehension of the NICE protocol. All participants were consented in accordance to the university review board policies. Four participants met the criteria, and three participants completed the NICE treatment. One individual discontinued treatment due to substance abuse issues. Participants were paid $50 upon completion of the project. In the sections that follow, each participant and his experience during the NICE pilot study is described in more detail.

Participant SF. Participant SF was a 51-year old male three years post onset of TBI secondary to a physical altercation with several unknown persons. No loss of consciousness was noted in the medical report at the time of injury. He completed 14 years of education and, prior to injury, was employed as an internet programmer. SF self-reported difficulty when needing to ask for help from strangers and following verbal directions to find his way to a goal destination.

Inappropriate use of humor and language was noted at the time of initial interview as well as limited eye contact with the examiner. Chronic symptoms reported by a case worker included mild cognitive impairments in attention and short term memory. The case worker stated that SF often locked himself out of the apartment and missed scheduled appointments. SF stated he wanted to participate in the NICE training to gain independence while wayfinding in the community.

Pre-treatment performance on the EFRT-R (Cho, Sohlberg, & Boyd, 2012) was characterized by point deductions on ask understanding, information seeking, retaining directions, error detection, and error correction for both routes. Also, SF distorted peripheral details while recalling the goal destination, requiring clarification and/or cues to self-monitor by the examiner. Social behavior while help-seeking was also rated during the EFRT-R routes when participants requested for assistance from helpers during the wayfinding task. Points were deducted on the social behavior rating scale when inappropriate behaviors were observed when getting attention of the helper (e.g., "Hi sweetie pie.") and when negative self-talk was apparent (e.g., "I am crazy, stupid, dumb."). SF often walked away from the helper before getting the full directions and no eye contact was observed with any of the helpers during the help-seeking attempts.

Participant MA. Participant MA was a 24-year old male four years post onset of TBI secondary to a longboarding accident without a helmet. Medical reports indicated loss of consciousness for three days after the injury with an initial GCS of 3. PTA duration was not documented. He completed 12 years of education and, prior to injury, was employed in retail. MA self-reported difficulty navigating to non-routine routes unassisted. At the time of interview, limited eye contact with the examiner was noted and MA asked questions without giving the

examiner adequate time to respond before changing the topic. Chronic symptoms included mild cognitive impairment in short-term memory, impulsivity, and poor conversational turn-taking. MA stated that he wanted to participate in the NICE training to navigate independently without assistance in the community.

Pre-treatment performance on the EFRT-R (Cho et al., 2012) was characterized by point deductions on task understanding, information seeking, retaining directions, error detection and error correction for Route 1 and for task understanding, information seeking, retaining directions, error detection, error correction, and on-task behavior for Route 2. Social behavior while help-seeking was also rated during the EFRT-R routes when MA requested for assistance from helpers during the wayfinding task but only for Route 1. Help-seeking was not self-initiated on the Route 2 because a passerby offered assistance before MA could request for help. For the one pre-treatment EFRT-R route, points were deducted on the social behavior rating scale when MA displayed difficulty paying attention to the helper (e.g., maintaining eye contact) and expressing the right idea (e.g., asking the navigation/destination question clearly and concisely). No compensatory strategies were used to remember information.

Participant GB. Participant GB was a 52-year old male 26 years post onset of TBI secondary to explosion of a self-made bomb. Medical reports indicate loss of consciousness for 11 days after injury with no GCS or PTA duration documented. He completed 12 years of education and, prior to injury, was employed as an auto technician. GB self-reported that he seldom navigated to unfamiliar places unassisted by a caregiver. At the time of interview, no eye contact was attempted with the examiner. Chronic symptoms reported by his case workers included lack of assertiveness and judgment when decision making (e.g., would defer all

decision making to caregiver) and poor inferencing skills. GB stated that he wanted to participate in the NICE training to navigate independently to unfamiliar places without his caregiver.

Pre-treatment performance on the EFRT-R (Cho et al., 2012) was characterized by point deductions on task understanding, information seeking, retaining directions, error detection and error correction for Route 1 and point deductions on error correction for Route 2 Social behavior was also rated during the EFRT-R administration when participants requested for assistance from helpers during the wayfinding task. Points were deducted on the social behavior rating scale when GB displayed difficulty getting attention of the helper, paying attention the helper, and clearly expressing his needs. No compensatory strategies were used to remember information and negative self-talk was noted throughout the task.

