Directive Language Input to Children Born Preterm and Full Term

By

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Directive Language Input to Children Born Preterm and Full Term

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Abstract

The mothers of children born preterm face many challenges in the formation of high-quality dyadic interactions with their children. Because children born preterm are at risk for many neurodevelopmental delays, it is important to study the language input directed to these children and its contribution to their language development. One type of language input commonly used by mothers of young children is directive language input. The purpose of this study was to examine different types of directives, supportive and intrusive, in the language input of mothers of preterm children compared to mothers of full term children. The relationship between the maternal use of intrusive and supportive directives and language outcomes in their children also was examined. Ten mother-child dyads (five preterm and five full term) participated in this study. The children ranged in age between 9-15 months. Mothers of full term children were matched to the preterm sample controlling for child's gender, child's age, and maternal education. Each mother and child dyad participated in a play session using a standard set of toys. The play session was audio- and videotaped. The difference between production of intrusive and supportive directives by mothers of preterm children and mothers of full term children was not statistically significant. However, practical significance, as determined by moderate effect sizes, were evident, with mothers of children born preterm using more intrusive directives than mothers of children born full term. Additionally, it was found that the maternal use of intrusive directives had a strong negative relationship with child language outcomes for the children in the preterm group. The maternal use of intrusive directives may be detrimental to the language

acquisition process because they require the child to devote cognitive resources away from the task of language learning and result in less engagement of the child. The clinical implications of the findings are discussed.

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Table of Contents

Introduction

Within the social interactionist theory of language acquisition, a quality linguistic and social environment is considered tantamount to the language acquisition process (Tannock & Girolametto, 1992). This theory is supported by several studies documenting a strong positive correlation between quality of caregiver interactions and language outcomes in children (Girolametto, Weitzman, Wiigs, & Pearce, 1999; Nelson, 1973). The social interactionist theory posits that particular types of interactions, called responsive interactions, facilitate language development. Responsive interactions include responding to and expanding on the child's communication attempts, and labeling and describing objects and events in the child's environment (Girolametto, Weitzman, & Greenberg, 2000). Other caregiver behaviors have been posited to be non-facilitative, or even detrimental, in the language acquisition process. These interactions include rejecting, ignoring, and interrupting the child's communicative attempts (Girolametto, et al., 2000).

Historically, directives (e.g., "Stop that", "Put that down", "Get the ball") have not been considered a part of responsive caregiver interactions (Nelson, 1973). However, the role of directives may be more complex than first thought. Some researchers suggest the existence of two types of directives, supportive and intrusive, each with different implications for language acquisition (Flynn & Masur, 2007; McCathren, Yoder, & Warren, 1995). Directives that follow the child's attentional focus (e.g., the child is trying to stack blocks and the mother says "Put the block on top!") are hypothesized to provide a very salient connection between the words being spoken and their referent; therefore aiding language development (McCathren, et al., 1995). This direct link between words

and their referents is not present in directives that do not follow the child's attentional focus (e.g., the child is stacking blocks and the mother says "Put the cow in the barn!"), and has therefore been hypothesized to be non-facilitative of the child's language skills (Flynn & Masur, 2007).

Researchers who adopt a social interactionist model are particularly interested in populations that are at risk for low-quality social interactions between a mother and her child. This study focuses on one population that is at risk for low-quality social interactions, children born preterm. There are many factors that may influence the interaction of mothers with their children born preterm. These include maternal factors such as socioeconomic status, educational level, stress, and anxiety (Muller-Nix, Foracada-Guex, Pierrehumbert, Jaunin, Borghini & Ansermet, 2004; Potharst, Schuengel, Last, Wassenaer, Kok, & Houtzager, 2012). Factors related to the children born preterm, such as medical fragility, higher rates of fussing and crying, attention deficits, and higher rates of language impairment also have implications for the formation of highquality maternal/child interactions (Bendersky & Lewis, 1994; Brachfeld, Goldberg, & Soloman, 1990; Landry, 1986). When compared to mothers of children born full term, mothers of children born preterm have been described as "controlling" and "dysynchronous" in their interactions with their children (Feldman & Eidelman, 2007; Forcada-Guex, Pierrehumbert, Borhini, & Muller-Nix, 2006). The mothers of children born preterm have been shown to be more directive in their interactions with their children in comparison to mothers of children born full term (Murray & Hornbaker, 1997). However, this research did not carefully analyze the types of directives being used by these mothers.

