

Pragmatic Deficits after Childhood Traumatic Brain  
Injury: Caregivers' Perspectives

FINAL PROJECT REPORT

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## **Executive Summary**

The purpose of this research was to describe children's pragmatic skills after traumatic brain injury (TBI) within the context of parent-child interactions. Children with TBI are known to exhibit a variety of pragmatic deficits. How these deficits affect a child's ability to interact with parents is largely unknown. Research examining parent and child pragmatic behavior after TBI is needed because parent-child interactions are an important component of a child's recovery.

Two exploratory studies were conducted. Participants included ten mothers and their child with TBI. Children were ages 6-12 years, had sustained a moderate to severe TBI, and were more than one-year post-injury. All participants participated in both studies. The first study used a phenomenological qualitative approach to describe mothers' experiences communicating with their child with TBI. The mothers' experiences were collected through semi-structured interviews and questionnaires. Interviews were analyzed using a deductive framework and constant comparison analysis to develop home and outside of the home social contexts and pragmatic deficit themes.

The results of the first study showed that mothers primarily described their child with TBI as exhibiting average or near average pragmatic skills at home. However, the majority of mothers observed some problematic communication behaviors resulting in six home and five outside of the home contexts in which pragmatic deficits were observed. These contexts consisted of different pragmatic deficit themes, with only three of ten themes overlapping across environments (home and outside of the home).

The second study used a descriptive research design to characterize parent-child pragmatic behaviors during a conversation in the home. During the home visit, children

completed language, pragmatics, and general intellect assessments. Mothers completed questionnaires on family functioning and the child's executive function behaviors. Mother-child conversations were recorded then analyzed using exchange structure analysis.

Child assessments showed six of the children demonstrated average to near average language, pragmatics, and general intellect. Analysis of the conversations revealed mother-child dyads exhibited positive communication while conversing at home. The mothers asked a higher proportion of questions that placed the child in the position to give information. Children conversed by responding to their mothers' questions and by spontaneously giving other information. Mothers and children collaborated to repair communication breakdowns and negotiate meaning when the conversational content was ambiguous. Although all dyads exhibited positive communication, the types and proportion of these behaviors varied in ways that appeared in some cases to be related to the child's communication and cognitive strengths and challenges.

This research contributes to the childhood TBI pragmatic research by showing that mother-child communication may not be a problem after TBI.

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## **Investigators**

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## **Background Summary**

Pragmatic research using standardized and functional communication assessments have demonstrated that children with TBI exhibit a variety of pragmatic deficits (Biddle, McCabe, & Bliss, 1996; Chapman et al, 1992; Dennis & Barnes, 1990). How these deficits affect a child's ability to interact with parents is largely unknown. Evidence shows that pragmatic deficits negatively affect a child's social and behavioral functioning (Ryan et al., 2015; Yeates et al., 2004), but poor functioning may be attributed to specific pragmatic deficits and may be exacerbated by a particular social context.

Because children routinely interact with their parents, it is reasonable to expect that parents would recognize pragmatic deficits and be able to provide meaningful feedback on a child's pragmatic skills after TBI. Collecting the parents' personal experiences would reveal the communicative contexts that are problematic for the child and allow researchers to focus on maximizing recovery in useful contexts. Observing the child's and the parent's pragmatic behaviors while communicating at home allows researchers to assess the child's pragmatic skills in a useful context while examining how the parent is supporting the child's pragmatic development. Supportive parent-child interactions are important for a child's social skills recovery after TBI (Raj et al., 2014); therefore, research examining parent and child pragmatic behavior after TBI is needed.

### **Significance**

The present studies address a significant gap in the research literature by exploring the parents' experiences in communicating with a child after TBI during everyday communication routines (like having a conversation) and examining communication strategies employed by both the parent and child in these situations. Parents have the most consistent interaction with the

child; therefore, they can provide the most meaningful feedback on the child's communication skills.

### **Purpose**

The purpose of the present studies is to characterize pragmatic communication between children with TBI and their parent. These studies will answer two questions: 1) What home environment social contexts do parents report as affected by their child's pragmatic deficits after TBI and 2) What pragmatic communication patterns do parents and their child with TBI demonstrate when conversing at home? The results of two related studies will be reported.

## Study 1

### Pragmatic Skills after Childhood Traumatic Brain Injury: Parents' Perspectives

#### Abstract

The purpose of this study was to characterize pragmatic deficits after childhood traumatic brain injury (TBI) within the home environment social contexts that they occur.

This study used a phenomenological qualitative approach to describe parents' experiences communicating with their child with TBI. Participants were ten parents', all mothers, of a child 6-12 years old who had sustained a moderate to severe TBI more than one year prior to the mother participating in the study. The mothers' experiences were collected through semi-structured interviews and questionnaires. Interviews were analyzed using a deductive framework and constant comparison analysis to develop home and outside of the home social context and pragmatic deficit themes. Child language, pragmatics, general intellect, and executive function assessments were completed during a home visit.

The results of the first study showed that mothers primarily described their child with TBI as exhibiting average or near average pragmatic skills at home. However, the majority of mothers observed some problematic communication behaviors resulting in six home and five outside of the home contexts in which pragmatic deficits were observed. These contexts consisted of different pragmatic deficit themes, with only three of ten themes overlapping across environments (home and outside of the home). Child assessments revealed six children demonstrated average to near average language, pragmatics, and general intellect. This study's pragmatic deficit themes expanded on prior childhood TBI pragmatic investigations by identifying the home and outside of the home contexts in which pragmatic deficits may occur after TBI.

**Highlights**

- Six home and five outside of the home social contexts emerged from the mothers' interviews.
- Pragmatic deficits themes differed by social context.
- Children were primarily described as exhibiting average to near average pragmatic skills in the home environment.

## **1. Introduction**

In the United States, an estimated half a million (511,257) children ages 0-14 years sustain a traumatic brain injury (TBI) annually (Faul et al, 2006). A TBI within this age range is especially alarming because damage to a maturing brain can derail a child's cognitive development resulting in long-term deficits (Anderson, Catroppa, Morse, Haritou, & Rosenfeld, 2005b; Crowe, Catroppa, Babl, Rosenfeld, & Anderson, 2012). Children with severe TBI often demonstrate long-term deficits in the social communication skills needed to establish relationships and thrive in social environments (Anderson & Beauchamp, 2010; Catroppa & Anderson, 2004; Dennis & Barnes, 1990; Dennis et al., 2013; McDonald et al., 2013; Turkstra, McDonald, & DePompei, 2001; Yeates et al., 2004). Consequently, pediatric TBI (pTBI) can result in social skills impairments such as reduced participation in school, family, and community socialization activities (Bedell & Dumas, 2004;) and ineffective interactions with peers (Gauvin-Lepage & Lefebvre, 2010; Yeates et al., 2013).

The American Speech-Language-Hearing Association (ASHA) defines social communication as including social cognition, pragmatics, social interaction, language processing and expression (ASHA, n.d.). Pragmatic skills like speaking on topic, speaking in turn, and making relevant contributions to a conversation are integral components of social communication and enable an individual to comprehend and use socially appropriate verbal and nonverbal language to participate in social interactions. Pragmatic behavior is complex and requires an integrated interplay of language and cognitive skills (Kasher, 1991). Cognitive skills such as working memory, executive function, and theory of mind, in addition to semantic and syntactic language, are considered critical for pragmatic proficiency (McDonald, Turkstra, Togher, 2012).

Childhood TBI can result in a wide range of cognitive and language impairments. These deficits may be transient or persistent and, depending on the child's age at the time of injury, may not be evident for several years post-injury (Anderson et al. 2013; Catroppa & Anderson, 2004). Cognitive outcome studies have shown deficits in general intellect, memory, attention, processing speed, and executive function (Anderson et al., 2006; Anderson, Catroppa, Morse, Haritou, & Rosenfeld, 2005a; Anderson et al., 1997; Crowe, Anderson, Barton, Babl, & Catroppa, 2014; Catroppa, Anderson, Morse, Haritou, & Rosenfeld, 2007; Nadebaum, Anderson, & Catroppa, 2007), with some deficits persisting five years post-injury (Catroppa et al., 2007; Nadebaum, Anderson, & Catroppa, 2007). Although recovery of basic language skills, including sentence comprehension, confrontation naming, and vocabulary, is generally good after pTBI, children often exhibit persistent cognitive-communication deficits such as word finding and limitations in higher-level language (e.g. pragmatics) (Catroppa & Anderson, 2004; Crowe et al., 2014; Ewing-Cobbs & Barnes, 2002; Ewing-Cobbs, Levin, Eisenberg, & Fletcher, 1987).

Pragmatics research has largely compared the pragmatic skills of children and adolescents with TBI to uninjured children on both standardized and non-standardized assessments. The evidence, overall, suggests that pragmatic deficits are chronic (Catroppa & Anderson, 2004; Dennis & Barnes, 1990; Ryan et al., 2015), associated with a younger age at injury (9 years old or younger) (Chapman, Levin, Wanek, Weyrauch, & Kufera, 1998; Didus, Anderson, & Catroppa, 1999; Ryan et al., 2015) and observed in children with all TBI severities (Dennis & Barnes, 2000); the greater the severity the more evident the deficits (Chapman et al., 2001; Chapman et al., 1992; Crowe et al., 2014). Specifically, between-group studies using standardized assessments reveal that children and adolescents with TBI have more difficulty with

interpreting and using language in context compared to uninjured peers (e.g. Dennis & Barnes, 1990; Didus et al., 1999; McDonald et al., 2013).

The results of pragmatic studies using non-standardized discourse assessments are less clear than those using standardized because these studies have examined narrative and conversational discourse, used different discourse measures, and employed both group and individual data analyses. Both narrative and conversational discourse research have examined microlinguistic features of discourse using between-group analyses and have shown that children and adolescents with TBI demonstrate similar lexical use/diversity, syntactic complexity, and cohesion as their uninjured peers (Chapman et al., 1992; Chapman et al., 1998; Ewing-Cobbs, Brookshire, Scott, & Fletcher, 1998; Van Leer & Turkstra, 1999).

Narrative and conversational discourse diverge in the measurement techniques used to examine content. Narrative discourse has used between-group comparisons to examine differences in macrostructures whereas conversational discourse has used between-group comparisons to examine differences in discourse errors and pragmatic behaviors. Narrative discourse research on macrostructural features show that the narratives of children and adolescents with TBI are often less informative, (Biddle, McCabe, & Bliss, 1996; Chapman et al, 1992; Chapman et al., 1998; Crowe et al., 2014), less organized (Chapman et al, 1992; Chapman et al., 1998), and less efficient (Biddle et al., 1996; Chapman et al., 1992; Chapman et al., 1998,) as those produced by uninjured peers. Between-group conversational discourse studies, by comparison, suggest that children with TBI exhibit similar discourse errors and pragmatic behaviors as uninjured peers (Morse et al., 1999; Turkstra, Brehm, & Montgomery, 2006).

However, more individualized conversational discourse analyses that described the discourse of children with and without TBI has found differences. Campbell and Dollaghan

(1990) and Morse et al. (1999), performed descriptive analyses that examined the children's discourse data individually rather than as aggregated groups. Using uninjured children/adolescents as a developmental benchmark, Campbell and Dollaghan (1990) individually compared the injured children's and adolescents' data to their uninjured counterparts' data. Their analysis revealed immense variability in the recovery of microlinguistic discourse features, with 5 of the 9 injured children demonstrating deficits on the majority of measures (Campbell & Dollaghan, 1990). Similarly, Morse et al. (1999) reported that individual examination of the groups' results revealed that TBI groups (mild, moderate, and severe) demonstrated errors in more discourse error categories than controls. Notably, the severe TBI group showed particular difficulty in the category of relation, with errors including poor topic maintenance and inappropriate responses (Morse et al., 1999).

Children with TBI are known to exhibit a variety of pragmatic deficits; however, few studies have explicitly described how these deficits affect a child's ability to communicate in day-to-day parent-child interactions. The social-interactionist pragmatic development research emphasizes the importance of parent involvement and social context for advancing a child's pragmatic skills (Allen & Marshall, 2011; Tamis-LeMonda, Bornstein, & Baumwell, 2001; Tannock & Girolametto, 1992). Within a social-interactionist developmental framework, young children build their pragmatic proficiency through routine interactions with parents, like discussing the child's day (Bruner, 1983). Parent-child interactions remain instrumental throughout middle childhood (Allen & Marshall, 2011; Raffaelli & Duckett, 1989) when children have been shown to demonstrate poorer pragmatic outcomes after TBI (Ryan et al., 2015).

Examining interactions between parents and children with TBI is especially important because parents may try to compensate for relationships that deteriorate for the child after TBI. For example, Gauvin-Lepage and Lefebvre (2010) interviewed adolescents with TBI and found that they had lost one or more friends since their injury (Gauvin-Lepage & Lefebvre, 2010). Additionally, Bedell and Dumas (2004) found that children with TBI participated less in social activities (e.g. sports) and with peers. This may put parents in the situation of being the child's primary social and communication partner and become a source of stress to the parent and child if social interactions are continuously challenging.

Social functioning after childhood TBI has been studied from the parent's perspective; however, there is a major research gap in the identification of context specific pragmatic deficits that affect the child's interactions in everyday home contexts. A number of studies have quantified a child's social competence after TBI by having parents rate their child's behavior and social functioning using standard questionnaires. Results of these studies suggest that parents rate children with severe TBI as having greater difficulty adjusting behavior, including communication, to effectively interact with others (Catroppa, Anderson, Morse, Haritou, & Rosenfeld, 2008; Fletcher, Ewing-Cobbs, Miner, Levin, Eisenberg, 1990; Ganesalingham et al., 2011; Ganesalingham, Sanson, Anderson, & Yeates, 2006; Max et al., 1998; Moran et al., 2015). More concerning is evidence that behavior and social problems tend to persist over time, especially for children with severe TBI (Anderson et al., 2006; Catroppa et al., 2015; Catroppa, Godfrey, Rosenfeld, Hearps, & Anderson 2012; Chapman et al., 2010; Fletcher et al., 1990; Schwartz et al., 2003). Although behavioral and social functioning research has found measurable differences in a child's social behavior after TBI compared to children without TBI, these differences are sometimes minor (Chapman et al., 2010) and dependent on which social

behavior domains (e.g. communication, externalizing behaviors, etc.) are assessed (Fletcher et al. 1990). Nevertheless, Prigatano and Gray (2007) found that parents of children with TBI (ages 7 to 17 years) with self-reported high levels of distress expressed concern regarding their child's social skills deficits, lack of friendships, and the child's inability to control their emotions.

Childhood TBI social outcomes research indicates that the home environment significantly contributes to a child's and adolescent's social and behavioral functioning after TBI (Taylor et al., 2001; Yeates et al., 2004; Yeates, Taylor, Chertkoff Walz, Stancin, & Wade, 2010). Positive family characteristics like communicating, problem solving and supporting each other are associated with better functioning after pTBI (Taylor et al. 2001; Yeates et al., 2004; Yeates et al., 2010); however, a child's negative behaviors can disrupt the family dynamic by increasing family burden and stress (Taylor et al., 2001). Evidence shows that pragmatic deficits negatively affect a child's social and behavioral functioning (Ryan et al., 2015; Yeates et al., 2004), but poor functioning may be attributed to specific pragmatic deficits and may be exacerbated by a particular social context, like negotiating a later curfew. A limitation of the social outcomes research is that the home environment and child functioning have largely been quantified using standard questionnaires (Yeates et al., 2004). As a result, little is known about the specific social behavior deficits or family environment contexts impacted by pTBI.

Because children routinely interact with their parents, it is reasonable to expect that parents would recognize pragmatic deficits and be able to provide meaningful feedback on a child's pragmatic skills after TBI. Collecting the parents' personal experiences would reveal the communicative contexts that are problematic for the child and allow researchers to focus on maximizing recovery in useful contexts. The purpose of this study is to characterize pragmatic deficits after pTBI within the home environment social contexts that they occur. This study will

answer three questions: 1a) What home environment social contexts do parents report as difficult for effective communication? 1b) What communication breakdowns do parents observe during these social contexts? and 1c) What pragmatic deficits do parents report as the potential cause of communication breakdowns in these social contexts?

## **2. Method**

A phenomenological qualitative approach was chosen for the present study because the study's research questions focused on the parents' experiences during interactions with their child with TBI (Creswell, 2013). Qualitative research allows for the use of flexible data collection methods, like interviews, to elicit personal data that cannot be fully captured with the use of quantitative data collection methods, like standardized assessments (Creswell, 2013). The parents' experiences were collected through semi-structured interviews and questionnaires. Interview data was analyzed using a deductive framework to answer a priori research questions related to the parent's experiences with and observations of the child's communication.

### *2. 1. Participants*

After approval from the appropriate research ethics committees was obtained, participants were recruited from two pediatric hospitals. One hospital was located in Ohio and the other in Georgia. Purposive sampling from a convenience sample was employed to strategically select parents of children with TBI (Patton, 2002). First, a research or clinical employee from the hospitals, whose sole responsibility for this project was to assist with recruitment, identified and contacted potential participants who met the present study's inclusion criteria. To be included, a participant had to self-identify as the primary caregiver/parent of a child that met the following criteria: 1) 6-12 years old at the time of the parent interview, 2) sustained a moderate to severe TBI (moderate TBI was categorized as a Glasgow Coma Scale

(GCS) score post-resuscitation of 9-12 or 13-15 with abnormal imaging or other evidence of neurological impairment while severe TBI was categorized as a GCS of 8 or less), 3) more than 1 year post-injury, 4) no premorbid history of developmental delay, as determined by parent report, 5) capable of following single step directions, as determined by parent report, 6) intelligible speech (The parent could understand at least 80% of the child's speech during conversation.), as determined by parent report, 7) normal hearing, as determined by parent report, 8) English as the primary language, as determined by parent report, and 9) parent reported concern regarding the child's functioning (e.g. academics, behavior, communication, etc.) post-TBI. Parents were excluded if the child's TBI was not accidental.