Method

The NICE protocol was piloted in the three participants using a pre- and post-test case study. Prior to participating in the pilot, each participant completed two routes with the EFRT-R. The EFRT-R was administered at the University of Oregon campus using two routes. All routes were equated for distance (e.g., 294 feet), number of turns (e.g., 5) and floor level change (e.g., two floors = 1 floor level change). There was a slight variation in footsteps (e.g., 130-140 steps) dependent on building stairs. A second rater verified the final measurements (e.g., number of steps) and an average was taken across four trials. Two locations started on a top level and ended downstairs; two locations started on a bottom level and ended upstairs. Each participant selected route order randomly by picking numbers out of a bag. The equivalence and validity of these routes was established in an earlier study (Cho et al., 2012). The EFRT-R was administered individually to all participants within two weeks before beginning the NICE group intervention. It was administered again within one week of completing the NICE intervention.

The author conducted the treatment groups once weekly for six weeks at a university clinic. Each group treatment session lasted 60 minutes and followed the aforementioned structure. The three participants who completed the intervention attended all six sessions. Prior to each session, participants completed a role play probe using the scripted role play with two trained graduate students. Participants were individually escorted to a separate room to complete the videotaped role play. As described, each problem scenario presented an element of conflict and the participant had a choice of two confederates available to request for help when lost (see Appendix C). The confederates were trained by the author during five 30 minute sessions in order to ensure consistent application of the script. Performance on the role plays were scored by two speech-language pathologists (author and a naïve scorer) and inter-observer agreement was 91.5%.

Results

Following completion of the NICE intervention in the pilot study, all three participants demonstrated improvement on the EFRT-R (Cho et al., 2012) both in terms of a reduced foot-step ratio and on the EFRT-R Total Score. Participants showed variable improvements on the role plays. Results supported the hypothesis that group intervention on help-seeking could positively impact wayfinding. Findings for each of the participants are described below.

Participant SF. Post-treatment performance data revealed improvement on the EFRT-R Total Score, with specific improved ratings in task understanding, information seeking, retaining directions, error detection, and error correction. Additionally SF exhibited a reduction in footstep ratio (FSR) indicating he was taking fewer steps to reach the goal destination. No examiner cues were required for task completion. On the role play, SF's social behavior rating score improved from 10 to 21 points. Specific improvements were noted in the following areas: getting attention

of the helper, reducing negative self-talk, and waiting for a response from the helper when asking for help during the EFRT-R wayfinding task.

Participant MA. Post-treatment performance data revealed improvement on the EFRT-R Total Score, with specific improved ratings in information seeking, retaining directions, error detection, and error correction. A reduction in FSR was noted from pre- to post- treatment, indicating that MA was taking fewer steps to reach to the goal destination. On the role play, MA's social behavior rating score improved from 11 to 21 points. Specific improvements were noted in the following areas: getting attention of the helper, paying attention to the helper, expressing the right idea, reducing negative self-talk, using compensatory strategies, and waiting for a response from the helper. MA also self-reported that he felt more confident taking on the role of a helper post-NICE treatment and giving directions to others, not just asking for directions from others.

Participant GB. Post-treatment performance data revealed improvements on the EFRT-R Total Score, with specific improved ratings in all areas with the exception of error correction for Route 1. A reduction in FSR was noted from pre- to post- treatment, indicating that the GB was taking fewer steps to reach to the goal destination. On the role play, GB's social behavior rating score improved from 13 to 21 points. Specific improvements were noted in the following areas: getting attention of the helper, waiting for a response from the helper, and reducing negative self-talk. GB and his caseworker also reported more instances of positive self-talk outside of the treatment sessions.

All three participants exhibited diverse cognitive and social profiles and successfully completed the six week NICE treatment. Post-treatment measures suggested they were more efficient in their wayfinding after being taught help-seeking skills. Specifically, there was a

reduction in their EFRT-R footstep ratio. In addition, improvements on the EFRT-R Total Score suggested they were more effective in their social interactions. Specific to help-seeking behavior, each of the three participants demonstrated improvements during the in-session role plays. Improvement in role play was shown by score gains on the social behavior rating scale specifically developed for use in this study. These preliminary results support the further development and evaluation of the NICE protocol to train help-seeking in this dissertation study.