This study will compare the types of directives, intrusive and supportive, used by mothers of children born preterm to mothers of children born full term during play interactions. An additional aim of the study is to better understand the link between different types of directives used by mothers and language outcomes in their children. The following section will contain a review of the literature describing an overview of factors impacting children born preterm and the factors' consequences for their mothers. Next, the influence of these factors on the formation of high-quality interactions between mother and child will be described. The theoretical framework for this study also will be explained, leading to the statement of the problem, the procedures for obtaining and analyzing the data, and the statistical methods that will be utilized. The results of the study will be presented and discussed, as well as the clinical implications of the research.

Review of the Literature

Characteristics of Children Born Preterm and Their Mothers

Preterm birth, or birth that occurs before 37 weeks gestational age (GA), accounts for 12.18% of all live births in the United States each year (Martin, Hamilton, Ventura, Osterman, Kirmeyer, Matthews, & Wilson, 2011). Children who are born before their due dates have not yet attained fetal maturity, and are therefore considered "premature." These children can be placed into three categories based on risk for the development of perinatal complications and gestational age at birth (McCormick, Litt, Smith, & Zupancic, 2011). In addition to categorization based on GA at birth, infants born before their due dates can be classified by their birth weight, which is highly related to preterm birth in most cases (McCormick et al., 2011). This study will use the definitions in Table 1 as they refer to infants born before 37 weeks GA (McCormick et al., 2011).

Table 1. Definitions of Type of Preterm Based on GA and Birth Weight

	Birth GA (weeks)
Late Preterm	34-36
Very Preterm	26-33
Limits of Viability	25 weeks

	Birth Weight (grams)
Low Birth Weight (LBW)	< 2500
Very Low Birth Weight (VLBW)	< 1500
Extremely Low Birth Weight (ELBW)	≤ 1000

Children born preterm are at risk for a variety of health and other complications that affect their social, cognitive, emotional, and physical development, with risk increasing the earlier the child is born (Colvin, McGuire, & Fowlie, 2004). As modern

technology advances and an increasing number of children born preterm survive infancy (McCormick et al., 2011), additional research has been devoted to understanding the neurodevelopmental outcomes of these children.

Recent research in the area of developmental outcomes in children born preterm has focused on their cognitive, motor, and language outcomes. Although there are children born preterm who exhibit no measurable deficits as a result of their prematurity, intellectual development is commonly impacted in children born preterm. Even when sociodemographic risk is taken into consideration, children born preterm are at a significantly higher risk for below average intelligence (i.e., IQs lower than 85) (Hack, Klein, & Taylor, 1995). As many as 65% of children born at or before 32 weeks gestational age have been identified with learning disabilities, as compared to 13% of children born full term (Grunau, Whitfield, & Davis, 2002).

Difficulties in the area of motor development are also common in children born preterm. Between 6% and 9% of children born at or before 32 weeks gestational age have a diagnosis of cerebral palsy (CP). The rate of CP increases to 16%-28% when the child is born at or before 26 weeks gestational age (Milligan, 2010). Even children born without gross neurological insults have more difficulty with gross motor and fine motor skills and show problems with coordination when compared to full term peers (Schmidhauser, Caflisch, Rousson, Bucher, & Latal, 2006).