When a parent expressed interest in participating, the hospital employee forwarded the contact information to the principal investigator (PI) or provided the participant the PI's contact information. The PI then communicated with the potential participant to confirm interest and to schedule the interview. No potential participant who spoke with the PI declined to participate in the study. Participants were mailed a copy of the parent consent form after the interview was scheduled. On the day of the interview, participants gave verbal consent to participate in the study by phone. Written parent consent was obtained at a later time as part of a home visit.

Once verbal consent was obtained, child medical information (medical reports specifying GCS scores, imaging results, etc.) and household demographic information were collected. The household demographic questionnaire was developed specifically for the present study and collected information regarding mother's education, family income, individuals living in the home, number and ages of children in the family, current grade and special education history of the child participating in the study.

Ten parents, all mothers, participated in the present study. Although all participants reported English as the primary language, one mother reported speaking a second language in the home. Four of the mothers had a male child with TBI and six had a female child with TBI. Two children with severe TBI received rehabilitation services immediately after their injury. Of the ten children, two children (1 with moderate and 1 with severe TBI) currently had an Individual Education Plan (IEP) with the eligibility criterion of communication disorder or speech-language disorder. One child with moderate TBI previously had an IEP with this criterion but was no longer receiving services.

Based on the participants' questionnaire results, there was a diverse representation of educational attainment and household characteristics. Four of the mothers possessed a graduate degree; two had a bachelor's degree; one had an associate's degree; one had some college experience; two had a high school diploma/general education development (GED). According to a United States' census report, the median household income in the United States in 2014 was \$53,657 (DeNavas-Waltz & Proctor, 2015). Three participants reported a household income slightly below or above the national average; three reported household incomes substantially lower than the national average; and four reported household incomes substantially higher than the national average. Participants reported a mean of 4.9 individuals living in the home (range = 3 to 9 people) with a mean of 3.1 children per household (range = 2-7) ranging from 2 to 17 years old. Two of the ten mothers reported only one adult living in the home.

Nine of the ten participants previously participated in at least one other TBI research project at the aforementioned hospitals. The participants were reimbursed for their participation in this study with a \$50 department store gift card.

## 2.2. Procedure

Participants completed individual, in-depth, semi-structured, audio-recorded phone interviews that averaged 71 minutes in duration (range = 54 to 113 min.). Phone interviews were selected because they were considered less burdensome on the families and, therefore, more likely to elicit participation. The interviews were conducted by the PI to investigate the parent's perspective of their child's pragmatic skills in the home environment. As part of the interview, participants completed the *Children's Communication Checklist, Second Edition (CCC-2)* (Bishop, 2003), a standard questionnaire. Their responses to these structured questions were followed up with semi-structured interview questions.

Descriptions of the child's pragmatic skills were collected in part using the CCC-2. The CCC-2 was administered because it asks about specific pragmatic deficits (e.g. stands too close to people when talking) and skills (e.g. appropriately uses gestures) that may be difficult for mothers to recognize independently. Furthermore, the CCC-2 has been shown to be a valid and reliable communication screening tool for children and includes ten communication scale results: *Coherence, Initiation, Scripted Language, Context, Nonverbal, Social Relations, Interests, Speech, Syntax, and Semantics* (Bishop, 2003). The questionnaire consists of 70 questions/items divided into two sections (Bishop, 2003). The deficit section, which is administered first, consists of 50 items that probe communication deficits. It uses a rating key that indicates the frequency at which the respondent observes the communication deficit (0 = never, 1 = occasionally, 2 = frequently, and 3 = always) (Bishop, 2003). A higher score on this section (Items 1-50) indicates communication problems.

The skill section, which is administered second, consists of 20 items which probe communication skills. CCC-2 respondents answer these questions based on the frequency at

which they observe the child using the specific communication skill (3 = always, 2 = frequently, 1 = occasionally, 0 = never). A higher score on these questions indicates positive communication behaviors. This second section (Items 51-70) checks for consistency of responses by administering some of the items in the first section using a reverse scale (Bishop, 2003). The interview procedures were as follows:

First, each item from the CCC-2 was read aloud to the participant, in sequential order, and they were asked to respond using the CCC-2 frequency rating key. When the mother reported observing a communication deficit on one of the first 50 items (i.e. frequency rating of 1, 2, or 3), she was asked follow-up questions that probed the contexts in which the deficit was observed. When the mother reported that she did not “always” observe a communication skill on one of the last 20 items (i.e. frequency rating of 0, 1, 2), she was asked follow-up questions that probed the contexts in which the skill was not observed. The following contexts guided the follow-up questions: the situations in which the mother perceived the child’s communication deficits (e.g. re/telling a story) and where (e.g. at home) and with whom the deficit occurs (e.g. parents, siblings).

After completing the CCC-2, the participants were given an opportunity to provide any additional information, regarding the child’s communication skills, they thought was important to share. The interviewer maintained field notes, completed during and/or immediately following each interview, to record initial impressions.

Second, a home visit lasting 90-105 minutes was scheduled during which mothers completed questionnaires and children were administered standardized assessments. The PI or a research assistant, trained by the PI to administer the assessments per standardized protocol, assisted the mother with completing questionnaires related to home demographic information,

family functioning, and the child's executive functions. Because executive function skills contribute to a child's social competence (Yeates et al, 2004) mothers completed the *Behavioral Rating Inventory of Executive Functions* (BRIEF) (Gioia, Isquith, Guy, & Kenworthy, 2000). The *Behavior Regulation* and *Metacognition* index scores, in addition to the *General Executive Composite* score are reported. One mother had completed the BRIEF, as part of a different study, within 12 months from the time she participated in this study; therefore, with parent consent, these scores were used. The *General Functioning* and *Communication* scales of the *McMaster Family Assessment Device* (FAD), a reliable and valid measure of family functioning, was given to quantify family functioning and communication style (Miller, Epstein, Bishop, & Keitner, 1985; McCauley et al., 2012).

Children were administered the *Pragmatic Judgments* subtest from the *Comprehensive Assessment of Spoken Language* (CASL) to assess pragmatic functioning and the *Core Language Subscale* as a measure of general receptive and expressive language abilities (Carrow-Woolfolk, 1999). The CASL was selected because it is a recommended language measurement tool by the Pediatric Common Data Elements (CDE) Traumatic Brain Injury (TBI) working group and has a pragmatic subtest that can be administered separately from the core battery (McCauley et al., 2012). One of the ten children had been administered the CASL *Pragmatic Judgement* subtest, as part of a different study, within 12 months from the time she participated in the present study; therefore, with parent consent, this score was used. Additionally, all children were administered the *Wechsler Abbreviate Scale of Intelligence, Second Edition* subtests of *Vocabulary* and *Matrix Reasoning* (WASI-II) to approximate overall cognitive ability (Wechsler & Zhou, 2001). The WASI-II was selected because it is a recommended intelligence measurement tool by the

Pediatric CDE TBI working group (McCauley et al., 2012). To minimize testing fatigue, the children were frequently offered testing breaks.

The home visit occurred, on average, 22 days after the interview (range = 2 to 48 days) and was part of the study's second phase. As part of the home visit, the mother and child also engaged in a video-recorded conversation. The results of this research activity are not included in the present study.

### 2.3. *Analysis*

Audio-recorded interviews with the mothers were transcribed verbatim by four trained research assistants. The assistants' accuracy was assessed prior to transcribing the interviews. The interview transcripts served as the primary data source for analysis; however, portions of the audio-recordings were reviewed as needed to inform the transcript analysis. The interviewer's field notes, recorded during and/or immediately after each interview, were not included in the analysis.

Primary and secondary analyses of the interview transcripts were completed. The primary analysis was completed using a deductive framework. A deductive framework uses a priori research questions as a guide for identifying data (mothers' statements) (Pope, Ziebland, & Mays, 2000). The first step of the primary analysis was identifying statements in the transcript that were relevant to the mothers' experiences in communicating with their child during day-to-day home environment contexts (research questions 1a, 1b, and 1c). Spontaneous statements and responses to items on the CCC-2 were considered as interview data. That is, if a mother did not provide more information about a communication deficit other than how the deficit was described on the CCC-2, then the exact wording of the question was indexed with a 1c to indicate its relationship to research question 1c. Because the focus of the present study was the

child's pragmatic deficits, items from the CCC-2 scales of *Coherence, Initiation, Scripted Language, Context, Nonverbal, Social Relations, and Interests* were included in the analysis and questions from the *Speech, Syntax, and Semantics* scales were excluded. All statements describing the mother's experiences or observations related to the research questions were indexed according to the relevant research question. For example, if a mother said, "He does not use people's names when he tells me about his day at school" the statement "he does not use people's names" would be indexed with a 1c and the statement "when he tells me about his day at school" would be indexed with a 1a. Because mothers were first asked about the child's communication behavior (items from the CCC-2), these statements were, typically, indexed first. Then, statements related to the follow up questions, like the home contexts, were indexed.

Subsequent transcript reviews (primary analysis) focused on identifying statements regarding the mothers' communication experiences with their child that did not correspond with the a priori research questions but were related to difficulties in communicating with the child. Statements unrelated to the research questions were indexed into potential categories that emerged while reading and indexing the transcripts. Although the focus of the present study was to identify problematic home environment contexts, a number of mothers observed challenging pragmatic behaviors outside of the home. Therefore, the emergent category of *outside of the home social contexts* and the pragmatic behaviors that occurred in these contexts were indexed and included in the secondary analyses. Statements related to the research questions and emergent statements were listed together in an excel file to capture reoccurring issues or experiences.

The secondary analysis consisted of two analyses; context and pragmatic deficits. The purpose of the context analysis was to develop home environment and outside of the home

context themes. The first step of the context analysis was to explore the data related to the mothers' communication experiences with their child. At this step, the mothers' individual experiences were condensed into written summaries used for member checking; as described later in the Trustworthiness section of this paper.

Next, the mothers' individual statements were combined and synthesized to develop home and outside of the home context themes (Pope et al., 2000). Themes were identified using constant comparison analysis and consisted of reoccurring patterns of statements regarding home and outside of the home contexts which were difficult because of the child's communication (Creswell, 2013). Contexts that were reported by more than one mother were considered to be a meaningful theme.

Once the context analysis was completed, two pragmatic deficit analyses were performed. The purpose of the first pragmatic deficit analysis was to develop pragmatic deficit and communication breakdown themes that occurred in the home and/or outside of the home for all mothers (combined analysis). The results of the first pragmatic deficit analysis are reported in conjunction with the context analysis results (i.e. contexts). The purpose of the second pragmatic deficit analysis was to identify any additional emergent pragmatic deficit patterns that occurred in any context. This second analysis evolved while comparing communication behaviors observed in the home to those observed outside of the home. The results of the second pragmatic deficit analysis are reported separate from the first pragmatic deficit analysis results.

The first pragmatic deficit analysis consisted of listing all indexed communication behaviors and communication breakdowns in and outside of the home by context (i.e. situation and who was involved) and developing pragmatic deficit and communication breakdown themes. Similar to the context analysis, themes were identified using constant comparison analysis

(Creswell, 2013). Because of the difficulty differentiating between a communication breakdown and a pragmatic deficit, at this stage of the analysis, the decision was made to collapse statements indexed for these research questions. As a result, two research questions remained with question 1c revised accordingly: 1a) What home environment social contexts do parents report as difficult for effective communication? and 1c) What pragmatic deficits do parents observe in these social contexts?

Confirmation of defining a communication behavior as a pragmatic deficit was made by the mother indicating that the behavior is different from peers, siblings, the child's pragmatic functioning prior to the TBI, or that she did not know whether the behavior was related to the child's TBI and/or the age-appropriateness of the behavior. This was accomplished through statements made by the mother during the interview both spontaneously or in response to questions. When such confirmation was not accomplished during the interview, follow-up questions were asked during the member-checking. If the behavior was observed, but not described as different from other children of the same age, the behavior was considered not confirmed. Both the context and behavior analyses used confirmed and non-confirmed communication behaviors.

The home environment context themes consisted of only confirmed communication behaviors. That is, only communication behaviors that were described as different from children without TBI or the mother did not know whether the behavior was related to the child's TBI and/or the age-appropriateness of the behavior were included in the home environment contexts analysis. In contrast, the portion of the context analysis focused on identifying outside of the home context themes included both confirmed and non-confirmed communication behaviors. The decision to include non-confirmed communication behaviors in the outside of the home

category themes was made because the aim of this analysis was to identify emergent themes that were not part of the study's primary aim.

Similar to the context analysis, the pragmatic deficit analyses also included these confirmed and non-confirmed communication behaviors because the purpose of the second behavior analysis was to discover emergent pragmatic deficit themes. All pragmatic deficit themes were considered meaningful (i.e. reported by more than one mother) with or without the inclusion of non-confirmed communication behaviors.

Indexing the mothers' statements, generating themes and interpreting the data were completed by peer review. Peer review is comparable to the quantitative research strategy of interrater reliability (Creswell, 2013) and has been used in previous adult neurogenic communication disorders qualitative research (Howe et al., 2012). For the present study, peer review involved the study's first and second authors completing the data analysis together and reaching consensus at each stage of the context and pragmatic deficit analysis steps. Although peer review typically involves two or more researchers of equal status (Lincoln & Guba, 1985), the first and second authors had a mentor-mentee relationship which fostered candid discussions of data analysis methods and interpretations. Furthermore, the second author's expertise in child language disorders ensured that the data was analyzed and interpreted from multiple perspectives; reducing the likelihood of biased results. This peer review process allowed for rigorous scrutiny of the data and served as a means of reliability and validity (Creswell, 2013; Lincoln & Guba, 1985).

#### *2.4. Trustworthiness*

The qualitative research constructs of trustworthiness are comparable to the quantitative research methods of reliability and validity and are standards for assessing scientific rigor

(Creswell, 2013; Lincoln & Guba, 1985). Lincoln and Guba (1985) identified several qualitative research constructs of trustworthiness including credibility, confirmability, and transferability. Qualitative research achieves reliable results by employing methods of credibility (Lincoln & Guba, 1985). The present study achieved credibility through the use of peer review/debriefing, member checking, and triangulation. The reader is referred to the data analysis section of this paper for a description of the present study's peer review methods. Member checking is the process of confirming a study's results with the participants and is considered by Lincoln and Guba to be "the most critical technique for establishing credibility" (Lincoln & Guba, 1985, p. 314). The present study conducted informal member checks which consisted of the PI reading aloud a brief summary of the mother's individual interview results over the phone. Member checking was completed with nine of the ten mothers. One mother was unable to be reached despite several phone calls and messages. During the member check, the mothers were asked if the brief summary accurately represented the information they provided in the interview. All summaries were confirmed to be accurate. Additionally, the member checks were used to establish that each mother considered the communication behaviors observed in the home environment to be different from other children without TBI and/or not age-appropriate. Mothers were also offered the option of saying they did not know the age-appropriateness of the behavior. On average, member checks were completed 11 months after the interview (range= 10 to 14 months). Notes were taken during the member check phone calls.

Triangulation is a technique that can both confirm and validate a study's findings (Lincoln & Guba, 1985). Therefore, the present study's triangulation methods establish both credibility and confirmability. Triangulation involved collecting an array of data using multiple

sources: interviews, questionnaires, and standardized assessment and using the results of each source to corroborate findings.

The qualitative construct of transferability refers to the likelihood that findings from one group of participants can be applied to those in similar situations but did not participate in the study (Lincoln & Guba, 1985). As suggested by Lincoln and Guba (1985), the authors of this paper make no claims that results can be transferred outside of the study's setting. Instead, we aim to provide sufficient detail of the present study so that other individuals can judge the relevance of the present study's results to that of their own situation (Howe et al., 2012; Lincoln & Guba, 1985).

### **3. Results and Discussion**

#### *3.1. Assessments*

Six of the children scored within an average range (within 1 standard deviation (SD) from the mean) on both CASL and the WASI-II *Full Scale-2 Composite* assessments. Table 1 shows all assessment results by child. Eight children scored within an average range on both the CASL *Core Language* subscale and the *Pragmatic Judgement* subtest (mean = 100, SD = 15). Six children scored within an average range on the WASI-II *Full Scale-2 Composite* (mean = 100, SD = 15). Seven children scored within an average range on the WASI-II *Vocabulary* subtest while eight children scored within an average range on the *Matrix Reasoning* subtest (mean = 50, SD = 10). The two children that scored below average (greater than 1 SD from the mean) on the CASL *Core Language* subscale also scored below average on the WASI-II *Vocabulary* subtest, however, one of these children scored within an average range on the CASL *Core Language* subscale but below average on the WASI-II *Vocabulary* subtest.

The CASL and WASI-II are assessments administered to the child whereas the BRIEF and CCC-2 are parent completed questionnaires. Eight mothers rated their child within an average range on the *General Executive Composite* and the *Behavior Regulation and Metacognition* indexes (mean = 50, SD = 10). According to the CCC-2 results, seven mothers rated their child as exhibiting communication skills within an average range (mean = 100, SD = 15) (Table 1). The CCC-2 results are provided, however, the administration procedure deviated from the standard CCC-2 protocol; therefore, scores are reported for descriptive purposes only. Although a majority of the children were rated as exhibiting average communication skills on the CCC-2, interview data suggested that 9 of the mothers observed some problematic communication behaviors in at least one home environment context.