Appendix B

SESSION 1: ORIENTATION SESSION

PURPOSE: Introduce group participants and NICE

WHAT IS THIS GROUP ABOUT?

This is a group that teaches people how to ask for help when they are lost. Knowing how to ask for help to find your destination is an important skill. Everyone gets lost and after brain injury it may occur more frequently.

GROUP ACTIVITY

Have you ever been lost? Share your experience with the group. How did you feel? What did you do?

WHAT IS COMMUNICATION AND WHY DO WE NEED GOOD COMMUNICATION FOR HELP-SEEKING WHEN LOST?

Communication skills are necessary for effective help-seeking when lost. Help-seeking involves interacting with other people. You need to be able to ask for and use information. Good communication skills are needed to do this.

Communication includes being able to express your thoughts and needs while listening to others. If you have good communication skills you have a better chance of asking for help in the community. If a person does not have good communication skills it may be difficult to ask other people for help when lost.

GOOD COMMUNICATION SKILLS REQUIRE:

- Paying attention (Maintain eye contact with the helper)
- Expressing the right ideas (Ask your navigation question clearly and concisely)
- Being polite (Use words and tone that make people feel comfortable)
- Maintaining appropriate space (Use personal space that makes people feel comfortable)
- Having social confidence (Use your affirmation statement and positive self-talk)

Brain injury can cause problems in any of these areas. Many people who have had a brain injury report difficulty communicating when they need to ask for help.

The purpose of this group is to help people with brain injuries learn about how to ask for help, improve communication skills and work to reach these goals. We do this in a group because people can learn from each other's experiences, offer each other support and give each other feedback about how they are doing.

Each week, we will have a little time to reconnect with each other, review homework and discuss new topics.

Today we will introduce NICE. We will focus on the “N”= Notice you have a problem. How do you know when you are lost?

SESSION COMPETENCIES

1. Identify NICE
2. Identify purpose of group

HOMEWORK

Talk with a family member or friend about your experience in group today. Tell that person how you felt being in the group and what you expect to gain from being a part of this group experience. Let your family member or friend look over the homework if possible. Write down any questions that you or they may have about the group.

What is NICE?

Notice you have a problem

How do you know when you are lost? Were you walking too long? Do you not know where to go next?

1. **WHAT happened?**
2. **WHY did it happen?**
3. **WHERE did it take place?**
4. **Do you need to ask for help?**

Identify the information you need for help

Where are you going (building, location, floor, room number)? Remember your goal (where am I going).
Most importantly, be a great communicator when asking for help. How?

- **Paying attention (Maintain eye contact with the helper)**
- **Expressing the right ideas (Ask your navigation question clearly and concisely)**
- **Being polite (Use words and tone that make people feel comfortable)**
- **Maintaining appropriate space (Use personal space that makes people feel comfortable)**
- **Having social confidence (Use your affirmation statement and positive self-talk)**

Compensatory strategies

What strategies will you use to remember the route (directions)?

- **Write it down?**
- **Say it out loud?**
- **Ask if the person is heading in that direction or at least part of the way?**
- **Ask the helper to repeat/clarify information?**
- **Draw?**

Evaluate progress

Are you getting closer? If not, do you need to ask for help again?

- **Are you still lost? If yes, go back to N= Notice you have a problem**
- **Do you need to ask for help? If yes, go back to I = Identify the information you need for help?**
- **Are you using your strategies? If no, go back to C= compensatory strategies**

SESSIONS 2 & 3: SKILLS OF A GREAT COMMUNICATOR

PURPOSE: Practice how to ask for help, review NICE

REVIEW
Last time we shared how to notice when you have a problem. What does "N" stand for in NICE? Let's do a role play together to practice the **N** part.

THE GREAT COMMUNICATOR
Can you think of someone who is a great communicator? Try to think of someone you know who is really good at communicating. Now, think about what makes that person a great communicator. What skills or behaviors does that person display that make him easy to understand and enjoyable in conversation?