Language outcomes of children born preterm. As with the other areas of neurodevelopment, children born preterm are at risk for difficulties related to language (Bendersky & Lewis, 1994). Deficits are evident even in children without gross neurological impairment. Differences in language abilities have been documented

between children born preterm and children born full term across the lifespan (Casiro, Moddemann, Stanwick, Panikkar-Thiessen, Cowan, & Cheang, 1990; Foster-Cohen, Edgin, Champion, and Woodward, 2007; Magill-Evans, Harrison, Van der Zalm, & Holdgrafer, 2002).

During infancy, the onset of canonical babbling in children born preterm is similar to that of children born full term (Eilers, Oller Levine, Basinger, Lynch, & Urbano, 1991). Although the age of onset of babbling may not be affected by prematurity, infants born preterm produce significantly fewer vocalizations at 6 months than their counterparts born full term (Salerni, Suttora, & D'Odorico, 2007). Differences between children born full term and children born preterm also are evident during the first year of life on formal measures of language comprehension (Casiro et al., 1990).

During the toddlerhood period, typically developing children reach many important language-related milestones. Foster-Cohen et al. (2007) conducted a large, randomized trial to determine the effects of preterm birth on language outcomes during toddlerhood. They found that children born preterm exhibited delays in the area of expressive vocabulary at age two, even when the children's ages were adjusted based on their GA at birth. They also demonstrated that a clear linear relationship existed between a child's GA at birth and his or her later expressive vocabulary size. The earlier the child was born, the smaller the child's expressive vocabulary during toddlerhood. These researchers also found lower rates of ability to use decontextualized language (i.e., talk about past events, objects/people that are not currently present) in the group of children born preterm. Lastly, this study revealed differences in morphosyntactic complexity between children born preterm and children born full term. Children in the extremely

preterm group were found to be 50% less likely than their full term counterparts to use the morphological markers plural -s, possessive -s, past tense –ed, and progressive –ing as per parent report.

The preschool period also is an important period of growth for language development, especially in terms of morphosyntactic development (Brown, 1973). A study conducted by Le Normand and Cohen (1999) evaluated the effects of preterm birth on the productions of finite and nonfinite verb morphology. These researchers noted a nearly 18 month delay in the acquisition of auxiliaries in children born preterm when compared to full term controls during the preschool period. These differences were not found for non-finite verb morphology. Children in the preterm group also had shorter mean length of utterances (MLUs) and used fewer utterances containing multiple clauses. On broader measures of language development, children born very preterm, but without gross neurological impairment, also underperformed in comparison to full term controls (Foster-Cohen, Friesen, Champion, & Woodward, 2010). This latter study found that children in the very preterm group performed significantly lower on all subtests of the Clinical Evaluation of Language Fundamentals-Preschool (CELF-P), with receptive language scores slightly lower than expressive. The children in the very preterm group were found to be twice as likely as the children born full term to score as having a clinically significant language delay on the CELF-P.

During the school-age years, children's semantic, morphosyntactic, and pragmatic skills are further refined. Although evidence indicates language deficits during early childhood, in some cases, language deficits may not be diagnosed until later in life and the effects of preterm birth continue to impact children well into childhood and even

early adolescence (Magill-Evans et al., 2002; Taylor, Klein, Minich, & Hack, 2000). Children born preterm who were between the ages of 9 and 16 years old were found to display significantly lower scores in the areas of expressive and receptive language skills, linguistic processing speed, verbal memory, reading comprehension, and syntactic comprehension. However, when environmental factors such as socioeconomic status (SES) were statistically controlled, differences between the two groups were only found in the areas of linguistic processing speed, verbal memory, and reading comprehension. A few studies have highlighted difficulties with reading in this population, a skill that relies heavily upon language abilities (Anderson & Doyle, 2003; Andrews, Ben-Shachar, Yeatman, Flom, Luna, & Feldman, 2010).