Table 1. Child assessment results by child

Child	Moderate TBI							Severe TBI		
	2	3	4	6	8	9	10	1	5	7
<b>Direct Assessments</b>										
CASL: Core Language	101	104	90	106	112	100	84	104	77	90
CASL: Pragmatic Judgments	109	101	100	97	110	89	90	99	79	96
WASI-II: Full Scale- 2 Composite	102	104	92	105	79	98	79	86	79	75
WASI-II: Vocabulary	52	54	46	50	41	41	31	33	33	43
WASI-II: Matrix Reasoning	51	51	45	56	35	57	45	51	42	27
<b>Parent Questionnaires</b>										
CCC-2: General Communication Composite	84	89	98	101	120	79	98	96	97	84
BRIEF: Global Executive Composite	52	58	48	49	57	68	50	52	56	65

BRIEF: Behavior Regulation Index	54	55	56	43	59	65	57	56	58	63
BRIEF: Metacognition Index	51	58	44	53	55	69	46	50	54	65
FAD: Communication	2.5	1.1	2.2	1.8	1.5	2.7	1.8	1.2	1.5	2.0
FAD: General Functioning	1.8	1.3	1.5	1.1	1.6	1.8	2.1	1.2	1.8	1.9

Note. CASL = *Comprehensive Assessment of Spoken Language* (Carrow-Woolfolk, 1999); WASI-II = *Wechsler Abbreviate Scale of Intelligence, Second Edition* (Wechsler & Zhou, 2001); CCC-2 = *Children’s Communication Checklist, Second Edition* (Bishop, 2003); BRIEF = *Behavioral Rating Inventory of Executive Functions* (Gioia, Isquith, Guy, & Kenworthy, 2000); FAD = *McMaster Family Assessment Device* (Miller, Epstein, Bishop, & Keitner, 1985)

### 3.2. Context Analysis

#### 3.2.1 Home environment social contexts

The purpose of the context analysis was to answer the following research questions: 1a) What home environment social contexts do parents report as difficult for effective communication? and 1c) What pragmatic deficits do parents report in these social contexts? Analysis of the interview data (mothers’ statements) revealed that pragmatic deficits were primarily observed in six home environment contexts. Listed in order of most frequently occurring to least occurring, these contexts were: **Talking with Family, Desirable Future Activities, Unexpected/Different Situations, Undesirable Future Activities, Activities, and Disagreement Among Sibling.**

The home environment context was defined as a home setting or a setting similar to home (e.g. car) where the child was interacting with immediate family members and/or extended family members living in the home (e.g. grandmother). The mothers’ descriptions of these settings often included the person the child was interacting with and the situation/event taking place. Only communication behaviors confirmed to be different from peers and/or siblings, inconsistent with the child’s functioning prior to the TBI, or those that the mother did not know

whether the behavior was related to the child’s TBI and/or the age-appropriateness of the behavior were included in the home environment context results. These communication behaviors were then listed by home environment context and organized by pragmatic deficit themes. Home environment contexts were included in the results if the context contained the same pragmatic deficit theme(s) for more than one child. This decision was made because the goal of the study was to identify common communication experiences. A summary of this data is provided in Table 2.

Table 2. Home environment social contexts and associated pragmatic deficit themes

Home Environment Social Contexts	Pragmatic Deficit Themes
Activities	Excessive Ignoring
Desirable Future Things or Activities	Repeatedly Seeking Assurance
Undesirable Future Activities	Excessive Talking
Unexpected/Different Situations	Overreaction Nonverbal Behavior
	Overreaction Verbal-Aggressive/Defiant
Talking with Family	Excessive Talking
	Difficulty with Cohesion/Coherence
	Repeating Information
	Difficulty with Abstract Language
	Self-Absorbed Behavior
	Provides Inaccurate Information
Disagreement among Sibling	Overreaction Nonverbal Behavior
	Overreaction Verbal-Aggressive/Defiant

These six home environment contexts are further explained below and the pragmatic deficit themes associated with them are described. In these explanations, the term “family” refers

to immediate and/or extended family members living in the home and the term “parents” refers to the mother and father. Additionally, the term “communication behavior(s)” is used for communication behaviors described by the mother during the interview and the term “pragmatic deficit(s)” are used for pragmatic deficit themes. For home contexts with more than one pragmatic deficit theme, the pragmatic deficit themes are listed in order of most frequently observed to least. Some of the home environment context and pragmatic deficit themes are illustrated with quotations and/or information from the mothers’ transcripts.

Theme 1: **Talking with Family** was a broad theme and included general conversation, joking around, discussing family plans or events, and narrative discourse tasks like retelling a movie, story, or event from the child’s day. These contexts were described by seven of the ten mothers and interactions were not limited to mother-child. Six pragmatic deficit themes occurred in this context: *Difficulty with Cohesion/Coherence*, *Repeating Information*, *Excessive Talking*, *Difficulty with Abstract Language*, *Self-absorbed Behavior*, and *Provides Inaccurate Information*.

Five of the seven mothers described **Difficulty with Coherence/Cohesion**. All five mothers observed this communication behavior in mother-child interactions involving narrative discourse tasks. For example, the mother of a 10-year-old boy stated that while her son is retelling her events from his day “he can kind of jumble things around little,” while another mother of a 10-year-old boy said that her son may “leave the person’s name out,” when telling her something he’s excited about.

Three of the seven mothers observed *Repeating Information*. This pragmatic deficit theme included statements that described the child as telling a family member facts the family member already knew. Of the three mothers, two observed this behavior when the child was

talking with siblings whereas one mother observed this behavior when the child was talking with family. The mother of a 10-year-old boy described her son as repeatedly telling his older brother information related to the family's schedule or an upcoming trip. She stated that when her child exhibited this behavior he may be "trying to mess with" his sibling. The mother of a 12-year-old girl described similar behavior when her child was talking with her older sister and stated that as a result of her daughter repeating information to her sibling, she and the sibling "start arguing." The mother of another 12-year-old girl indicated that the behavior occurs when the child is talking with family and described the situation as the child telling family when "another child is on punishment."

Two of the seven mothers described *Excessive Talking*. Both mothers observed this communication behavior in sibling-child interactions and mother-child or parent-child interactions. The mother of a 12-year-old girl made the following statement: "I don't know if she's so excited or when she just talks and when it comes out it just comes out and when it comes out it just keep going." The mother of a 10-year-old boy recounted that her son will continually describe an event from his day, even after the family has listened and asked him follow-up questions about the event.

Two of the seven mothers observed *Difficulty with Abstract Language*. This communication behavior was described primarily as the child having trouble understanding jokes during sibling-child and family-child interactions. For example, the mother of a 12-year-old girl stated:

If we say a joke she has to go and, like if it's a longer joke she has to go and, evaluate it in her mind then she'll come back like 5 minutes later like, "yeah I got it," and we're like well everyone else got it like 5 minutes ago.

Two of the seven mothers observed *Self-absorbed Behavior* while the child interacted with siblings. For example, the mother of a 10-year-old boy explained that when talking with his older brother, she observed the child bringing the conversation back to his own interests rather than asking the brother about his interests.

Two of the seven mothers observed *Provides Inaccurate Information*. The mother of a 12-year old girl explained that her daughter sometimes misinterprets information provided by the parent. The child repeats this inaccurate information to siblings. For example, the mother described a situation in which she told her daughter that she could have ice-cream. After hearing this, the child inaccurately told her siblings they too could have ice-cream. The mother of a 10-year-old boy stated that when the child retells her events from his day “that there is some exaggeration that goes on... he’ll just um have descriptions of things that that are not completely accurate.”

Theme 2: **Desirable Future Things and Activities** were primarily described as home environment contexts in which the child was anticipating a desirable event including receiving a treat or presents, going out to dinner, or attending a sleepover. These contexts were described by four of the ten mothers and one pragmatic deficit theme occurred: *Repeatedly Seeking Assurance*. More specifically, three of the mothers described their child’s communication behavior as repeatedly asking about the future thing or activity. For example, the mother of a 10-year-old boy explained:

He will every day ask me what’s going to be for dinner, like when he gets home from school...and I can tell him and even later talk about what we’re going to be having and then later when his dad gets home he will come in and kind of ask again what we’re having for dinner. But he knows what we’re having for dinner. Usually he’s trying to get

us to go out to dinner, like he's trying to manipulate the situation a little but he will continue to ask those questions like that almost if he doesn't get the answer that he wants he'll keep asking questions.

The mother of a 12-year-old girl explained her child's behavior as frequent reminding. This mother stated:

She does it a lot when she tries to remind me of something, like for instance that she wants to go and have an overnight in two weeks. Like she'll tell me two weeks ahead of time, which is the house rule, then she'll tell me multiple times during that two weeks.

Theme 3: **Unexpected/Different Situations** were described as events that were different from the child's or the family's home routine. These events included the child being involved in a new family activity/game, not getting a preferred item, or a change in family plans. One pragmatic deficit theme with two subthemes occurred in this home context: *Overreaction: Overreaction Nonverbal Behavior* and *Overreaction Verbal-Aggressive/Defiant*. Three of the ten mothers described *Overreaction* in this home context; however, two mothers primarily observed *Overreaction Nonverbal Behavior* while one observed *Overreaction Verbal-Aggressive/Defiant*. One mother described the events in her home as "minor;" however, all three mothers described overreaction behaviors during these events. Two mothers observed nonverbal behaviors (e.g. crying and screaming) while one mother described the child as verbalizing his reluctance to participate. The mother of a 12-year-old girl provided the following example of an

**Unexpected/Different Situation** where she observed *Overreaction Nonverbal Behaviors*:

One day a couple of weeks ago, we were all getting out of the car at the mall and I had to I shut the door with my key and it locked automatically, and she hadn't got out of the car yet and instead of thinking well I can just unlock the door she went into full meltdown.

Like was screaming and crying instead of thinking, oh well I can just unlock the door and get out.

The mother of a 6-year-old boy offered the following example of an **Unexpected/Different Situation** where she observed *Overreaction Verbal-Aggressive/Defiant* behaviors, “If he’s not familiar with the activity that’s gonna happen, he won’t do it. He’ll usually ask ‘Can somebody else do it first?’ to watch them and then he’ll do it.”

Theme 4: **Undesirable Future Activities** included statements where the child was with his/her mother or family and was awaiting an undesirable event or activity, including going to work or bed. One pragmatic deficit theme occurred in this context: *Excessive Talking*. Two of the ten mothers described their child as exhibiting this communication behavior as a means to avoiding the undesired activity. The mother of a 12-year-old girl described her daughter as finding “anything in the world to talk about” as long as it delays the daughter going to her babysitting job.

Theme 5: **Activities** was comprised of the mothers’ statements that described interacting with their child while the child was actively involved in a preferred task or favorite activity, like playing with cars or Legos. One pragmatic deficit theme occurred in this context: *Excessive Ignoring*. Two of the ten mothers described **Activities** as a home context in which their child excessively ignored the mother and/or other family members. For example, the mother of a 6-year-old boy explained that her child would ignore her and/or siblings until he was finished with the activity.

Theme 6: **Disagreement Among Siblings** was a home environment context described by two of the ten mothers. One pragmatic deficit theme and two subthemes occurred in this context: *Overreaction: Overreaction Nonverbal Behaviors and Overreaction Verbal-Aggressive/Defiant*.

One mother described her 12-year-old daughter as exhibiting *Overreaction Nonverbal Behaviors*. This mother described her daughter's behavior as going to her room, or getting quiet, or having a temper tantrum. The mother of a 7-year-old boy observed *Overreaction Verbal-Aggressive/Defiant* behavior. She stated, "he'll take it to the next level, say things that are hurtful, um, silly things like calling his brother fat...just hurting peoples' feelings unnecessarily."

These six home contexts can be organized into two broader categories: routine and less familiar/novel home contexts. Routine home contexts included **Talking with Family** and **Disagreement among Siblings**. These contexts were comprised of routine social interactions with family and were described by mothers as situations such as the child retelling events from his/her day, a movie he/she had watched, or a book he/she was reading. Novel home contexts were less focused on mother-child communication and more event/activity-based. These contexts included **Desirable Future Things or Activities**, **Unexpected/Different Situations**, **Undesirable Future Activities**, and **Activities**. Mothers described these contexts as situations such as the child engaging in solitary play, a new family game/activity, or anticipating a desirable event like going to a sleepover or an undesirable event like going to bed.

Within the six home contexts, ten pragmatic deficit themes emerged. The themes tended to differ between difficulty with interpreting and using language versus difficulty with social behavior. Difficulty with language was evident within the pragmatic deficit themes of *Difficulty with Cohesion/Coherence* and *Difficulty with Abstract Language*. These language-based pragmatic deficit themes were described as occurring only during the routine home context of **Talking with Family**. In contrast, social behavior-based pragmatic deficit themes occurred in both routine and novel home contexts. These themes included *Repeating Information*, *Excessive*

*Talking, Self-absorbed Behaviors, Repeatedly Seeking Assurance, Overreaction: Nonverbal Behaviors* and *Verbal- Aggressive/Defiant, Excessive Ignoring*. It was difficult to categorize the communication behaviors described in the theme *Provides Inaccurate Information* because mothers reported communication behaviors that could be explained by failure to understand the language or confabulation. For example, the mother of a 12-year-old girl reported that her daughter misinterpreted the mother's message and, as a result, provided inaccurate information to siblings. In this example, the mother told the daughter that the mother and father were going shopping, and the child told her siblings that she was going too.

### *3.2.2. Outside of the home social contexts*

Although the aim of the present study was to identify home environment contexts made difficult due to the child's pragmatics, 6 of the mothers expressed concern regarding pragmatic skills, in at least one situation, outside of the home environment. These outside of the home contexts emerged because, during the interviews, these mothers stated that some of the communication deficit items examined by the CCC-2 were not observed at home or, if they were observed at home, they were perceived as being less problematic or occurring less often than in other social contexts. Therefore, one step of the context analysis involved categorizing mothers' statements describing the child's communication behaviors outside of the home. Outside of the home environment was defined as situations in or outside of the home in which the child is interacting with or in the presence of family members but also non-family members (e.g. a family friend). Listed in order of most frequently occurring to least occurring, these contexts were: **In the Presence of Other Children, In The Presence of Family with Others, Unexpected/Different Situations, School, and Attending Organized/Conventional Events.**

Because this step of the analysis was not the study’s primary goal, not all of the mothers’ statements describing the child’s communication behaviors in these contexts were confirmed as being different from peers, siblings, or the child’s functioning prior to the TBI. Therefore, it is possible that some of the communication behaviors observed in these contexts are no different than what children without TBI exhibit in these contexts. Consistent with the home environment context analysis, outside of the home context themes were included in the results if the theme contained the same pragmatic deficit theme(s) for more than one child. A summary of these data are provided in Table 3. For outside of the home contexts with more than one pragmatic deficit theme, the pragmatic deficit themes are listed in order of most frequently observed to least. Some of the outside home contexts and pragmatic deficit themes are illustrated with quotations and/or information from the mothers’ transcripts.

Table 3. Outside of the home social contexts and associated pragmatic deficit themes

Outside of the Home Social Contexts	Pragmatic Deficit Themes	Number of Statements Confirmed
Unexpected/Different Situations	Overreaction Nonverbal Behavior	1 of 2
School	Overreaction Nonverbal Behavior	0 of 1
	Overreaction Verbal-Aggressive/Defiant	1 of 1
In the Presence of Other Children	Reluctance to Interact	0 of 5
	Self-Absorbed Behavior	2 of 2
In the Presence of Others	Reluctance to Interact	2 of 4
Attending Organized/Conventional Events	Other Situational Inappropriateness	2 of 2

Theme 1: **In the Presence of Other Children** were contexts in which the child was interacting with or around other children. Other children were described as friends, classmates, or children unfamiliar to the child with TBI. These contexts were described by six of the ten

mothers and two pragmatic deficit themes occurred: *Reluctance to Interact* and *Self-absorbed Behavior*. Five of the six mothers described *Reluctance to Interact*. For example, the mother of a 12-year-old girl made the following comment when describing her child around a group of unfamiliar children, “She’ll cling to that person she does know and she just acts kind of awkward. It looks like she doesn't know what to do with herself.” The mother of a 10-year-old girl stated that her daughter “barely talks to anyone in her class.”

Two of the six mothers described *Self-absorbed Behavior*. The mother of a 10-year-old boy made the following statement while describing her son interacting with other children, “it’s true that he is a little bit more self-absorbed than really being more interested in what the other kid is doing or saying.” The mother of a 10-year-old girl recalled her daughter cutting a friend off and walking away when the friend was talking about her own interests.

Theme 2: **In the Presence of Others** was an outside of the home context where both family members and non-family adults were present. This theme included situations like attending church, talking with neighbors in the yard, and interacting with unfamiliar adults. Distinctions were made between interactions with non-family people/adults and children because the social dynamics of these interactions differ. Four of the ten mothers described contexts where others were present and one pragmatic deficit theme occurred: *Reluctance to Interact*. For example, the mother of a 10-year-old girl explained, “On Sunday when we’re at church, she can sing in the choir with familiar, in a group, but when it’s time to branch out... She a little uncomfortable, you know she couldn’t adapt as much... she’d be quiet.”

Theme 3: **Unexpected/Different Situations** outside of the home included situations such as a coach introducing a new scrimmage technique at practice or the family traveling on an airplane. These contexts were described by two of the ten mothers and one pragmatic deficit

theme occurred: *Overreaction*. Both mothers observed *Overreaction Nonverbal Behaviors*. The mother of a 10-year-old boy observed her son sitting on the sideline and not participating at practice when the coach changed the scrimmage drill at practice. The mother of a 10-year-old girl described her daughter as having a tantrum on an airplane when only passengers in first class received ice cream.