WHY IS COMMUNICATION IMPORTANT WHEN YOU ARE LOST AND NEED TO ASK FOR HELP?
Sometimes directions fail and you may get lost. You may need to ask for help. If you want to improve or change a skill, it is important to first take a look at what you are doing right now. How do you ask for help? What things do you do well? What things are difficult for you?

BE A GREAT COMMUNICATOR WHEN ASKING FOR HELP. HOW? THIS IS THE "I" PART OF N*I*CE.

GOOD COMMUNICATION SKILLS REQUIRE:
- Paying attention (Maintain eye contact with the helper)
- Expressing the right ideas (Ask your navigation question clearly and concisely)
- Being polite (Use words and tone that make people feel comfortable)
- Maintaining appropriate space (Use personal space that makes people feel comfortable)
- Having social confidence (Use your affirmation statement and positive self-talk)

SESSION COMPETENCIES
1. Identify good communication skills
2. Identify I in NICE

HOMEWORK
As part of the homework, I will be asking you to take this form home and get some feedback from your family/friends as well. Share strengths and challenges when getting lost.

SESSION 4: DEVELOPING SOCIAL CONFIDENCE WITH POSITIVE SELF -TALK

PURPOSE: Identify what is confidence and self-talk, introduce "C" in NICE

GROUP ACTIVITY
Let's review "N" and "I" in **NI**CE. Did anyone use "N" or "I" this week when lost? Please share your experience with the group. How did you feel? What strategies worked well to remember the route? This is your "C" in NI**C**E.

CONFIDENCE
Today we are going to talk more about feelings when lost and what to do. Remember when we talked about the skills of a great communicator last session? Think again about someone who is a good communicator. One of the attributes of someone who communicates well is social confidence. What is this? People who feel socially confident usually ask more questions, smile more often, are polite and approachable. Social confidence is affected by how you feel about yourself. One way to improve your confidence is through positive self-talk.

SELF-TALK
Most of us make little comments to ourselves from time to time. This "self-talk" happens so automatically that we may be unaware that we are doing it. Sometimes it is quiet and sometimes it is something we say out loud. This self-talk can be positive ("I did it!") or negative ("I am stupid"). Self-talk can influence how we feel about ourselves and how we communicate. Social confidence may influence our desire to ask for help and willingness to interact with other people.

Negative self-talk is when we say things to ourselves that attack us as a person and stop us from asking for help from others.

Positive self-talk is when we say nice things to ourselves, giving ourselves a pat on the back.

EXERCISE 1: CHANGING NEGATIVE SELF-TALK
Let's come up with a list of situations that trigger negative self-talk. We will discuss why this happens and what needs to change about each situation so negative self-talk is decreased.

EXERCISE 2: ROLE PLAY NEGATIVE SELF-TALK
Partner up and role play an actual negative self-talk situation and together discuss how you feel. Switch roles.

SESSION COMPETENCIES
1. Identify social confidence
2. Identify self-talk
3. Identify C in NICE

HOMEWORK

1. Share with your family or friend what you have learned about confidence and self-talk. Come up with a positive self-talk statement that you can use.
2. Post your positive self-talk statement where you can see it (on your mirror, wall). Practice using positive self-talk during the week.
3. Make a list of positive things you can say to improve your social confidence.

SESSIONS 5 & 6: VIDEO TAPING & EVALUATION

PURPOSE: Learn to give and accept feedback, introduce "E" in NICE

GROUP ACTIVITY

We have been videotaping encounters with people each week. Today we are going to watch some videos together. Does anyone want to volunteer to share their video with the group?

Most people are uncomfortable being video-taped. If you feel a bit nervous about this session, you are not alone. Let's talk about some rules when watching videos together.

RULES FOR GIVING FEEDBACK

1. Point out improvements on individual goals
2. Be specific
3. Try to word your feedback in a positive and supportive manner
4. Be honest
5. Focus on positive behaviors rather than mistakes

VIDEO FEEDBACK

Video feedback is a powerful tool for improving communication skills. Video feedback helps us see and hear how we come across to other people. Watching yourself on videotape provides concrete and unbiased feedback. This kind of feedback is particularly useful when someone is not very aware of his communication skills, has difficulty accepting feedback from others or has difficulty understanding information. It also helps us learn from prior experiences of getting lost. This is our E= "evaluate progress" in NICE.