Socioeconomic status and its relationship with preterm birth. The link between SES and rate of preterm birth has long been noted, with higher rates of preterm birth in low SES populations (Rider, Taback & Knobloch, 1955). Although no one factor has been shown to cause this disparity, Kramer, Goulet, Lydon, Seguin, Dassa, Platt, and Chen (2001) have hypothesized a number of causal pathways to account for the higher rates of preterm birth in mothers with low SES. Unequal access to prenatal health care and poor diet are posited as two possible reasons for this trend. Additionally, there are higher rates of maternal smoking, caffeine, and drug use in the low SES population, all of which have been associated with preterm birth. Maternal stress, anxiety, and depression also have been shown to be correlated with low SES. These latter factors were hypothesized as a possible cause of preterm birth by Kramer and his colleagues. Lastly, increased rates of bacterial infections, especially those of the vaginal area, have been seen in women with low SES, and were another possible factor cited by Kramer and his

colleagues.

In recent years, the SES makeup of families with children hospitalized in the neonatal intensive care unit (NICU) has shifted slightly. This is due to advances in the medical field of fertility enhancement that have resulted in increased options available to couples unable to conceive through natural means. Some fertility techniques, such as in vitro fertilization, are more likely to result in multiple births. Twins are twice as likely as singletons to be born before 37 weeks, and higher order multiples are almost guaranteed to be born preterm (Gardner, Goldenberg, Cliver, Tucker, Nelson, & Copper, 1995). Singletons conceived through fertility treatments are also at a greater risk of being born preterm (Wang , Norman, & Kristiansson, 2002). Infertility treatments can be extremely costly, and higher SES families are more likely than low SES families to utilize infertility treatments (Smith, Eisenberg, Glidden, Millstein, Cedars, Walsh, Showstack, Pasch, Alder, & Katz, 2011). Therefore, it stands to reason that the past few decades have seen a rise in the number of high-income families with children in the NICU.

Stress and anxiety in mothers of children born preterm. Parents of children hospitalized in the NICU have a variety of reactions to the preterm birth of their child. The parental stress associated with preterm birth may be the result of several factors including the child's health, financial hardship, and physical and emotional isolation from their infant (Bell, 1997). The source of stress associated with having a child in the NICU may also change over time. Initially, not being able to hold their infant was a primary stressor for parents of hospitalized neonates, but later on in the hospitalization as the child's health grew more stable, being able to hold the infant became a primary stress factor (Alfonso, Hurst, Mayberry, Haller, Yost, & Lynch, 1992).

The mothers of children born very preterm (<33 week gestational age) have higher rates of both depression and anxiety than mothers of children born full term (Gennaro, 1988; Singer, Salvator & Guo, 1991). One study found relatively low rates of clinically significant anxiety (18%) in mothers of preterm infants during the NICU stay, although this number was significantly higher than the rates of clinically significant anxiety in the mothers of full term children (7%) (Carter, Mulder, Bartram, Darlow, 2005). Other studies have found higher rates of stress-related disorders, and post-traumatic stress disorder has been indicated in up to 39% of mothers of high-risk newborns (Muller-Nix et al., 2004).

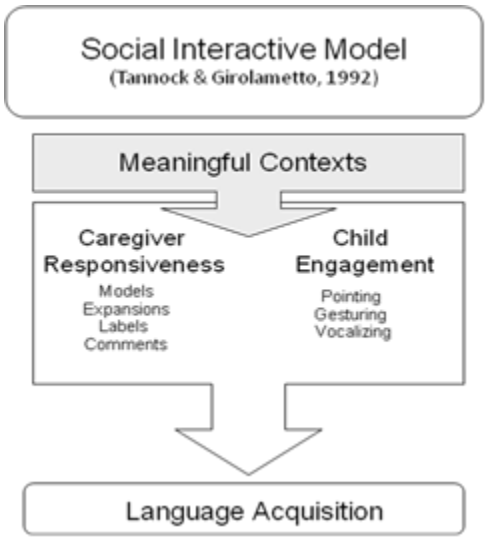
Caregiver Responsiveness

Environmental factors, such as previously described parental stress and SES as well as the increased risk of motor, language, and cognitive delays in children born preterm have important implications when considering the formation of high-quality, responsive interactions between a child and his or her caregivers.