Theme 4: **School** was another outside of the home context in which two of the ten mothers described the pragmatic deficit theme of *Overreaction*. The mother of a 7-year-old boy described her son as exhibiting both *Overreaction Nonverbal* and *Verbal-Aggressive/Defiant* behavior at school. She stated the following:

He has a short fuse and he acts before he thinks about it. Sometimes he speaks or acts before he thinks about it. So, um, I think that gets him in trouble more often than not with his friends and at school.

Similarly, the mother of a 12-year-old girl suggested that her daughter demonstrated *Overreaction Nonverbal Behaviors* which she described as “immature behavior” like “throwing her notebook on the floor” when “she couldn’t do something.”

Theme 5: **Attending Organized/Conventional Events** involved attending church, a funeral, and organized after school activities. Two of the ten mothers described these contexts and one pragmatic deficit theme occurred: *Other Situational Inappropriateness*. Communication behaviors in this theme included hysterically laughing, blurting something out, and making jokes. The mother of a 10-year-old boy observed her son making jokes and blurting out comments while attending church and boy scouts. The mother of a 12-year-old girl described her daughter as “hysterically laughing” while attending a funeral.

The five outside of the home contexts can be organized into two broader categories: standard and less predictable outside of the home contexts. Standard outside of the home contexts required the child's communication and behavior to conform with social norms (e.g. school, church, and other organized events). These outside of the home contexts included **School, and Attending Organized/Conventional Events**. The social norms of these standard contexts likely served as a basis for the mother's expectations of the child's communication and behavior and, thus deviations from these norms would be perceived as problematic. Less predictable contexts included **In the Presence of Other Children, In the Presence of Others** and **Unexpected/Different Situations**. **Unexpected/Different Situations** outside of the home were similar to the situations occurring at home in that they were new events/activities. Mothers described **In the Presence of Other Children** and **In the Presence of Others** as situations such as the child interacting with other children and/or adults they did not know well or classmates. The unfamiliarity with the situation and/or communication partner in these three contexts may have made these contexts less predictable for the child and, therefore, the child was less competent at effectively communicating.

Within the five outside the home contexts, five pragmatic deficit themes emerged. All of the themes revealed difficulty with social behavior and included *Reluctance to Interact, Self-absorbed Behaviors, Overreaction: Nonverbal Behaviors* and *Verbal- Aggressive/Defiant*, and *Other Situation Inappropriateness*.

### 3.2.3. Comparison of home and outside of the home contexts

A comparison of the home and outside of the home environments revealed only one common social context: **Unexpected/Different Situations**. The pragmatic deficit theme *Overreaction* occurred in **Unexpected/Different Situations** both in the home and outside of the

home. Three pragmatic deficit themes that emerged in both home and outside of the home contexts were *Overreaction Nonverbal Behaviors* and *Verbal Aggressive/Defiant*, and *Self-absorbed Behavior*. The themes that occurred both inside and outside of the home were primarily those indicating difficulty with social behavior.

Examination of the differences between the home and outside of the home contexts, we found that the language-based themes only occurred in the home context of **Talking with Family**. *Reluctance to Interact* was the only theme that occurred outside of the home that did not also occur at home. While **Talking with Family** at home, some mothers observed difficulty with language (cohesion/coherence and abstract language), but also describe their child as *Excessively Talking* and displaying other social behavior problems including *Self-absorbed Behaviors*. In comparison, while **In the Presence of Other Children** and **In the Presence of Others** outside-the-home, some children were described as reluctant to engage in conversation/interact with *Self-absorbed Behaviors* only occurring when the child was interacting with another child. Moreover, *Overreaction Nonverbal Behaviors* were observed during **Unexpected/Different Situations** in both contexts while only **Verbal-Aggressive/Defiant** behaviors occurred at home.

Differences in the pragmatic deficit themes that emerged in home versus outside of the home contexts were frequently related to the mother's expectations and the child's level of comfort in the particular context. Home social contexts were described as being less demanding and more accepting for the child and, therefore, communication behaviors were often described as less problematic. However, it is possible that the mothers may have knowingly or unknowingly developed strategies that compensate for the child's pragmatic deficits and promote

successful interactions at home. Also, the child may be more confident and appear more competent when interacting in a comfortable environment.

Outside of the home social interactions are typically less routine and may require advanced social skills. Chapman et al. (2010) suggested that “the extent of social problems may not be apparent until social expectations increase and the child is in situations that require well-developed social skills” (Chapman et al., 2010, p. 55). During outside of the home interactions, a child’s pragmatic deficits may be more apparent to the mother because these contexts provide an opportunity to compare the child’s social behavior with peers. Furthermore, a mother may not be directly involved in the child’s interactions outside of the home or, because they are in public, may have less control over the child’s behavior. For these reasons, the child’s pragmatic deficits may be more apparent in social contexts outside of the home and, ultimately more troublesome for mothers.

### *3.3. Pragmatic Deficit Analysis*

Communication behaviors observed by the mothers were reviewed without regard to the contexts in which they were observed in order to develop additional emergent pragmatic deficit themes. The expectation was that communication behaviors would either cluster revealing new pragmatic deficit themes and/or not all pragmatic deficit themes would be captured in the context analysis. No new pragmatic deficit patterns or themes emerged. In other words, all pragmatic deficit themes (i.e. communication behaviors observed by more than one mother) were captured in the context analysis.

### *3.4. Implications*

A major implication of this study is that mothers described few home and outside the home environments as presenting social challenges in which mothers observed pragmatic

deficits. One mother could not identify any pragmatic deficits; of the eleven total home and outside contexts described as challenging, only five contexts were described as a challenge by more than two mothers. Because of the limited number of consistent concerns, home and outside of the home contexts were considered a theme if at least two mothers described it. Although none of the home or outside of the home contexts were common across all ten mothers, we did find that mothers described six home contexts and five outside of the home contexts in which pragmatic deficits were observed. The home and outside of the home contexts consisted of different pragmatic deficit themes, with only three of ten themes overlapping across environments (home and outside of the home).

This study was one of the first to describe a child's pragmatic deficits in the context of interacting with others in and outside of the home; however, a number of this study's pragmatic deficit themes are consistent with findings from other quantitative studies examining children's pragmatics after TBI. The pragmatic deficit theme *Difficulty with Abstract Language* is consistent with pragmatic research using standardized assessments to assess comprehension of language in social situations (Anderson et al., 2013; Dennis & Barnes, 1990; Dennis et al., 2001; McDonald et al., 2013; Ryan et al., 2015; Turkstra et al., 2001). Some mothers in this study also described *Difficulty with Cohesion/Coherence*, which has been examined in previous discourse research, but the results have been variable. A majority of narrative discourse research has not identified difficulty with cohesion after childhood TBI (Chapman et al., 1998; Ewing-Cobbs et al., 1998; Van Leer & Turkstra, 1999), while difficulty with coherence has been more consistently reported (Chapman et al. 1992; Chapman et al., 1998; Chapman et al., 2006; Hay & Moran, 2005). Not all studies have found differences in coherence between adolescents with TBI and uninjured peers (Van Leer & Turkstra, 1999). Congruencies between this study's

themes and pragmatic deficits identified in previous pragmatic research are important because they suggest that some of the deficits affecting a child's ability to effectively communicate at home can be measured with standardized and discourse assessments. However, many of the pragmatic deficit themes identified in this study could not be easily captured without observation of the child in a naturalistic setting and/or parent report.

The feedback elicited in this study revealed that mothers more frequently observed their child demonstrating social behavior problems rather than language-based social deficits. Communication has been identified as a social behavior problem in some research that specifically addresses communication (Anderson et al., 2006; Fletcher et al., 1990; Max et al., 1998; Moran et al., 2015). However, other behavioral and social outcomes studies have identified adaptive, externalizing, and/or internalizing behavior problems after TBI (e.g. Catroppa et al., 2012; Chapman et al., 2010; Ganesalingam et al., 2006), which could also be classified as communication. For instance, studies have described withdrawn behavior or poor conduct after childhood TBI (Fletcher et al., 1990; Ganesalingam et al., 2006; Yeates et al., 2013) which were captured in our themes of *Reluctance to Interact*, *Excessive Ignoring* (withdrawn) and *Repeating Information*, *Overreaction Nonverbal Behavior* and *Verbal Aggressive/Defiant* (poor conduct).

Ylvisaker and Feeney (1998) explained that undesirable social behaviors after TBI can serve as communication. Even a lack of behavior (e.g. ignoring or being quiet) can be considered communication. Undesirable social behaviors typically communicate a social desire that is either access-motivated or escape-motivated (O'Neil, Horner, Albin, Storey, & Sprague, 1990; Ylvisaker & Feeney, 1998). Some pragmatic deficit themes found in our study (e.g. *Repeating Information* in the home context of **Desirable Future Things or Activities**) reveal access-

motivated undesirable social behaviors while other themes (e.g. *Overreaction: Nonverbal Behaviors* and *Verbal-Aggressive/Defiant* in the home context **Unexpected/Different Situations**) show escape-motivated behaviors. These themes indicate that ineffective communication may be displayed as social behavior problems as suggested by Ylvisaker and Feeney (1998).

The communication behaviors observed in the home and outside of the home contexts in this study appear to be similar than those that may be exhibited by healthy children of the same age. Precautionary methods were used to ensure that communication behaviors were included in the analysis only if they were confirmed by the mothers as different from other children, inconsistent with the child's pre-TBI communication functioning, or the mother did not know whether they were related to the child's TBI or were age-appropriate. Because these questions were not asked for the communication behaviors observed in outside of the home contexts, this should be considered when interpreting the outside of the home context results. Comparison of the qualitative interview results to other data sources corroborate the overall interview findings that the children in this study exhibited few problematic communication behaviors in the home and outside of the home social contexts. First, six of the children in this study exhibited average language, pragmatics, and general intellect as evidenced on standardized assessments. Next, eight of the children exhibited average executive function behavior as evidenced on a standard parent questionnaire. Lastly, all mothers rated their family's *Communication* and *General Functioning* as adequate on the FAD.

### 3.5. *Limitations and Future Research*

This study's findings are restricted by several methodological limitations. First, recruitment was restricted to a convenience sample. Nine of the ten participants were recruited

from pediatric hospitals, had participated in previous pTBI research, and volunteered to participate in this study. Therefore, the number and characteristics of the participants in this study represents a small subset of the population of children with moderate to severe TBI.

Second, the children were not required to present with pragmatic deficits nor were parents required to have expressed concern regarding the child's communication. Thus the results of this study may have been more robust had the CCC-2 been used as a communication screener to identify parents that rated their child's communication as below average. Those parents could have been asked follow-up questions related to the social contexts in which pragmatic deficits were observed in order to further explore how pragmatic deficits effect social interactions in the home environment. Using a screening to assure that communication concerns existed may have resulted in richer social context and pragmatic deficit theme results.

Third, the limited number of pragmatic deficits described and the limited social contexts may be explained by age, cultural, and other issues that may affect the mother's perceptions of her child's pragmatics. The varied child ages may have restricted this study's findings because the types and frequency of interactions with the mother and other individuals may differ by age (Raffaelli & Duckett, 1989). A 12-year-old child is likely to be involved in more complex social interactions than a 6 or 7-year old child because they are more socially independent and navigate more social relationships (Nippold, 1993). Additionally, cultural issues like ethnicity that could affect a mothers' perceptions of her child's pragmatics (Paul, 2007) were not accounted for.

Finally, some of the methods employed in this study complicated the sorting of typical and atypical child behavior. For example, part of the difficulty distinguishing between typical and atypical communication behaviors was due to some of the wording on the CCC-2. Based on the ratings provided and/or the communication behaviors described, the wording on certain

CCC-2 items appeared confusing to some of the mothers. That is, certain communication deficit items were interpreted by some mothers as referring to communication skills. As examples, some mothers required clarification that the CCC-2 item probing for the child's use of unusual words was not related to the child having a large, age-appropriate vocabulary. Some mothers required clarification that the CCC-2 item probing whether the child had restricted interests was asking for more distinguishing behaviors than age-appropriate interests like frequently playing videogames or being on the computer. The CCC-2's frequency rating scale was the most challenging for differentiating between typical and atypical communication behaviors since all children are likely to display problematic communication behaviors some of the time.

Because the mothers in this study often described their child's pragmatic deficits as being evident during interactions with other individuals, future research should elicit feedback on the child's pragmatic skills from multiple informants to provide a more complete representation of the child's pragmatic skills across environments like home and school. Information from multiple informants would also protect against any biases one informant may have.

Additionally, future research should examine the child's perceptions of his/her own pragmatic skills and the impact these perceptions have on the ability to effectively interact with others.

Although few studies have elicited a child's/adolescent's perceptions of their social skills, results suggest that children can provide insightful information regarding their social skills and social interactions (Gauvin-Lepage & Lefebvre, 2010; Ross, McMillan, Kelly, Sumpter, & Dorris, 2011).

### *3.6. Conclusion*

The mothers that participated in this study primarily described their child with TBI as exhibiting average or near average pragmatic skills at home. Although this was a small study of

ten mothers, these results are promising and offer preliminary evidence that some children with moderate to severe TBI demonstrate recovery of the communication skills needed for effective social interactions in the home environment. While the results of this study are encouraging, several home and outside of the home contexts emerged for which pragmatic deficit themes were identified. A number of this study's pragmatic deficit themes are consistent with findings from quantitative studies examining children's pragmatics and/or social behavior. The results of this study expanded on prior investigations by identifying the home and outside of the home contexts in which pragmatic deficits may occur after TBI.

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## Study 2

### Pragmatic Skills after Childhood Traumatic Brain in the Context of Parent-Child Interactions

#### **Abstract**

The purpose of this study was to characterize pragmatic communication between children with traumatic brain injury (TBI) and their parent.

A descriptive research design was used to characterize parent-child pragmatic behaviors during a conversation in the home. Participants were ten mothers and their child with TBI (dyads). Children were ages 6-12 years, had sustained a moderate to severe TBI, and were more than one-year post-injury. During the home visit, children completed language, pragmatics, and general intellect assessments. Mothers completed questionnaires on family functioning and the child's executive function behaviors. Mother-child conversations were recorded then analyzed using exchange structure analysis.

Child assessments showed six of the children demonstrated average to near average language, pragmatics, and general intellect. All dyads exhibited positive communication while conversing at home. The mothers asked a higher proportion of questions that placed the child in the position to give information. Children conversed by responding to their mothers' questions and by spontaneously giving other information. Both mothers and children collaborated to repair communication breakdowns and negotiate meaning when the conversational content was ambiguous. Although all dyads exhibited positive communication, the types and proportion of these behaviors varied in ways that appeared in some cases to be related to the child's communication and cognitive strengths and challenges. The results of this study showed that mothers exhibited supportive communication strategies regardless of their child's pragmatic behaviors.

## **Highlights**

- Mother-child dyads primarily exhibited a mother led, question-answer communication pattern.
- The types and proportion of positive mother-child pragmatic behaviors varied in ways that appeared in some cases to be related to the child's communication and cognitive strengths and challenges.
- The results of this study showed that mothers exhibited supportive communication strategies regardless of their child's pragmatic behaviors.

## **1. Introduction**

Children with traumatic brain injury (TBI) often demonstrate long-term deficits in the social communication skills needed to establish relationships and thrive in social environments (Anderson & Beauchamp, 2010; Catroppa & Anderson, 2004; Dennis & Barnes, 1990; Dennis et al., 2013; McDonald et al., 2013; Turkstra, McDonald, & DePompei, 2001; Yeates et al., 2004). Consequently, pediatric TBI (pTBI) can result in social skills impairments such as reduced participation in school, family, and community socialization activities (Bedell & Dumas, 2004;) and ineffective interactions with peers (Gauvin-Lepage & Lefebvre, 2010; Yeates et al., 2013). Social communication competence depends on a complex interplay of social cognitive, language, and pragmatic skills to produce socially appropriate communication across social contexts (ASHA, n.d.; Landa, 2005; McDonald, Turkstra, & Togher, 2012). Pragmatic skills like speaking on topic, speaking in turn, and making relevant contributions to a conversation enable an individual to use socially appropriate communication and have been shown to be especially important for social competence after childhood TBI (Yeates et al., 2004).

Pragmatic deficits after TBI have been quantified using spoken discourse analysis. Discourse analysis is a non-standardized assessment method that analyzes an individual's communication within the context of everyday events such as telling a story (narrative) or talking to a friend (conversation). Narrative discourse research has shown that the narratives of children and adolescents with TBI are often less informative, (Biddle, McCabe, Bliss, 1996; Chapman et al, 1992; Chapman, Levin, Wanek, Weyrauch, Kufera, 1998; Crowe, Anderson, Barton, Bahl, & Catroppa, 2014), less organized (Chapman et al, 1992; Chapman et al., 1998), and less efficient (Biddle et al., 1996; Chapman et al, 1992; Chapman et al., 1998,)

Conversational discourse analyses indicate that children with TBI produce variable syntactic and semantic abilities and demonstrate poor topic maintenance and inappropriate responses than uninjured peers (Campbell & Dollaghan, 1990; Morse et al., 1999).

Discourse analysis is an effective assessment method for identifying pragmatic deficits after childhood TBI; however, few studies have used this method to examine the pragmatics of both the child and the child's communication partner (e.g. peer, parent, teacher) while engaged in conversation. Pragmatic competence is dependent on a variety of pragmatic skills including: using language to express a variety of communication functions, using the social context to infer the other person(s) communicative intent, and modifying verbal and nonverbal communication based on the communication partner's needs and social norms (Landa, 2005; McDonald et al., 2012; Paul, 2007). Focusing on both the child's and the partner's communication allows researchers to assess the child's pragmatic skills while examining how the partner communicates, both verbally and nonverbally, (conversational strategies) with the child after TBI.