SESSION COMPETENCIES

1. Identify E in NICE
2. Complete video feedback

HOMEWORK

Write about what you learned from the video feedback session. Did you agree with the feedback you received? How will you use this information to improve your communication skills when asking for help if you get lost? Share with a family member or friend what you learned today.

Appendix C

Scenario 1: The helper speaks too fast without adequate time to remember information

Participant Index Card (given immediately before the videotaped interaction):

You are lost and need to ask for help. Current location: Library main floor lobby Goal Destination: Library room 505

Two confederates will be seated in the conference room. One participant will have a library badge clearly visible in front of her desk. Another confederate will play the role of a student who is studying for an exam.

Instructions for Confederate:

*The participant will ask you for directions. You must speak at a rate that is **abnormally fast** with the following information: "First you go straight down here (point) and make a right turn into the elevator up to the 5th floor. As soon as you get off the elevator make a left and room 505 is in front of you". **Try to be consistent with your rate and tone for all participants**. This interaction will be videotaped.*

Scenario 2: The helper is rude

Participant Index Card (given immediately before the videotaped interaction):

You are lost and need to ask for help. Current location: HEDCO clinic front desk Goal Destination: HEDCO 1st floor coffee shop

Two confederates will be seated in the conference room. One participant will have a clinic badge clearly visible in front of her desk. Another confederate will play the role of a patient waiting for her appointment at the clinic filling out initial registration forms.

Instructions for Confederate:

*The participant will ask you for directions. **You will be a "rude" helper who is busy playing games on your cellphone**. When the participant asks for directions you will continue to play games on your cellphone and state "Go out the main doors and walk past the courtyard. Make a right and you will see the coffee shop on your left". **Try to be consistent with your behavior for all participants**. This interaction will be videotaped.*

Scenario 3: The helper gives bad directions

Participant Index Card (given immediately before the videotaped interaction):

You are lost and need to ask for help. Current location: Hospital main lobby Goal Destination: Dr. Happy's office room 163

Two confederates will be seated in the conference room. One participant will have a hospital badge clearly visible in front of her desk. Another confederate will play the role of a caregiver waiting for a patient completing work on her personal laptop while listening to music.

Instructions for Confederate:

The participant will ask you for directions. ***You will be a helper who gives "bad" directions*** *and state "Go here and there and then over there. Then you want to take the elevator and get out and walk more there".* ***Try to be consistent with your behavior for all participants.*** *This interaction will be videotaped.*

Scenario 4: The helper shares information but clearly states he/she does not know the destination

Participant Index Card (given immediately before the videotaped interaction):

You are lost and need to ask for help. Current location: Macys Goal Destination: Food court

Two confederates will be seated in the conference room. One participant will have a Macys badge clearly visible in front of her desk. Another confederate will play the role of a customer looking at jewelry for purchase.

Instructions for Confederate:

The participant will ask you for directions. ***You will be a helper who offers information but clearly does not know the location.*** *You will state: "Well, today is actually my 1st day working here at Macys. I am really not sure and have never been there but let me give it a try… I think you go out the main entrance and walk until you see the JC Penny and make a left. I think that is the way but I am guessing. I have never been there".* ***Try to be consistent with your behavior for all participants****. This interaction will be videotaped.*

Scenario 5: The helper distracts the participant with irrelevant information/questions

Participant Index Card (given immediately before the videotaped interaction):

You are lost and need to ask for help. Current location: Target entrance Goal Destination: Target Pharmacy

Two confederates will be seated in the conference room. One participant will have a Target outfit clearly visible. Another confederate will play the role of a customer shopping for food.

Instructions for Confederate:

The participant will ask you for directions. ***You will be a "distracting" helper who does not answer the destination question and present irrelevant information****. You will state "I really love working here. It is such a beautiful day today, no? I really like your jacket. Where did you get that? X is my favorite color. What is your favorite color?"* ***Try to be consistent with your behavior for all participants.*** *This interaction will be videotaped.*

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