Caregiver responsiveness and child engagement together form a central tenant of the social-interactive model of language acquisition (Tannock & Girolametto, 1992). In this model, the interaction between the child and caregiver are important in the acquisition of a language system. A high-quality social environment provides the support for the child's development of language. In particular, specific types of social interactions are considered facilitative in the language acquisition process. Interactions associated with high levels of language proficiency are referred to as responsive language. Responsive language input has been described as providing children models, expansions, labeling, and comments that follow the child's lead in meaningful contexts

(Girolametto et al., 2000). This type of maternal input aids the language acquisition process by reducing contextual ambiguity, providing redundancy, and increasing the saliency of the interaction, which in turn reduces the cognitive demands placed on the child, leaving more cognitive resources available for language learning (Harris, Jones, Brookes, & Grant, 1986; Tomasello & Todd, 1983). In contrast, language input that is not responsive has been characterized as that which ignores, interrupts, or rejects the child's utterances (Girolametto et al., 2000). Child engagement involves periods of joint attention and joint action that occur between a child and the caregiver in meaningful contexts (Tannock & Girolametto, 1992) (See figure 1).

Figure 1.



Maternal responsiveness measures. Maternal responsiveness and child interactions have been defined and assessed in a variety of ways by different researchers and in different fields. Frequency of responsive behaviors, such as the number of imitations, interpretations, labels, and expansions used by the mother, is one way to measure responsiveness (Girolametto et al., 1999). Beckwith, Cohen, Kopp, Parmalee, and Marcy (1976) subdivided responsiveness into two categories, measures of talk (i.e.,

number of comments, contingent response, commands, etc.) and measures of touch (i.e., holding child, kissing, removing object from child's hand, etc.). Still other researchers use scales, such as the CARE Index, which is an instrument that evaluates a mother's interaction in three categories: sensitivity, control, and unresponsiveness (Forcada-Guex et al., 2006). This variation in the methods used to define and measure maternal responsiveness has implications on how the results of these studies can be interpreted.

Additionally, responsiveness can be measured in a variety of settings. Some researchers have chosen to study maternal responsiveness in highly natural settings, such as the child's home with toys and activities that have not been predetermined by the researcher (Beckwith et al., 1976). Other researchers observed interactions during visits to a laboratory, controlling the setting by asking the mother to play with a standard set of toys, which allows for a more direct comparison between mothers (Rocissano & Yatchmink, 1983).

Maternal responsiveness and child language outcomes. Several studies have highlighted the relationship between maternal responsiveness and child language abilities. The relationship between the type of linguistic input the child receives during interactions with his or her mother and later language development has been documented in children in the general population (Nelson, 1973) and in children with language deficits (Girolametto et al., 1999). Girolametto and his colleagues found that certain maternal behaviors were highly correlated with later language outcomes in children who were identified as late talkers. Specifically, children whose mothers frequently imitated and expanded their child's utterances had larger expressive vocabularies four months after the interactions were observed. It should be noted that this study was correlative in

nature and did not indicate causation.

The associations between maternal interaction style and child language outcomes have also been studied in the preterm birth population. The findings of these studies are consistent with other findings noted previously with the full term population; a responsive maternal interaction style is positively associated with language outcomes in children born preterm. In fact, a high-quality maternal interaction style may soften some of the adverse effects associated with preterm birth. A study by Cohen, Beckwith, and Parmelee (1978) divided 50 children born preterm into two groups based on receptive language competency at age 2;0 years. The two groups were found to be very similar in terms of gestational age at birth, length of hospital stay, and birth weight. The factor that separated the high and low language competency groups was the maternal interaction style. The mothers who had children in the high receptive language competency group used positive verbal interactions such as praising the child, imitating the child, and making comments about the environment more frequently than the mothers of children in the low language competency group. The mothers of children with children in the high language competency group also showed more positive attentiveness, spending more time affectionately touching the child, helping the child, and facilitating the child's play. These findings have been replicated by other researchers, who have found that maternal interactions during play can in some ways moderate the negative effects of preterm birth in other areas of development. A high-quality maternal interaction has been found to have positive effects on visual-spatial processing (Dilworth-Bart, Poehlmann, Miller, & Hilgendorf, 2011) and sensorimotor development (Beckwith et al., 1976).