Conversational discourse studies with adults have shown that communication partners communicate differently to adults with TBI than to adults without TBI (Togher, Hand, & Code, 1996, 1997; Togher, 2000). Togher, Hand, and Code (1997) examined phone conversations of adults with and without TBI communicating with various communication partners to identify differences in how information was communicated to the adults with TBI. The partners included individuals of varying authority and familiarity. The conversations were analyzed for frequency and quantity of information given and/or asked for of both adults with and without TBI. In addition to the partner's use of negotiating strategies such as checking for clarification (Togher et al., 1997). Of significance, conversational analysis revealed that mothers, in particular, provided

and asked for less unique information (e.g. asked questions the mothers already knew the answer to) of the adult with TBI (Togher et al., 1997).

For a child, interactions with a parent/caregiver provide opportunities to practice and learn social communication skills (Tomasello, 1992). Cognitive and language (semantic, syntax, and pragmatic) developmental research stresses the importance of parent-child interactions (e.g. conversation or play) for developing a child's pragmatic and social skills (Landry, Smith, Swank, Assel, & Vallet, 2001; Tamis-LeMonda et al., 2001). Parents, as routine communication partners, can provide critical support to a child's pragmatic development by employing various communicative strategies like focusing on child-selected conversation topics, maintaining balanced participation, and/or providing the child with responsive interactions, including verbal and nonverbal cues that demonstrate the parent's attentiveness in the parent-child interaction (Landry et al., 2001; Tamis-LeMonda et al., 2001; Tannock & Girolametto, 1992).

In contrast, a child's pragmatic and social skills development can be hindered by parent-child interactions which routinely restrict or direct the child's participation (Landry et al., 2001; Tamis-LeMonda et al., 2001; Tannock & Girolametto, 1992). Child language intervention research has found that training caregivers/parents to employ supportive communication strategies with children, ages ranging from infants to 10 years, can improve a child's pragmatic skills including verbal initiations (Allen & Marshall, 2011) and turn-taking (Tannock & Girolametto, 1992).

Parent-child interactions have been shown to be equally important for the recovery of a child's social behavior after TBI. Raj et al. (2014) observed parents resolving a conflict with adolescents (ages 12-17 years) 3.5 months after sustaining a TBI. Parent-adolescent interactions were rated for the parent's use of a warm or negative interaction style and supportive

communication strategies. Parents also completed a standardized questionnaire assessing the adolescent's emotional and behavioral functioning in social environments (social behavior). Results indicated that the adolescents of parents who employed supportive communication strategies, including expressing their views in a clear and nonthreatening manner and listening to and validating the adolescents' views, demonstrated fewer social behavior problems after TBI (Raj et al. 2014).

However, a child's social behavior after TBI can affect the parent's interaction style and communication strategies (Wade et al., 2008). Wade et al. (2008) compared parent-child (ages 3 to 7 years) play and structured interactions among children with TBI and children with orthopedic injury (OI) during the initial months of the child's recovery. Interactions were observed for frequency of parent restrictions or discipline, directives and providing cognitive supports for the child's behaviors. Using 5-point scales, they rated parental interaction style and the child's social behavior including eye contact and use of verbal and nonverbal language (pragmatics) (Wade et al., 2008). Observational analyses revealed that parents responded less warmly to the children with TBI than the children with OI and used more directives with children with moderate and severe TBI. These differences were found to be related, in part, to the children with TBI exhibiting poorer self-regulation as reflected in more social behavior problems (Wade et al., 2008).

Although Wade et al. (2008) found differences in parent-child interactions during the initial weeks post-TBI compared to parent-child interactions post-OI, no significant differences were found between dyads of parents and adolescents with TBI and OI engaging in pleasant conversation and resolving a conflict 4.25 years post-injury (Wade et al., 2003). Using 5-point rating scales, pleasant and conflict conversations were rated for parent and adolescent

supportive/criticism, dominance, and engagement behaviors. Parent and adolescent problem solving behaviors were also rated while resolving a conflict, and a rating of parent-adolescent warmth was generated from observing both the pleasant and conflict conversations. These individual rating scales were then combined to create composite scores. The composite scores included an adolescent engagement/dominance total score, a parent-adolescent criticism/coldness total score, and problem solving total score. Wade et al. (2003) suggested that the lack of parent-adolescent interactional differences may be the result of adverse parent-adolescent interactions after both TBI and OI since 46% of the dyads were rated as displaying high levels of criticism and conflict.

In contrast to Wade et al. (2003), Togher et al. (1997) and Wade et al. (2008) showed that pragmatic deficits in children and adults with TBI elicited restrictive/directive behavior from communication partners, especially parents. For children, these results are troubling since routine, restrictive/directive parent-child interactions can negatively affect the development of a child's social skills (Landry et al., 2001; Tamis-LeMonda et al., 2001; Tannock & Girolametto, 1992). For a child with TBI, perpetually directive parent-child interactions may lead to the development of ineffective communication routines because the child does not have the opportunities to practice and learn the pragmatic behaviors needed for effective social communication (Tomasello, 1992; Ylvisaker & Feeney, 1998).

Supportive parent-child interactions are important for a child's pragmatic and social development (Landry et al., 2001; Tamis-LeMonda et al., 2001) and for social behavior recovery after TBI (Raj et al., 2014; Wade et al., 2011). Therefore, research examining parent and child pragmatic behavior after TBI is needed. Observing the child's and the parent's pragmatic behaviors while communicating at home allows researchers to assess the child's pragmatic skills

in a useful context while examining how the parent is supporting the child's pragmatic development. Analyzing both communication partners' pragmatic behaviors provides insight into their communication strengths and weakness during these interactions. The purpose of this study is to characterize pragmatic communication between children with TBI and their parent. This study will answer two questions: 2a) What communication exchange patterns do parent-child dyads demonstrate when conversing at home? 2b) What conversational moves do parent-child dyads use to exchange information when conversing at home?

## **2. Methods**

A descriptive research design was used to characterize parent-child pragmatic behaviors during conversation. The focus of this descriptive research is to describe observational data related to parent-child pragmatic behaviors in the home environment after TBI.

### *2.1. Participants*

Participants for this study were recruited from one pediatric hospital in Ohio and one in Georgia with the approval of the appropriate research ethics committees. Research and clinical employees at these hospitals assisted with recruitment. Participants were specifically recruited to include children with TBI and their parent or primary caregiver. If a parent expressed interest in participating in the study, a hospital employee forwarded the parent's contact information to the principal investigator (PI) or provided the PI's contact information to the parent. The PI then spoke with the parent to confirm interest. No parent that spoke with the PI declined to participate in the study.

Each child selected for this study met the following criteria: 1) 6-12 years old at the time of the study, 2) more than 1-year post-injury, 3) sustained a moderate to severe TBI (moderate TBI was categorized as a Glasgow Coma Scale (GCS) score post-resuscitation of 9-12 or 13-15

with abnormal imaging or other evidence of neurological impairment while severe TBI was categorized as a GCS of 8 or less), 4) no history of developmental delay. Further, per parent report, each child had normal hearing, exhibited intelligible speech (the parent could understand at least 80% of the child's speech during conversation.), was capable of following single-step directions, and spoke English as their primary language. Lastly, each child's parent had expressed concern regarding the child's functioning (e.g. academics, behavior, communication, etc.) post-TBI. Children were excluded if the TBI was not accidental. Parent consent and child assent forms were mailed for the participants to review. Signed forms were collected during a home visit.

Ten children, meeting the aforementioned criteria, and each child's mother (mother-child dyads) were the study participants. Four of the dyads were mother and son and six of the dyads were mother and daughter. Although all participants reported English as the primary language, one mother reported speaking a second language in the home. Participant characteristics (mothers and children) are summarized in Table 1. Table 2 lists the pragmatic deficit themes for each child that emerged during interviews with the children's mothers that were conducted as part of another study. As part of the interview, mothers completed the *Children's Communication Checklist, Second Edition* (CCC-2) (Bishop, 2003). The CCC-2 has been shown to be a valid and reliable communication screening tool for children (Bishop, 2003). The children's pragmatic deficit themes are presented in this study as a means to describe the child's communication in the home. Nine of the ten participants previously participated in at least one other TBI research project at the aforementioned pediatric hospitals. Each mother was given a \$50 department store gift card for their participation in this study.

Table 1. Participant characteristics

Participant	Moderate TBI	Severe TBI
<b>Child:</b>		
Female	5	1
Male	2	2
Age at time of home visit <i>M</i> range	10;0 (6;8 to 12;7)	9;4 (7;5 to 10;6)
Age at time of injury <i>M</i> range	4;0 (0 to 7;8)	4;2 (2;5 to 7;1)
Amount of time since TBI <i>M</i> range	6;3 (2;2 to 10;1)	4;8 (3;4 to 7;6)
Admitted to Rehabilitation	0	2
Had an Individualized Education Program (IEP) with the eligibility criteria of speech-language and/or communication disorder since the injury	2	1
<b>Parent:</b>		
High school diploma/General Education Development	2	0
Some college	0	1
Associate's or Bachelor's degree	2	1
Graduate Degree	3	1
Household income:		
Slightly above or below the U.S. median	2	1
Substantially above the U.S. median	3	1
Substantially below the U.S. median	2	1

Note. According to a United States' census report, the median household income in the United States in 2014 was \$53, 657 (DeNavas-Waltz & Proctor, 2015).

Table 2. Child pragmatic deficit themes

	Pragmatic Deficit Themes
Child 1	Overreaction verbal-aggressive/defiant
Child 2	Overreaction nonverbal, Repeatedly seeking assurance, Provides inaccurate information, Excessive talking, Difficulty with cohesion/coherence, Repeating information, and Difficulty with abstract language
Child 3	Difficulty with abstract language
Child 4	Excessive talking, Self-absorbed behavior, Repeating information, Ignoring, Overreaction nonverbal, Overreaction verbal-aggressive/defiant
Child 5	Repeatedly seeking assurance, Difficulty with cohesion/coherence, and Overreaction nonverbal
Child 6	Difficulty with cohesion/coherence
Child 7	Repeatedly seeking assurance, Excessive talking, Overreaction verbal-aggressive/defiant, Overreaction nonverbal, Difficulty with cohesion/coherence, Repeating information, Self-absorbed behavior, and Provides inaccurate information
Child 8	No pragmatic deficits reported
Child 9	Difficulty with cohesion/coherence and Difficulty with abstract language
Child 10	Overreaction verbal-aggressive/defiant and Repeatedly seeking assurance

## 2.2. Procedure

Child assessments, parent questionnaires, and parent-child conversations (data) were completed during the home visit. Although one family preferred to complete these research tasks at the University of Cincinnati Speech, Language, and Hearing Clinic instead of their home, all data collection sessions for the purpose of this study are referred to as “home visits”. Home visits were 90 to 105 minutes in length and consisted of the following procedures:

First, children were given a language and general intellect assessment administered by the PI and/or a research assistant trained by the PI. All children, with the exception of one, were given the *Pragmatic Judgments* subtest from the *Comprehensive Assessment of Spoken Language* (CASL) to assess pragmatic functioning and the *Core Language Subscale* as a measure of general receptive and expressive language abilities (Carrow-Woolfolk, 1999). One

child was given the *CASL Pragmatic Judgement* subtest, as part of a different study, within 12 months from the time the child participated in the present study; therefore, with parent consent, this score was used. The CASL was selected because it is a language measurement tool that is recommended by the Pediatric Common Data Elements (CDE) Traumatic Brain Injury (TBI) working group and contains a pragmatic subtest that can be given separately from the core battery (McCauley et al., 2012). Additionally, all children were given the *Vocabulary* and *Matrix Reasoning* subtests of the *Wechsler Abbreviated Scale of Intelligence, Second Edition* (WASI-II) to determine approximate overall cognitive ability (Wechsler & Zhou, 2001). The WASI-II was selected because it is a recommended intelligence measurement tool by the Pediatric CDE- TBI working group (McCauley et al., 2012). To minimize testing fatigue, children were frequently offered testing breaks.

Next, mothers were given questionnaires requesting information on family functioning, the child's executive functions, and household demographics. Specifically, the parent form of the *Behavioral Rating Inventory of Executive Functions* (BRIEF) was given to assess the child's behavior regulation and metacognition (Gioia, Isquith, Guy, & Kenworthy, 2000). One mother had completed the BRIEF, as part of a different study, within 12 months before the home visit; therefore, with consent, these scores were used. The *General Functioning* and *Communication* scales of the *McMaster Family Assessment Device* (FAD) were given to quantify family functioning and communication style (Epstein, Baldwin, & Bishop, 1983; Miller, Epstein, Bishop, & Keitner, 1985). In addition, a household demographic questionnaire was given to collect information regarding the mother's education, family income, and special education history of the child with TBI (see Table 1).

Last, after completing the questionnaires and assessments, the mother-child dyads (dyad) were invited to engage in conversation in their home environment. During the process of identifying the children's pragmatic deficits at home, contexts in which these deficits occurred were described. Based on this information, eight dyads (3, 4, 5, 6, 7, 8, 9, and 10) were encouraged to discuss a topic related to school, hobbies, and planned events; one of the dyads (dyad 1) was given the context of playing a game; and one (dyad 2) was given the context of having the child retell a story in a book. No other dyads were given a specific conversational context because either one did not emerge or the context that did emerge was not able to be recreated (e.g. disagreement with a sibling). The implications of using different social contexts for two of the dyads are discussed in the limitations section of this paper.

Regardless of conversational topic, all dyads were instructed to converse for 15 minutes in a location the dyads deemed comfortable or typical for their daily social interactions (e.g. sitting on the couch). The dyads' conversations were video-recorded by the PI. In order to minimize distractions and to promote a naturalistic environment, the PI's presence in the room was limited to turning the camera on and off; she was not in the room during the conversation nor did she provide feedback to the dyad regarding their conversation. If the dyads were still conversing when the PI entered the room after 15 minutes, they were permitted to continue with the camera left on. Dyad conversations were, on average, 17.5 minutes in duration and ranged from 15 to 27 minutes.

### *2.3. Data Analysis*

Dyad conversations were orthographically transcribed by five research assistants trained by the PI. Their transcription accuracy was assessed by the PI prior to transcribing the dyads conversations. Transcription methods generally followed the Systematic Analysis of Language

Transcription (SALT) conventions for utterance segmentation, unintelligible segments, mazes, and overlapping speech; however, the SALT coding conventions were not used because language was not being examined (Miller & Iglesias, 2008). On a few occasions, other family members briefly conversed with either the mother or child during their conversation. Only mother-child utterances directed toward each other were included in the transcript and the subsequent analysis.

Transcription of the dyads' conversations consisted of a three-step process. In step one, three of the five research assistants orthographically transcribed only the verbal language from the video recordings. In step two, the remaining two assistants checked the verbal language transcriptions by watching the recordings while simultaneously reading the transcript. During these checks, the assistants added nonverbal language produced in place of verbal language (e.g. head nod) to the transcripts. In step three, the same two assistants as in step two divided the transcripts into communication units (C-unit). A c-unit was defined as an independent clause or an independent clause and its dependent clause (Miller & Iglesias, 2008). Transcription reliability was established for 40% of the conversation transcripts and included two reliability measures: content (verbal and nonverbal language) and c-unit divisions. Content agreement averaged 89% and ranged from 80% to 95% while c-unit agreement averaged 88% and ranged from 87% to 91%. Differences in any transcript reliability measure were discussed until a consensus was reached between the two assistants and the PI. The dyads' transcripts served as the primary data source for analysis; however, portions of the audio-recordings were reviewed as needed to inform the transcript analysis.

After transcription, exchange structure analysis (ESA) was used to analyze the dyads' conversation transcripts. ESA is a discourse analysis method that analyzes the language used

when giving and receiving information, goods, or services (as cited in Togher, n.d., p.2). ESA has been used in previous adult TBI discourse research and has provided insight into how communication partners exchange information with adults with TBI and the effect the communication partner has on the social role of the adult with TBI (Bogart, Togher, Power, & Docking, 2012; Togher, 2000; Togher et al., 1996, 1997; Tu et al., 2011). Consistent with ESA, both the mother's and the child's c-units were coded for communicative function (e.g. giving information, demanding information, etc.), social role (i.e. who controls the information), and how the information was expressed (i.e. conversational moves) (Togher, n.d.). This study followed an ESA manual titled *Interpersonal Analysis from Systemic Functional Linguistics: An Introductory Guide for Speech pathologist* created by Dr. Leanne Togher, an expert in ESA (Togher, n.d.). All ESA procedures, code definitions and terms are from her manual.

Consistent with the ESA manual, the dyads' conversational transcripts, including both mother and child utterances, were first divided into mother and child conversational turns. Conversational turns mainly consisted of c-units (as described above) but were also single words (e.g. "Yeah"). Next, each conversational turn was coded by moves. Moves provide data on social role and how information is expressed.

ESA primarily consist of two types of moves: synoptic and dynamic. Synoptic moves are categorized as either giving or requesting information or giving or receiving an action. Within the category of giving or receiving information, the communication partners' social role is also coded. The person who knows the information is coded as the *primary knower* (K1) and the person who does not know the information is coded as the *secondary knower* (K2) (Togher, n.d.; Togher, et al., 1996, 1997). The *primary knower* (K1) is considered to be in a position of control since they are passing knowledge onto their communication partner (Togher et al., 1997). In

this paper, all ESA code names will be italicized. Dynamic moves are pragmatic behaviors that negotiate, maintain, or challenge the course of the conversation (Togher, n.d.; Togher, 2000; Togher, et al., 1997). For example, backchanneling (e.g. “uh-huh”) maintains the course of the conversation whereas asking for clarifying negotiates the meaning of the conversation (Togher, n.d.). Although ESA primarily consists of synoptic and dynamic moves, a few coded moves are not categorized as either synoptic or dynamic. These codes are referred to here as “miscellaneous” and include communicative functions like greeting the communication partner and calling to the partner by name (Togher, n.d.).