Factors that Influence Maternal Responsiveness

Maternal responsiveness has been studied in a variety of populations, many of which have implications for the interactions of mothers with their children born preterm. The studies also give insight into what factors influence the way a mother interacts with her child. These factors can be subdivided into three categories 1) characteristics of the mother 2) characteristics of the child and 3) characteristics of the environment.

Characteristics of the Mother

SES. As previously discussed, rates of preterm birth are much higher for mothers with low SES. Therefore, it is important to understand the differences in maternal interaction style that are associated with changes in SES. SES is comprised of many factors including family income, occupation, number of parents living in the home, and parental education. Education level, outside of extreme poverty, has been found to be the most influential component of SES when evaluating maternal behavior (Bornstein, Hahn, Suwalsky, & Haynes, 2003), and maternal SES is often measured by the maternal education level in studies of child language outcomes (Dollaghan, Campbell, Paradise, Feldman, Janosky, & Pitcairn, 1999; Hoff, 2003).

Some mothers from low SES backgrounds interact with their children differently from mothers from higher SES backgrounds. Specifically, differences have been found in the mothers' number of utterances and number of topic-continuing replies made to their children's communication bids (Hoff, 2003). The vocabulary used during dyadic play of low SES mothers is also less varied than high SES mothers (Hart & Risley, 1995; Hoff, 2003). Over time, these differences in interactions add up to substantially different communicative environments. It is estimated that children from low SES families hear

approximately 400 fewer utterances each day (Rowe, 2008). Several hypotheses exist to explain these observed differences. The hypotheses include differences in knowledge and beliefs of the caregiver about child development (Rowe, 2008), decreased language skill of the caregiver (Borduin & Henggeler, 1981), or a different style of communication used by the caregiver with all communication partners, not just children (Hoff-Ginsberg, 1991; Rowe, 2008).

SES also has been found to be a confounding factor in the interactions of mothers with their children born preterm. Mothers with low SES were shown to be more likely to exhibit an unresponsive maternal style than mothers of higher SES (Potharst et al., 2012).

Maternal stress. The maternal stress associated with preterm birth may have a negative impact on the formation of high-quality mother-child interactions. Muller-Nix et al. (2004) found that during dyadic play with their 6 month-olds, the mothers of children born preterm who experienced high levels of maternal stress during the perinatal period were found to be less sensitive and more controlling than the mothers of children born full term. However, these differences in maternal interaction were not found in the dyadic play of mothers when the children had reached the age of 18 months. Muller-Nix and her colleagues hypothesized that this may be due to an increased ability for mothers to cope with the challenges of raising a child and the increasing medical stability of the child.

Characteristics of the Child

Engagement of the Child. Communication is a two-way street in which each communication partner takes turns sending and receiving the message. The communication process is reciprocal in nature, and some children, especially those who are fussy or do not vocalize frequently, may not make ideal communication partners.

Recall that engagement of the child is one of the central components of the social interactionist theory, and, with caregiver responsiveness, creates the language learning environment. Children born preterm exhibit some behaviors that may influence their parent's ability to engage the child. For example, children born preterm more frequently divert their attention away from an object of joint attention than children born full term during play with their parents (Landry, 1986). Periods of joint attention have been hypothesized to aid the language acquisition process by providing important "linguistic scaffolding" for the child (Tomasello & Farrar, 1986).

Children born preterm also exhibit other behaviors that may not be beneficial to a parent who is attempting to engage their child. When compared to children born full term, children born preterm show less positive affect (Garner & Landry, 1992), and fuss and cry more (Brachfeld et al., 1990). In addition to this, infants born preterm have been described as being less socially responsive (Malatesta, Grigoryev, Lamb, Albin, & Culver, 1986). They also vocalize less frequently than their term counterparts and therefore provide fewer opportunities for their care providers to respond to their vocalizations (Salerni et al., 2007). These behavioral characteristics of children born preterm may have a transactional relationship with the characteristics of the mother, meaning that the child's behavior is influencing the mother's responsiveness and vice versa.

Gender of the child. The evidence to support gross differences in maternal interactive style based on the child's gender is somewhat mixed. Mothers initiate interaction and respond to communication attempts as frequently with their female children as with their male children in structured play (Gunnar & Donahue, 1980).

However, some specific types of maternal interaction have been found to be variable based on the gender of the child. For example, mothers tend to use more directives with male versus female children during free play and bath time (Flynn & Masur, 2007).

O'Brien and Nagle (1987) found that mothers use much more expressive language when engaging in play with toys that are considered traditionally "feminine" (e.g., dolls) when compared to toys that were considered traditionally "masculine" (e.g., cars). Although they did not examine specifically the differences between input to the different genders, it stands to reason that female children may hear more expressive linguistic input from their mothers if they often engage together in play with traditionally feminine toys such as dolls.

Age of the child. Several studies show that a mother's overall interactive style stays fairly consistent as a child ages. That is, responsive mothers tend to stay responsive over time (Masur & Turner, 2001). Although the rates of child vocalization increases with age, mothers initiate and respond to their infants at similar rates when their children are 6, 9, and 12 months of age (Gunnar & Donahue, 1980). However, the particular types of responsive behaviors and language used during play do change as children mature. In a longitudinal study of the types of linguistic input that mothers use during play, Halliday and Leslie (1986) found that some maternal behaviors are consistent over time, but others are not. Their research indicates that mothers consistently use questions, directives, and detailed labels as their children age from 9 months to 36 months. Although these behaviors could be observed across the age span, some behaviors occurred more or less frequently at certain ages. The frequency that mothers asked questions increased as the children grew older and had the cognitive and linguistic capabilities to respond to the

questions. Imitations of the child's vocalizations were used by the mothers only before the child began independently labeling items. As children began to label items independently, mothers began expanding and evaluating their utterances. Additionally, variation in the mother's prosody, which is one aspect of responsive interaction, peaks when the child is 4 months old (Stern, Spieker, Barnett, & MacKain, 1983).

Characteristics of the Environment

Context of the interactions. The context in which social interactions occur can have a profound impact on the linguistic exchanges between two communicators. When examining the dyadic interactions of mothers with their infants, it is important to take into consideration the context in which the interaction took place, and consider what effect it may have on the types of maternal linguistic behaviors. As previously noted, O'Brien and Nagle (1987) found that mothers provided significantly more linguistic input, especially in the form of questions and nouns, during play with dolls when compared to play with vehicles. They also found that play with a shape sorter elicited the most frequent use of directives from the mothers. Flynn and Masur (2007) examined the social interactions of mothers and their full term children in two different contexts, play and bath time. They found that mothers used nearly twice the number of supportive directives, directives that follow the attentional focus of the child, during play than during bath time. Bath time also elicited more use of intrusive behavioral directives, directives that do not follow the child's attentional focus.

Maternal Responsiveness and Children Born Preterm

Given that high-quality, responsive interactions of a mother with her child have important impacts on the child's later development, the study of mother-child interactions

in the preterm population has important implications for early intervention. The interactions of mothers of children born preterm have been directly compared to the interactions of mothers with their children born at term. The literature in the area of preterm birth and its impact on maternal interactive style is somewhat at odds, and these studies have found varying degrees of responsiveness in the mothers of infants born preterm when compared to mothers of infants born full term.