After coding the moves, the sequences of related moves (synoptic, dynamic, and miscellaneous), were grouped as an exchange; for example, a mother asking “How was school?” and a child replying “It was boring.” would be grouped as an *information requesting exchange*. Exchanges provide data on the communicative function of the conversation and, per ESA, are divided into three categories: requesting information (general information and actions), giving information (general information and offering to carry out an action), and teaching/prompting (asking a question the speaker already knows the answer to) (Togher, n.d.).

The dyads’ moves were tallied and the proportions of synoptic, dynamic, and miscellaneous moves as a percentage of total conversational moves (synoptic + dynamic + miscellaneous moves) were calculated for mothers and children individually. These percentages for children and for mothers were averaged across dyads. Exchange structures were also tallied and the proportion of each exchange structure (i.e. information giving, information requesting, and teaching) as a percentage of total exchanges was calculated for mothers and children individually. These percentages for children and for mothers were averaged across dyads.

Moves and exchanges can be analyzed by calculating the number of instances of a specific move code as a proportion of the total number of conversational moves or it can be calculated as the number of occurrences of that move per minute (Togher, n.d.). The proportion of synoptic, dynamic, and miscellaneous moves per total moves and the proportion of exchange structures were selected for this analysis because the research questions were concerned with the quality of the dyads' conversations rather than the number of times they conversed. Specifically, we were interested in analyzing the types of moves and exchanges the dyads used and whether they were used by the mother or child.

Only moves and exchanges performed by four or more different mothers and/or children were included in the descriptive analysis. Of the ten synoptic moves coded in ESA, only three moves were excluded from the analysis. These three moves were performed by one or no mothers and/or children. Of the seventeen dynamic moves coded in ESA, only one move was excluded. This move was performed by two different mothers and/or children. No miscellaneous moves were included in the analysis. Of the six miscellaneous moves coded in ESA, only one move was performed by three different mothers and/or children. All other miscellaneous moves were performed by one or no mothers and/or children. Of the six exchange structures coded in ESA, one was excluded. One child performed the excluded exchange. Because some dynamic moves occur in response to another move (e.g. a mother requesting clarification and the child clarifying) response dynamic moves were included in the analysis regardless of how many different mothers or children used them.

Seven synoptic moves were included in the descriptive analysis: 1. *primary knower* (K1)- moves where the speaker is giving the listener unknown information either spontaneously or in response to a question, 2. *secondary knower* (K2)- moves where the speaker is requesting

unknown information or a listener's response to a question requesting known information, 3. *delayed primary knower* (dK1)- moves where the speaker asks a question for which they already know the answer, 4. *primary knower follow up* (K1f)- moves indicating that the person in the position of primary knower has received and assessed the listener's response, 5. *secondary knower follow up* (K2f)- moves indicating that the person in the position of secondary knower has received and assessed the speaker's message, 6. *Action request* (A2)- moves where the person is requesting or having an action performed for them, and 7. *Action* (A1)- moves where the person is/will conduct the action (Togher, n.d.).

Sixteen dynamic moves were included in the analysis: 1. *Backchannels* (bch)- moves that maintain the topic of conversation either with nonverbal or paralinguistic ("mhm") communication. 2. *Checks* (checks)- moves the speaker performs to ensure that the listener has enough background information to understand what has been said or that a portion of the message is clearly communicated. 3. *Response to check* (rcheck)- the listener's response. 4. *Confirmation requests* (cfrq)- moves to ensure that the listener understood the information given by the speaker. 5. *Response to confirmation request* (rcfrq)- the listener's response. 6. *Confirmation statements* (cf)- moves used by the listener to confirm what the speaker said; however, they are not expressed as a question. 7. *Clarification requests* (clrq)- moves the listener performs to obtain more information about a particular part of the speaker's message. 8. *Response to clarification requests* (rclrq)- the listener's response. 9. *Replay requests* (rprq)- moves performed by the listener when they have completely missed the speaker's meaning. 10. *Response to a replay request* (rrprq)- the listener's response. 11. *Self-corrects* (sc)- moves performed to alter or change a word or phrase that the speaker uttered. 12. *Collocation prompts* (cp)- moves in which the listener provides a word or finishes a portion of the speaker's utterance.

13. *Responses to collocational prompts* (rcp)- the listener's response. 14. *Challenge* (chall)- moves that question the experiential content or the relevance of what the speaker has said or the authority of the speaker to make the statement(s). 15. *Response to challenge* (rchall)- the listener's response. 16. *Justification* (jst)- moves that give a reason for the challenge. 13. *Response to justification* (rjst)- the listener's response (Togher, n.d.).

Five exchange structures were included in the analysis: 1. *Information requesting exchanges*-exchanges in which the speaker is in the role of *secondary knower* (K2) because they are eliciting unknown information from the listener, 2. *Teaching exchanges*-exchanges in which the speaker is in the role of *primary knower* (K1) because they are prompting or asking the listener to provide information the speaker already knows, 3. *Information giving exchanges*-exchanges in which the speaker is in the role of *primary knower* (K1) because they are giving the listener information the listener does not already know, 4. *Provision of action*- exchanges in which one person carries out an action, and 5. *Action requesting*- exchanges where one person requests that another person perform an action (Togher, n.d.).

Although the manual was followed, three coding conventions used for the present study deviated from the manual because of poor inter-rater reliability during training and/or the PI was unable to ascertain how the convention should be used from the ESA manual. These deviations included synoptic and dynamic move definitions and coding symbols. One of the definition deviations was the definitions used for a *backchannel*, a dynamic move, and a K1 or K2 *follow up* (K1f or K2f), synoptic move. The ESA manual defines a *backchannel* as follows: "They are often paralinguistic or nonverbal (e.g. laughter) but usually realized by "mm" or "ahah" (Togher, n.d., p. 9) while the manual defines a K1f or K2f as a move that acknowledges receipt of the communication partner's information such as "yeah" or "OK" (Togher, n.d.). In contrast to a

*backchannel*, which maintains the topic of conversation, K1f and K2f moves signal the end of an exchange (Togher, n.d.). By the manual's definition, a *backchannel* or a K1f or K2f move could be a verbalization such as "yeah" or "OK." However, the present study only coded nonverbal and paralinguistic verbalizations like "mm" as *backchannels* and all verbalizations like "yeah" or "OK" as either a K1f or a K2f.

The last definition deviation was the definition used for a *challenge*, a dynamic move. The ESA manual describes a challenge as a dynamic move carried out by the listener that potentially challenges the experiential content of what the speaker said or the authority of the speaker to make the statement, or the relevance of the message to the listener (Tougher, n.d.). For the present study, questions that seemed to challenge the experiential content because they were asked with, what was perceived to be, negative intonation were also coded as a *challenge*. For example, a mother asking her daughter, "Really?" after the daughter told her she was not learning equations in her math class.

The ESA manual states that synoptic move codes are enclosed in brackets and dynamic moves are denoted with arrows (Togher, n.d.). These coding symbols were not used in the present study because the manual did not provide examples or practice using these symbols. Therefore, it was unclear to the PI how the brackets and arrows should be placed. Instead of using symbols, the present study placed the synoptic and dynamic move codes without symbols in front of the corresponding c-unit.

The ESA coding of the dyads' conversational exchanges was completed by two research assistants trained by the PI and who were not involved in data collection. The PI familiarized herself with ESA by reading the manual, coding practice transcripts, and corresponding via email

with the author of the manual. Email correspondence consisted of ESA coding questions and requests for the author's feedback on portions of the coded practice transcripts.

### *2.3.1. Reliability*

Inter-rater reliability was completed for 100% of the dyads' ESA coded transcripts and included agreement for: division of c units and exchanges and ESA synoptic and dynamic moves coding. The average agreement for division of conversational turns was 98.6% with a range of 98% to 99%. The average agreement for division of ESA exchanges was 92.8% with a range of 82% to 100%. The average agreement for ESA synoptic and dynamic moves coding was 91% with a range of 86% to 95%. Differences in any inter-rater reliability measure were discussed until consensus was reached between the two raters (Coelho, Ylvisaker, & Turkstra, 2005; Sim, Power, Togher, 2013). When consensus was unable to be reached, the PI made the final decision.

The qualitative research constructs of trustworthiness are comparable to the quantitative research methods of reliability and validity and are standards for assessing scientific rigor (Creswell, 2013; Lincoln & Guba, 1985). Triangulation is a trustworthiness technique that can both confirm and validate a qualitative study's findings (Lincoln & Guba, 1985). For the present study, triangulation involved collecting a variety of data using multiple sources: questionnaires, standardized assessments, and mother-child conversational discourse. The results of each source were used to corroborate discourse conclusions.

Transferability refers to the likelihood that findings from one group of participants can be applied to those in similar situations but did not participate in the study (Lincoln & Guba, 1985). As suggested by Lincoln and Guba (1985), the authors of this paper make no claims that results can be transferred outside of the study's setting. Instead, we aim to provide sufficient detail of

the present study so that other individuals can judge the relevance of the present study's results to that of their own situation (Howe et al., 2012; Lincoln & Guba, 1985).

### **3. Results and Discussion**

#### *3.1. Assessments*

The CASL and WASI-II are standardized language and general intellect assessments administered directly to the child. The results of these assessments are shown by child in Table 3. Five children performed within an average range (within 1 standard deviation (SD)) on all CASL and WASI-II measures. Eight of the children scored within an average range (mean = 100, SD = 15) on the CASL *Core Language subscale* while nine scored within an average range on the CASL *Pragmatic Judgement* subtest. One child scored below average on both CASL measures. For the WASI-II *Full Scale-2 Composite* (mean = 100, SD = 15), six children scored within an average range. Seven children scored within an average range on the WASI-II *Vocabulary subtest* (mean = 50, SD = 10) and eight performed within an average range on the WASI-II *Matrix Reasoning* subtest (mean = 50, SD = 10). No child scored below average on all WASI-II measures.

In addition to the direct child assessments, parents responded to standard questionnaires to quantify the child's executive function behaviors, family functioning, and the child's communication skills. Results of these questionnaires are summarized by child in Table 3. For the BRIEF, a score of 60 or greater is associated with poorer executive function behaviors. Eight parents rated their child within an average range on the BRIEF *Global Executive Composite*, *Behavior Regulation* and *Metacognition* indexes (mean = 50, SD 10). Two parents rated their child as below average on all BRIEF measures. Scores on the FAD range from 1 to 4 with 4 representing poorer functioning. All ten mothers reported adequate family communication and

functioning on the FAD *Communication* and *General Functioning* scales, respectively, with no mother reporting a score greater than 2.7 (range = 1.1-2.7) (see Table 3 for results). Seven mothers rated their child as exhibiting communication skills within an average range (mean = 100, SD = 15) on the CCC-2. The CCC-2 was administered in an interview format rather than as a paper-pencil task. Therefore, the scores are provided as a means to describe the mothers' perception of the level of the child's communication skills but cannot be considered a standardized score.

Table 3. Child assessment results by child

Child	Moderate TBI							Severe TBI		
	2	3	4	6	8	9	10	1	5	7
<b>Direct Assessments</b>										
CASL: Core Language	101	104	90	106	112	100	84	104	77	90
CASL: Pragmatic Judgments	109	101	100	97	110	89	90	99	79	96
WASI-II: Full Scale- 2 Composite	102	104	92	105	79	98	79	86	79	75
WASI-II: Vocabulary	52	54	46	50	41	41	31	33	33	43
WASI-II: Matrix Reasoning	51	51	45	56	35	57	45	51	42	27
<b>Parent Questionnaires</b>										
CCC-2: General Communication Composite	84	89	98	101	120	79	98	96	97	84
BRIEF: Global Executive Composite	52	58	48	49	57	68	50	52	56	65
BRIEF: Behavior Regulation Index	54	55	56	43	59	65	57	56	58	63
BRIEF: Metacognition Index	51	58	44	53	55	69	46	50	54	65

FAD: Communication	2.5	1.1	2.2	1.8	1.5	2.7	1.8	1.2	1.5	2.0
FAD: General Functioning	1.8	1.3	1.5	1.1	1.6	1.8	2.1	1.2	1.8	1.9

Note. CASL = *Comprehensive Assessment of Spoken Language* (Carrow-Woolfolk, 1999); WASI-II = *Wechsler Abbreviate Scale of Intelligence, Second Edition* (Wechsler & Zhou, 2001); CCC-2 = *Children’s Communication Checklist, Second Edition* (Bishop, 2003); BRIEF = *Behavioral Rating Inventory of Executive Functions* (Gioia, Isquith, Guy, & Kenworthy, 2000); FAD = *McMaster Family Assessment Device* (Miller, Epstein, Bishop, & Keitner, 1985)

### 3.2. Dyad Conversations

The dyads’ conversations were analyzed using exchange structure analysis (ESA) to identify patterns in how parents and children with TBI communicate at home. The dyads’ conversations were analyzed for synoptic and dynamic moves as well as exchange structures. Results are presented in three subsections; Dyad Exchange Structures, Dyad Synoptic Moves, and Dyad Dynamic Moves. The Dyad Exchange Structures subsection is presented first to provide the framework for how information and actions were exchanged (e.g. requested, given, etc.) during the conversation. Within each subsection, the ESA category (i.e. exchanges, synoptic, and dynamic moves) is defined and the research question for that ESA category is given. Next, the results are stated and then discussed with information and/or quotations from the dyads’ transcripts. Lastly, at the end of the results section, examples of variation among the dyads are provided as case patterns.

#### 3.2.1. Dyad exchange structures

An exchange structure is comprised of a sequence of synoptic and dynamic moves (Togher, n.d.; Togher, 2000). The research question for this ESA category was: What communication exchange structure patterns do parent-child dyads demonstrate when conversing at home?

The results showed mothers initiated a greater proportion of *information requesting exchanges* (34.68%) and *teaching exchanges* (3.36%) than children (6.92% and 0.0%). Children and mothers initiated a similar proportion of *information giving exchanges* (children 26.94% and mothers 24.26%), *action requesting exchanges* (mothers 2.33% and children 0.88%), and *provision of action exchanges* (mothers 0.23% and children 0.37%). Overall, mothers initiated a greater proportion of exchanges (64.86%) than children (35.16%). See Table 4 for results.

Table 4. Proportion of exchange structures by parents and children

	% Parents Exchange Structures	% Children Exchange Structures
Information Giving	24.26	26.94
Information Request	34.68	6.92
Teaching	3.36	0.00
Provision of Action	0.23	0.37
Action Requesting	2.33	0.88
Other	0.00	0.05
Total	64.86	35.16

### 3.2.2. Discussion of exchange structures

The exchange structure results reveal that the mothers led exchanges by asking questions. For example, an *information requesting exchange* for dyad 1 consisted of the following sequences of moves: the mother asked, “So, what do you want to do after this?” and the child responded, “I don’t know.” Although most exchanges were initiated with questions that placed the child in position of *primary knower* (K1), by requiring the child to provide information unknown to the mother, some mothers asked questions that placed themselves in position of *primary knower* (K1). Mothers initiated *teaching exchanges* by asking the child questions in which the mother already knew the answer. For instance, while discussing the possibility of getting a dog and the responsibilities involved with taking care of it, the mother of child 7 initiated the following *teaching exchange*: “Do dogs have to eat or drink anything?” The child

responded, “Yes.” These *teaching exchanges* positioned the mother to control the conversation (*primary knower*) and the affect these questions had on the exchange of information is discussed in the Discussion of dyad synoptic moves section of this paper.

Comparison of the *information giving* and *requesting exchanges* to the *action requesting* and *action exchanges* reveals that a greater portion of the dyads’ conversations revolved around the exchange of information. This means that both mothers and children were rarely asking for and/or carrying out actions as part of their conversation. In the instances where the exchange of an action occurred, the exchange tended to be an *action requesting exchange* initiated by the mother. For example, the mother of child 7 requested that the child put his drink down while they were conversing.

### 3.2.3. Dyad synoptic moves

Synoptic moves are the “building blocks” of the exchange of information or actions (Togher, n.d., p. 4). These moves are categorized based on the giving or receiving of information or actions. Within the category of giving or receiving information, the communication partners are coded by who knows the information. The *primary knower* (K1) is the individual giving information and the *secondary knower* (K2) is the person receiving the information. In the category of giving or receiving an action, primary and secondary knower codes are not used. Rather, action synoptic moves are coded by the person who is requesting (*action request* (A2)) and the person who is performing the action (*action* (A1)). The research question for this ESA category was: What conversational moves do parent-child dyads use to exchange information in this social context [conversing at home]?

The results are children performed a greater proportion of *primary knower* (K1) synoptic moves (37.29%) than mothers (17.79%). Mothers used a greater proportion of *secondary knower*

(K2) moves (13.04%) than children (4.36%). Mothers performed a greater proportion of *delayed primary knower* (dK1) moves (1.43%) than children, who did not use this move at all. While in the position of *secondary knower*, mothers were more apt than children to verbally acknowledge the message after they had received the information. This is evidenced by comparing the proportion of *secondary knower follow up* (K2f) moves of mothers (4.34%) and children (1.59%). However, mothers (0.26%) and children (.14%) produced a similar low proportion of *primary knower follow ups* (K1f). Mothers and children also produced a similar low proportion of *action requests* (A2) (mothers 1.05% and children .38%) and *actions* (A1) (children 0.25% and mothers 0.38%). Overall, children produced a greater proportion of synoptic moves (44.05%) than mothers (39.44%). See Table 5 for results.

Table 5. Proportion of synoptic moves by parents and children

	% Parent Synoptic Moves	% Child Synoptic Moves
K1	17.79	37.29
K2	13.04	4.36
K1f	0.26	0.14
K2f	4.34	1.59
dK1	1.43	0.00
A1	0.23	0.25
A2	1.05	0.38
Other synoptic moves	0.02	0.04
Total Synoptic Moves	38.16	44.05

### 3.2.4. Discussion of synoptic moves

The synoptic move results show that children were more often in the position of *primary knower* (K1) and, thus, were controlling a greater proportion of the conversation. Children provided information in response to the mothers' questions and spontaneously. For example, while discussing books, the mother of child 2 asked her child, "What's that other series you read?" The mother's request placed the child in the position of giving information that was

unknown to the mother. Child 4 spontaneously gave her mother the following information while discussing getting a new phone, “I’m about to have my own Wi-Fi.” Mothers were more responsive during the conversations than the children. While playing a game with her child, the mother of child 1 requested unknown information by asking, “Do you want me to read you the rules?” The child gave information by responding, “Read.” The mother then followed up with, “Okay.”

As stated above in the Discussion of Exchange Structures section of this paper, only a small proportion of the mothers’ questions positioned the mother in control of conversation (*primary knower*) because they asked the children to give information the mother already knew. These questions are termed *delayed primary knower* (dK1) moves and they are included in the teaching exchange results. Overall, the mothers’ use of teaching questions (*delayed primary knower* (dK1) moves) did not affect the exchange of information. This can be seen by comparing the children’s total proportion of *primary knower* (K1) moves to their *secondary knower* (K2) moves, which capture the children’s responses to the mothers’ teaching interactions.

The proportion of requests for an action and the performance of these actions were similar for mothers and children. Mothers tended to use more *action requests* in which she asked the child to perform an action related to their conversation. For instance, while playing a game that required the mother and child to write, mother 1 asked that her child “Grab some pens.” However, other *action requests* controlled the child’s conversational behaviors. The mother of child 4 requested that her child, who learned Spanish as a young child, say some words in Spanish by saying, “Talk to me.” The mother of child 9 told her child to, “Sit still.” and to “Finish your whole sentence.”

### 3.2.5. Dyad dynamic moves

Dynamic moves provide information regarding the communication partners' understanding of the information being conveyed. They maintain the topic of conversation, negotiate the meaning of what has been said, or challenge what has been said (Togher, n.d.). Because several dynamic moves can be in the form of a question, they can elicit responses from the communication partner that are coded as a response to a dynamic move. The research question for this ESA category was: What conversational moves do parent-child dyads use to exchange information in this social context [conversing at home]?

The results are mothers performed a greater proportion of *backchannels* (bch) (0.62% vs 0.18% for children), *checks* (checks) (0.60% vs 0.0%), *confirmation requests* (cfrq) (1.93% vs 0.21%), *confirmation statements* (cf) (1.12% vs 0.65%), *clarification requests* (clrq) (1.23% vs 0.67%), *challenges* (chall) (1.10% vs 0.21%), and *justifications* (jst) (0.26% vs 0.14%). Children produced a greater proportion of *self-corrects* (sc) (2.40% vs 0.59% for mothers), *collocation prompts* (cp) (0.30% vs 0.02%), and all response moves (total proportion response moves for children 3.25% vs 1.22% for mothers). Children (0.29%) and mothers (0.25%) produced a similar proportion of *replay requests* (rprq). Overall, mothers (8.98%) and children (8.39%) produced a similar proportion of dynamic moves. See Table 6 for results.

Table 6. Proportion of dynamic moves by parents and children

	% Parent Dynamic Moves	% Child Dynamic Moves
bch	0.62	0.18
cfrq	1.93	0.21
rcfrq	0.16	0.91
cf	1.12	0.65
clrq	1.23	0.67
rclrq	0.53	1.06
rprq	0.25	0.29
rrprq	0.16	0.15
check	0.60	0.00

rcheck	0.00	0.18
cp	0.02	0.30
rçp	0.17	0.00
sc	0.59	2.40
chall	1.10	0.21
rçhall	0.12	0.95
jst	0.26	0.14
rjst	0.08	0.00
Other dynamic moves	0.04	0.10
Total Dynamic Moves	8.98	8.39
Total Miscellaneous Moves	0.17	0.23

### 3.2.6 Discussion of dynamic moves

Although the total proportion of mother and child dynamic moves was similar, the types of moves differed. Mothers used more dynamic moves that maintained the conversation and checked the child’s understanding of the message. Mothers maintained conversations through nonverbal communication (*backchannel*) that kept the child in the speaking role. For example, the mother of child 2 periodically nodded her head while her child retold the book she was reading. Mothers ensured a child’s understanding of her message with *checks*. Mother 1 used a *check* while explaining how to play a game to her child. During the explanation, the mother said, “Once you get your cards you want to mark off what’s in your card, what’s in your stack of cards.” The mother then immediately checked that her child understood the information by saying, “Okay?”

Mothers also used more dynamic moves, than the child, to confirm or clarify information, including *confirmation requests*, *confirmation statements*, and *clarification requests*. To start a conversation with her child, the mother of child 9 asked about an exam the child had taken at school. The child responded, “It was easy.” The mother then requested confirmation (*confirmation request*) by asking, “Easy?” Dyad 8 were discussing strategies that may help the

child do well on a math assignment. The child explained that she had an hour to complete her math assignment and stated “so I will be taking my time.” The mother responded with the following *confirmation statement*, “Take your time.” Child 5 was telling her mother that she and her friends like to play hide and go seek while riding the bus home from school. The mother requested that the child clarify this information (*clarification request*) by asking, “On a bus?”

In addition to the aforementioned dynamic moves, mothers also used more moves that challenged information (*challenge*). The mothers’ in this study occasionally offered a reason for their challenge (*justification*), which, in some cases, appeared to provide constructive feedback to the child. Dyad 10 were discussing facts the child learned about George Washington. While discussing this topic, the child said that George Washington did not live in the White House. The mother *challenged* this information by saying, “Yes he did,” and then provided *justification* by saying, “When he was president he lived in the White House.”

Children, on the other hand, used dynamic moves that responded to their mothers’ *checks, confirmation requests, clarification requests, challenges, and justifications*. In addition to these response moves, children used dynamic moves to correct their own utterances (*self-corrects*). While retelling the events of a story where witches live in two worlds; a witch world and a real world, child 2 produced the following *self-correct*, “Like you would have a world on the witch world and a world- I mean a day in the witch world and a day in the real world.” Children were also more likely to finish their mother’s sentence (*collocation prompt*). While discussing potential movies to see at a theater, the mother of child 6 said, “So maybe we can do that in...” and the child finished his mother’s utterance with, “In Seattle?” The mother responded to the collocational prompt (*response to collocation prompt*) with, “In Seattle on a rainy day.”

Mothers and children asked each other a similar proportion of questions indicating that they had missed the speaker's meaning (*replay requests*). While discussing their family vacation, the mother of child 8 asked her child what she had noticed about the coconuts they used on a scavenger hunt. The child, having missed the mother's meaning, produced the following replay request, "Hmm?" A response to a *replay request* (rrprq), consequently, is the speaker's reply, and both mothers and children used a similar proportion of this move. In the *replay request* example provided, the mother's *response to replay request* was to restate her question as follows, "What did you notice about the coconuts we used on the scavenger hunt?"

### 3.3. Case Patterns

Examination of the individual dyads' data reveals variability among the dyads in the proportion and types of exchange structures, synoptic, and dynamic moves employed. See Appendices A, B, and C. Comparison of the dyads' individual ESA data revealed three case patterns; structured communication, unbalanced participation, and balanced participation. Each case pattern will be defined below and the dyads that comprise each pattern will be described.

In the structured communication case pattern, the child was less involved in the conversation compared to the children in the other two case pattern groups. This case pattern was observed in dyads 1, 7, 8, 9, and 10. During these conversations, the mothers were giving more information and asking more questions than the child. These mothers tended to use a high proportion of teaching questions that placed them in the position of *primary knower* (K1) and in control of the conversation. They tended to use a high proportion of *action requests* and mothers 7 and 9 used a greater proportion of dynamic moves than all other mothers in this study. These ESA patterns suggest that these dyads had conversations in which the mother provided structure for the conversation.

In the unbalanced participation case pattern, the child gave substantially more information than the mother. This case pattern was observed in dyads 2, 3, 4, and 5. During these dyads' conversations, the children gave information both in response to the mothers' questions and spontaneously. These children used a higher proportion of *self-corrects* and, as a result, three children used a greater proportion of dynamic moves than their mother. The ESA patterns suggest that these dyads had conversations where the mother gave the child more control.

In the balanced participation case pattern, both mother and child were similarly contributing and participating in the conversation. This case pattern was observed in dyad 6. During their conversation, both mother and child gave a similar proportion of information and asked each other a similar proportion of questions eliciting unknown information. Mother and child collaborated to clarify and confirm communication. This ESA pattern suggest that mother and child maintained balanced participation in the conversation.

The reasons for these differing case patterns are unclear. Some differences may be related to the child's age. The children in the unbalanced and balanced participation groups were 9 to 12 years old, whereas three of the five children in the structured communication group were the youngest in the sample with ages ranging from 6 to 8 years. No child in the structured communication group was older than 10 years. A child's pragmatic skills develop over time, and between the ages of 9 and 12 years, healthy children are developing more sophisticated pragmatic skills that enable them to construct organized narratives; decipher ambiguous language; and generate persuasive arguments (Nippold, 1993, 1988; Paul, 2007). Therefore, older children may require less structure from their mother to participate in conversation. This

suggests that some of the older children in this group of children who were post TBI were exhibiting pragmatic skills that enable them to be successful in conversation with their mother.

Differences in case patterns may also be related, in part, to the child's assessment results. Four of the children in the unbalanced and balanced participation groups scored within the average to near average range on all language, general intellect, and executive function assessments. This suggests that these children had language skills which supported their high level of participation in the conversation. The high proportion of *self-corrects* by the children in the unbalanced group could be a result of their producing moves that provided information. The proportion of *self-corrects* suggests that they understood the need for revision which could reflect their executive function and pragmatic language skills.

No child in the structured communication group scored within the average range on all assessments. The children in this group performed within the average to near average range on all CASL language assessments. Three of the children scored near or below average on the general intellect composite assessment, and two of the children's communication and executive functions behaviors were rated as near or below average by their mothers. No other child in the sample was rated as exhibiting below average communication or executive function behaviors. Cognitive skills such as working memory, executive function, and theory of mind, in addition to semantic and syntactic language, are considered critical for pragmatic proficiency (McDonald et al., 2012).

The 10 dyads that participated in this study came from diverse backgrounds (see Table 1) and all mothers rated their family's *General Functioning* and *Communication* on the FAD as adequate; therefore, no associations between case pattern group and household demographic information or family functioning were found. Family environment factors like socioeconomic

status (SES) have been shown to be related to a child's recovery of language after TBI (Catroppa & Anderson, 2004; Crowe, 2014). SES and family functioning have been shown to be related to a child's behavior and social function after TBI, with more favorable family environments related to better language and social outcomes (Anderson, et al., 2013; Anderson, et al., 2006; Catroppa, et al., 2015; Catroppa & Anderson, 2004; Crowe, 2014).

One note is that the case patterns for dyads 1 and 2 may have emerged because of their conversational context. Dyad 1 played a game as part of their conversation. Neither mother nor child was familiar with the game; therefore, a portion of the mothers' conversation was reading the directions and explaining the game to the child. Dyad 2 discussed a book the child was reading, which placed the child in the position of *primary knower* (K1) because she was giving the mother information about the book. Although these social contexts were the primary focus of the dyads' conversations, their conversations transitioned into casual conversation with both dyads discussing school and family related matters.

### 3.4. Overall Summary

This study found that the dyads exhibited positive communication while conversing at home. The mothers asked a higher proportion of questions that placed the child in the position to give information. Children conversed by responding to their mothers' questions and by spontaneously giving other information. Both mothers and children collaborated to repair communication breakdowns and negotiate meaning to ambiguous conversational content. Although dyad communication was positive, the types and proportion of these behaviors varied in ways that appeared in some cases to be related to the child's communication and cognitive strengths and challenges. Mothers tended to provide greater structure for those children who were younger and those who scored below average on a composite general intellect assessment,

and/or were rated by their mothers as having weaker communication skills on the CCC-2 and executive function behaviors on the BRIEF.

### 3.4.1. Comparison to previous research

Mothers in this study demonstrated communication strategies that were similar to the supportive/responsive strategies described in the child language and cognitive development research. Similarities included trying to maintain balanced participation, providing verbal and nonverbal feedback demonstrating attentiveness (i.e. *secondary knower follow ups* and *backchannels*), confirming understanding of the child's message (*confirmation statements*) and *requesting clarification* and *confirmation* when there was a communication breakdown (Kaye & Charney, 1981; McDonald & Pien, 1982; Tamis-LeMonda et al., 2001; Yoder & Kaiser, 1989).

In the development research, directive strategies are described as those that constrain the child's participation in the interaction (Masur, Flynn, & Lloyd, 2013; McDonald & Pien; Olsen-Fulero, 1982). Parents can constrain a child's participation by using indirect or direct commands to control the child's behavior. Referred to as directives in the language development research (Masur et al., 2013), these pragmatic behaviors are coded as *action requests* in ESA.

Five of the ten mothers' in this study used *action requests* to control the child's behavior and/or participation. Some of the mothers' *action requests* asked the child to perform an act related to the conversation, like asking the child to get some pens for a game they were playing. On a few occasions, mothers asked their child to perform an action related to being videotaped. For example, mother 6 told her child to, "lean forward" so the child stayed in the camera's frame. However, some action requests directed the child's verbal participation, such as mother 4 telling her child to, "Talk to me." or redirected the child's behavior back to the conversation such as mother 7 asking her child, "Can you please put that drink down?" This suggests that some

children exhibited communication and/or social behaviors, specifically inattention, that disrupted the conversation prompting the mother's *action request* to manage the child's participation in the conversation.

Parents can also constrain their child's participation in an interaction by using teaching questions (McDonald & Pien; Olsen-Fulero, 1982; Yoder & Kaiser, 1989). This study found that seven of the ten mothers used teaching questions (coded as *delayed primary knower* (dK1)). Teaching questions place the mother in the position of *primary knower* (K1) and in control of the conversation by asking a question for which she already knows the answer. Although teaching interactions are not a preferred parent-child interaction for developing a child's language skills, they have been observed to be a typical component of parent-child conversations (Schegloff, Jefferson, & Sacks, 1977).

In this study, mothers tended to use teaching exchanges for two purposes. One was to generate a topic of mutual interest such as discussing the family's experiences on a vacation (dyad 8) and school events/activities (dyad 9). Because both participants had experienced or already talked about the event, the mothers may have asked questions to which they knew the answers in order to generate conversation for the assigned task. A second purpose was to instruct or prepare the child for future events. The mother in dyad 7 used teaching questions to instruct the child on the responsibilities of caring for a dog the family was about to purchase. The mother in dyad 9 used teaching questions to prepare her child for summer camp.

*Action requests* and teaching questions were only a small proportion of the mothers' total conversational moves. Mothers that used a higher proportion of these moves tended to be in the structured communication group with a young child or a child that attained a lower score on one or more of the child assessments (i.e. communication, general intellect, and/or executive

function). This suggests that the child's communication and executive function behaviors, specifically the child's attention during the conversation may have influenced the mothers' communication strategies. Wade et al. (2008) found that a child's social behavior after TBI can affect the parent's interaction style and communication strategies; however, Wade et al. (2003) did not find this relationship. In some cases, the mothers' *action requests* appeared to be used to support the child in conversation by redirecting his/her attention back to the conversation or establishing a topic of mutual interest. This suggests that these mothers were primarily employing supportive communication strategies to engage their child in conversation.

The mothers in this study primarily engaged in conversation with their child by asking questions that placed the child as *primary knower*. Togher (2000) found that when adults with TBI were placed in the role of *primary knower* during an interview, they provided a similar amount of information as adults without TBI. This suggests, that when given the opportunity to take a role of *primary knower* (K1), adults with TBI are able to interact in a way that is similar to others without TBI (Togher, 2000). Therefore, the mothers' use of questions in this study may have had the same positive affect on the child's communication.

The question-answer interactions in this study may have been the result of the communication task (asking the dyads to have a conversation) and recording of the interaction. The mothers knew beforehand the purpose of the study was to observe communications with their child; therefore, they may have felt compelled to use a high proportion of questions to keep the child engaged in conversation. Even though a case study observing an adult with TBI interacting with his mother reported a similar question-answer conversational style (Tu et al., 2011), this type of interaction may not be characteristic of parents' interactions with their healthy child of this age (6-12 years). More naturalistic research comparing the conversations of

mothers with healthy children and children with TBI is needed to determine the nature of their typical communication.

The observational finding, in this study, that mothers and children exhibited positive communication while conversing at home is supported by mothers' responses on standard questionnaires and direct child assessments. The mothers' ratings on standard communication and executive function questionnaires provided evidence that the child had the language and cognitive skills to communicate successfully. Nine of the children were rated by their mother as exhibiting average to near average communication skills and eight were rated by their mother as exhibiting average executive function behavior. The mothers' reports were corroborated by direct assessment of the children. Six of the children in this study exhibited average language, pragmatics, and general intellect as evidenced on standardized assessments. Finally, all mothers rated their family's *Communication* and *General Functioning* as adequate on the FAD.

### 3.5. Limitations

This study's findings are restricted by several methodological limitations that should be considered when interpreting results. First, recruitment was restricted to a convenience sample. Nine of the ten participants were recruited from pediatric hospitals, had participated in previous pTBI research, and volunteered to participate in this study. Therefore, the number and characteristics of the participants in this study represents a small subset of the population of children with moderate to severe TBI. Second, the children's access to acute rehabilitation and school-based speech-language pathology services was collected, but information regarding the nature of these services was not collected. Moreover, the type, frequency, and nature of other interventions such as counseling services that may have a positive influence on the mother-child interactions was not collected. Thus, it is unknown if the mothers were using supportive

communication strategies they learned during intervention or if we were observing their typical communication style.

Third, children did not have to present with pragmatic deficits nor did parents have to express concern regarding the child's communication skills to participate in the study. Thus results of this study may have been more robust had the CCC-2 been used as a communication screener to identify parents that rated their child's communication as below average. Using a screener to assure that communication concerns existed may have resulted in more diverse mother-child conversation results. The combination of these first three limitations likely resulted in a sample of mothers and children with TBI that were skewed in terms of the mother's motivation to help her child and the child's recovery from TBI.

Finally, some of the methods employed in this study complicated the analysis of the dyads' interactions. The dyads' conversations were recorded in a single session and all dyads were informed that the purpose of the conversation was to observe their communication. Knowing that their conversations were being analyzed for communication may have affected the mother's and/or child's conversational strategies. As previously described, two dyads (1 and 2) were given a specific social context rather than being invited to have a conversation. Because the context of their interactions were different from the other dyads, it is unclear if their communication patterns are representative of their day-to-day conversations. This study also did not control for cultural issues like ethnicity that could affect a mothers' perceptions of and reactions to her child's pragmatics (Paul, 2007).

### *3.6. Implications and Future Research*

Children with pragmatic deficits after TBI need help navigating the social world. This study examined mother-child interactions in the home environment; however, children have to

navigate a variety of social relationships and interactions. The results of this study show that mothers exhibited supportive communication strategies regardless of their child's pragmatic behaviors. Because the home environment is only one aspect of the child's social world, future research should continue to explore the social interactions of children with TBI and other communication partners like peers and teachers.

### *3.7. Conclusions*

The results of this study are encouraging. By using supportive communication strategies, the mothers in this study were able to engage their child in conversation, and the children were responsive. Although this was a small study of ten mother-child dyads, these results offer preliminary evidence that mothers and children with TBI may exhibit positive communication in the home environment.

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Appendix A. Proportion of parent and child exchange structures by dyad

	% Information Giving	% Information Requesting	% Teaching	% Provision of Action	% Requesting Action	% Other	% Total
Dyad 1:							
Parent	26.56	21.88	0.78	1.56	8.59	0.00	59.37
Child	16.41	17.97	0.00	3.13	3.13	0.00	40.64
Dyad 2:							
Parent	22.54	47.89	1.41	0.00	0.00	0.00	71.84
Child	26.76	1.41	0.00	0.00	0.00	0.00	28.17
Dyad 3:							
Parent	16.25	60.00	0.00	0.00	2.50	0.00	78.75
Child	20.00	1.25	0.00	0.00	0.00	0.00	21.25
Dyad 4:							
Parent	26.92	17.69	0.00	0.00	1.54	0.00	46.15
Child	46.92	6.15	0.00	0.00	0.77	0.00	53.84
Dyad 5:							
Parent	7.89	44.74	0.00	0.00	0.00	0.00	52.63
Child	36.84	10.53	0.00	0.00	0.00	0.00	47.37
Dyad 6:							
Parent	36.09	14.79	1.78	0.00	1.18	0.00	53.84
Child	31.95	14.20	0.00	0.00	0.00	0.00	46.15
Dyad 7:							
Parent	27.78	28.47	9.72	0.69	2.78	0.00	69.44
Child	18.75	9.03	0.00	0.00	2.78	0.00	30.56
Dyad 8:							
Parent	28.81	24.58	10.17	0.00	0.00	0.00	63.56
Child	28.81	7.63	0.00	0.00	0.00	0.00	36.44
Dyad 9:							
Parent	22.73	53.41	2.84	0.00	5.11	0.00	84.09
Child	13.64	2.27	0.00	0.00	0.00	0.00	15.91
Dyad 10:							
Parent	26.98	33.33	6.88	0.00	1.59	0.00	68.78
Child	21.69	6.35	0.00	0.53	2.12	0.53	31.22

Appendix B. Proportion of parent and child synoptic moves by dyad

	% K1	% K2	% K1f	% K2f	% dK1	%A1	%A2	% Other Synoptic Moves	% Total Synoptic Moves
Dyad 1:									
Parent	34.00	13.60	0.00	2.40	0.40	1.20	4.40	0.00	56.00
Child	18.00	10.40	0.00	1.20	0.00	2.00	1.60	0.00	33.20
Dyad 2:									
Parent	7.64	12.62	0.66	3.99	0.33	0.00	0.00	0.00	25.24
Child	59.14	0.66	0.00	1.33	0.00	0.00	0.00	0.00	61.13
Dyad 3:									
Parent	5.21	17.26	0.00	6.19	0.00	0.00	0.65	0.00	29.31
Child	50.81	0.33	0.00	0.33	0.00	0.00	0.00	0.00	51.47
Dyad 4:									
Parent	10.15	5.69	0.00	5.45	0.00	0.00	0.50	0.00	21.79
Child	58.91	1.98	0.50	1.24	0.00	0.00	0.25	0.00	62.88
Dyad 5:									
Parent	3.15	8.56	0.00	7.21	0.00	0.00	0.00	0.00	18.92
Child	57.66	2.25	0.00	1.35	0.00	0.00	0.00	0.00	61.26
Dyad 6:									
Parent	28.15	5.72	0.00	3.20	0.69	0.00	0.46	0.00	38.22
Child	27.92	6.86	0.92	3.43	0.00	0.00	0.00	0.00	39.13
Dyad 7:									
Parent	21.94	12.22	0.28	3.89	4.44	0.83	1.11	0.00	44.71
Child	21.67	7.78	0.00	1.67	0.00	0.00	1.11	0.00	32.23
Dyad 8:									
Parent	28.45	9.97	1.47	8.80	4.40	0.00	0.00	0.00	53.09
Child	22.87	5.87	0.00	3.52	0.00	0.00	0.00	0.00	32.26
Dyad 9:									
Parent	14.36	28.22	0.00	1.24	1.24	0.00	2.48	0.25	47.79
Child	30.45	1.98	0.00	0.50	0.00	0.25	0.0	0.25	33.43
Dyad 10:									
Parent	24.84	16.56	0.22	1.09	2.83	0.22	0.87	0.00	46.63
Child	25.49	5.45	0.00	1.31	0.00	0.22	0.87	0.22	33.56

Appendix C. Proportion of parent and child dynamic moves by dyad

	% bch	% cfrq	% rcfrq	% cf	% clrq	% rclrq	% rprq	% rrprq	% check	% rcheck	% cp	% rcp	% sc	% chall	% rchall	% jst	% rjst	% Other Dynamic Moves	% Total Dynamic Moves	
Dyad 1:																				
Parent	0.00	2.40	0.40	0.00	0.00	0.40	0.00	0.00	1.20	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	4.80	
Child	0.40	0.40	0.80	1.60	0.40	0.00	0.40	0.00	0.00	0.00	0.40	0.00	0.40	0.00	0.40	0.00	0.00	0.80	6.00	
Dyad 2:																				
Parent	1.33	0.00	0.00	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	1.99	0.00	1.00	0.00	0.00	5.32	
Child	0.00	0.00	0.00	0.33	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	4.65	0.33	2.33	0.33	0.00	0.00	8.31	
Dyad 3:																				
Parent	2.28	6.84	0.00	0.65	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	10.75	
Child	0.33	0.00	2.61	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	4.23	0.00	0.33	0.00	0.00	0.00	8.14	
Dyad 4:																				
Parent	0.74	0.25	0.25	1.24	1.24	0.00	0.50	0.25	0.00	0.00	0.25	0.25	0.25	1.24	0.00	0.25	0.00	0.00	6.68	
Child	0.00	0.50	0.25	0.74	0.00	0.74	0.74	0.25	0.00	0.00	0.25	0.00	3.71	0.00	1.24	0.00	0.00	0.25	8.66	
Dyad 5:																				
Parent	0.45	2.25	0.00	0.00	2.25	0.45	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.45	0.00	0.45	0.00	0.00	6.76	
Child	0.00	0.00	2.25	0.45	0.45	2.25	0.45	0.00	0.00	0.00	0.45	0.00	5.86	0.00	0.45	0.00	0.00	0.00	12.61	
Dyad 6:																				
Parent	0.92	0.23	0.69	1.83	1.14	2.06	0.23	0.23	1.37	0.00	0.00	0.46	0.69	0.23	0.23	0.23	0.00	0.23	10.53	
Child	0.23	0.69	0.00	1.37	2.97	1.14	0.23	0.23	0.00	0.46	1.14	0.00	2.52	0.46	0.23	0.23	0.00	0.00	11.90	
Dyad 7:																				
Parent	0.00	1.11	0.00	2.78	1.67	0.83	0.83	0.00	1.67	0.00	0.00	0.56	1.94	1.67	0.00	0.28	0.83	0.00	14.17	
Child	0.00	0.28	0.56	0.00	0.83	1.67	0.00	0.00	0.00	1.11	0.56	0.00	0.28	0.28	1.11	0.28	0.00	0.00	6.94	
Dyad 8:																				
Parent	0.00	0.59	0.00	2.35	1.17	0.88	0.00	0.88	0.29	0.00	0.00	0.00	1.17	0.29	0.00	0.00	0.00	0.00	7.62	
Child	0.59	0.00	0.29	0.88	0.88	1.17	0.88	0.00	0.00	0.00	0.00	0.00	0.59	0.29	0.29	0.29	0.00	0.00	6.16	
Dyad 9:																				
Parent	0.50	3.22	0.00	0.50	1.49	0.00	0.99	0.00	0.99	0.00	0.00	0.00	0.25	3.71	0.74	0.00	0.00	0.00	12.38	
Child	0.00	0.00	1.49	0.00	0.50	0.50	0.00	0.99	0.00	0.00	0.00	0.00	0.00	0.50	2.23	0.25	0.00	0.00	6.44	
Dyad 10:																				
Parent	0.00	2.40	0.22	1.53	2.40	0.65	0.00	0.22	0.44	0.00	0.00	0.00	1.31	0.65	0.22	0.44	0.00	0.22	10.68	
Child	0.22	0.22	0.87	1.09	0.65	2.18	0.22	0.00	0.00	0.22	0.22	0.00	1.74	0.22	0.87	0.00	0.00	0.00	8.71	

## **Conclusions and Recommendations**

Based on the results and limitations of this research, future research should address several needs. First, other sampling and participant recruitment methods should be employed. Using sampling methods such as maximum variation sampling and having a larger sample size would increase the likelihood of recruiting a more diverse sample (Creswell, 2013). When recruiting participants, children should be screened to determine their level of communication and/or pragmatic skills. Employing criteria for inclusion based on test results would result in a sample that more closely reflects the pTBI population for whom intervention is needed and results that suggest effective strategies. Future research should also collect a more thorough case history to protect against potential confounding variables such as the dyad's intervention history and cultural factors that may influence the dyad's pragmatic behaviors.

Second, future research should consider using a different communication questionnaire or altering how the CCC-2 was administered. If future research uses the CCC-2, it is recommended that the frequency scale be supplemented or replaced with questions related to how the child's communication behavior differs from behavior prior to the TBI or, if the child was injured at a young age, the age-appropriateness of the child's communication behavior. Using the CCC-2 frequency scale is helpful because it allows for comparison of the child's communication to normed data; however, modification of administration would allow mothers to rate a communication behavior as occurring infrequently but still describe the behavior as different from the child's behavior prior to the injury or from other children without TBI.

Third, future research should elicit pragmatic skills feedback from multiple informants to provide a more complete representation of the child's pragmatic skills across environments like home and school. Information from multiple informants would also protect against biases any

one informant may have. Additionally, future research should examine the child's perceptions of his/her own pragmatic skills and the impact these perceptions have on the ability to effectively interact with others. Although few studies have elicited a child's/adolescent's perceptions of their social skills, results of some studies suggest that children can provide insightful information regarding their social skills and social interactions (Gauvin-Lepage & Lefebvre, 2010; Ross, McMillan, Kelly, Sumpter, & Dorris, 2011).

Fourth, direct observation of the dyads interactions should be conducted in multiple communicative contexts and over more than one session. Originally, one of the interview goals was to identify a home environment social context described by the mother as difficult because of her child's communication. This context was to be used as the context for the recording of the mother-child conversation. Because few mothers identified a specific social context as difficult, eight of the ten dyads were instead invited to have a general conversation. Adult TBI discourse research using ESA has shown that the conversational context (e.g. general conversation or problem-solving task) influences the type and frequency of conversational strategies used by the adult with TBI and their communication partner (Tu et al., 2011). Observing the dyads over multiple sessions in varied contexts may provide a clearer picture of the communication strengths and challenges. In addition, multiple recordings would likely provide a more accurate representation of the dyads' communication strategies as the dyads may become less sensitive to being recorded over time. In addition, future research should consider collecting feedback from the dyads regarding their perceptions of the conversation. This would provide valuable insight into the mother's and child's perception of the effectiveness of their conversation and help explain the motivation for their pragmatic behavior during the conversation (Tu et al., 2011).

Fifth, future research should consider observing parents conversing with children older than 12 years. Pragmatic deficits may be more evident after age 12 when social demands and parents' social expectations are greater. Between the ages of 9 and 12 years, healthy children are developing the pragmatic skills needed for the social demands of adolescences and adulthood (Nippold, 1988). Children in this age range and into the teenage years are increasingly dependent on pragmatic skills for establishing and maintaining friendships, resolving interpersonal conflicts, and expressing opinions (Nippold, 1993; Paul, 2007; Raffaelli & Duckett, 1989; Turkstra, 2000). Pragmatic research suggests that children injured early in life may not follow a typical maturational timeline (Chapman et al., 1998; Ryan et al., 2015) and that their pragmatic deficits may become more apparent as social requirements become more complex (Chapman et al., 2010).

Finally, experimental research comparing the communication patterns of parents conversing with children with TBI to conversations with healthy children is warranted. Examination of the individual dyads' ESA results revealed three case patterns (structured communication, unbalanced and balanced participation) that appeared to be related to the child age and assessment results. Moreover, all mothers in this research exhibited a question-answer interaction style. More naturalistic research comparing the conversations of mothers with healthy children and children with TBI is needed to determine the nature of their typical communication and whether the conversations with children with TBI are different.

### **Implications for Intervention**

A substantial body of research has quantified children's pragmatic deficits after TBI; however, this research has not led to developing pragmatic interventions. McDonald et al. (2012) suggested that the lack of pragmatic intervention research has forced speech-language

pathologists to tailor intervention approaches developed for adults with TBI or children with developmental disabilities to meet the needs of children with TBI. These authors stressed that such tailoring is problematic because children with TBI exhibit different social communication strengths and weakness than adults with TBI or children with developmental disabilities (McDonald et al., 2012). Moreover, many of these interventions focus on decontextualized training in a therapeutic environment and have resulted in minimal functional improvements (Ylvisaker, Turkstra, & Coelho 2005).

One type of contextualized intervention used in the TBI research is training everyday partners, like parents, to support the individual with TBI (Ylvisaker & Feeney 1998, 2000). Partner training interventions have been used to improve the functional communication skills of adolescents and adults with TBI by assessing the effect of the partner's feedback on the individual's functional communication skills and training the partner to support those skills during day-to-day communication routines (Togher et al., 2013; Ylvisaker & Feeney, 2000; Ylvisaker, Feeney, & Szekeres, 1998). In addition, partner training has been used to improve children's behavior after TBI by teaching parents positive-parenting skills (Antonini et al., 2014). Partners have included spouses, caregivers, parents, rehabilitation specialists, and other individuals involved with the individual with TBI (Antonini et al., 2014; Togher et al., 2013; Ylvisaker & Feeney, 2000).

Translating how the results of this research informs pragmatic intervention is difficult for several reasons. The mothers that participated in this research primarily described their conversations with the child as presenting few social challenges. Direct assessment of the children and discourse analysis using ESA corroborated the mothers' reports that conversing with the mother at home was not a challenge for the dyads in this research. Moreover, the

children in this study were more than one year post-TBI, and adequate intervention histories were not collected; therefore, it is unknown if the mothers were using supportive communication strategies they learned during intervention or if we were observing their typical communication style. Regardless of how the mothers acquired these strategies, the strategies the mothers used fostered a positive communication environment.

If mothers are already employing supportive communication strategies with their child, then the mother would be the ideal person to train others involved in the child's life on how to support the child. This research did not observe the child communicating with other individuals; however, during interviews, some mothers described their child as exhibiting pragmatic deficits while interacting with other individuals like siblings, friends, neighbors, teachers, coaches, etc. Training the mother to teach supportive communication strategies to other individuals would empower the mother to be an advocate for her child and would allow for communication support in multiple environments and across other communication partners.

Having communication support at home and outside of the home would increase the frequency and intensity at which pragmatic intervention is delivered to the child. By having the child's social community (e.g. parents, siblings, coaches, teachers, etc.) actively involved in supporting the child's communication, the mother may be able to prevent and/or troubleshoot instances where the child's interactions with other individuals are compromised by pragmatic deficits. Additionally, by being proactive and training other individuals the mother may be able, in some social situations, to prevent social rejection and isolation of the child. The fact that the mothers in this study were able to describe problematic social situations outside of the home shows they were present during the conversation or had the conversation described to them by someone who was present, like a teacher. This suggests that mothers of children ages 6-12 years

are involved in some capacity in the child's social life outside of the home. Therefore, it would be natural for them to share supportive communication strategies with others.