As previously noted, a medically fragile child can be extremely anxiety inducing for new parents. It may be difficult for some parents to overcome these challenges and form high-quality interactions with their children. One study evaluated the interaction patterns of mothers with their children born preterm or full term at 6 months (Forcada-Guex et al., 2006). The mothers of children born preterm who participated in this study were more likely to have a controlling interaction pattern with their children (i.e., 28% of the time) than mothers of children born full term (i.e., 12% of the time). A controlling interaction pattern was defined as a dyad in which the mother scored highly on the "control" subscale of the Care Index (Crittenden, 1988). Crittenden defines a controlling interaction as one in which "the adult controls the choice and duration of the activity in spite of clear signals that it is not liked by the infant, has been continued too long, or is too difficult (e.g., forcing an eager baby to sit through an entire demonstration, refusing to let a child play with a desired toy or to use it as he/she wishes (p. 173)). The controlling interaction pattern also was associated with less favorable outcomes on the Griffiths developmental scales (Griffiths, 1954).

Preterm birth may have implications for maternal-child interactions even into preschool (Potharst et al., 2012). Potharst and colleagues evaluated the interactions of

mothers with their five-year-old children (n=94 preterm and n=84 at term). The children in the preterm group received less support for autonomy (i.e., their mothers were more intrusive, rejected their child's initiatives, or took excessive control over play) than their term-born counterparts during play. This difference was observed across SES levels, and differences in maternal education level could only partially account for the observed differences in interaction style. Children with severe disabilities and children of mothers with a low educational level received the least amount of support for autonomy.

In addition to the findings of Potharst et al., the mothers of preterm children also have been shown to smile less at their children. This finding is evident up until the child has reached his or her first birthday (Leiderman & Seashore, 1975).

Mothers of preterm infants also may follow a different turn-taking routine during interactions with their children. In comparison to mothers of children born full term, mothers of children born preterm were found to take a more active role in the turn-taking, guiding the structure of interaction with their very young infants (Reissland & Stephenson, 1999). These authors posit that this interaction pattern may have an adverse effect of the formation of high-quality dyadic interactions. The interactions of mothers and their infants born preterm have also been described as dysynchronous in comparison with mothers' interactions with infants born full term (Feldman & Eidelman, 2007). This research found that mothers of children born preterm had difficulty coordinating their social interactions with their infants' alertness level, resulting in dysynchrony in the interaction.

Although the preterm birth of a child presents many obstacles for achieving high-quality social interactions with mothers, some studies have shown that mothers are able

to overcome these obstacles and engage in high-quality, responsive interactions with their babies. Shortly after birth, the mothers of babies born preterm responded to a higher percentage of their children's non-cry vocalizations during interactions in the home (Reissland & Stephenson, 1999). Mothers of infants born preterm also have been shown to demonstrate more affectionate behavior than the mothers of children born full term (Crawford, 1982) and to seek more physical contact with their infants than mothers of full term infants (Malatesta et al., 1986).

Directive Language Input

Directive use is frequently measured in studies of maternal responsiveness, such as those previously described. A directive maternal style, which is characterized by the frequent use of imperatives, has long been thought to have detrimental effects on a child's language outcomes (Nelson, 1973). Since this early work, directives often have been associated with intrusive and insensitive maternal interactions that do not facilitate language growth in children. Directives may be detrimental to language acquisition because they do not provide a rich language model. Directives are generally short and do not typically use a rich vocabulary or complex morphosyntactic structure (e.g., "Stop that" "Come here", "Put that down"). Additionally, a directive maternal style has been associated with less child engagement, an important factor in the social interactionist model of language acquisition (Prizant, Wetherby, & Roberts, 1993). However, this negative view of directives is only partially supported by the literature. Whereas some studies do indeed suggest that directives are non-facilitative (Nelson, 1973; McDonald & Pien, 1982; Murray & Hornbaker, 1997), other studies, however, have shown no correlation between directives and child language outcomes (Tomasello & Todd, 1983;

Carpenter, Nagell, & Tomasello, 1998). Still other researchers have found positive relationships between directives and child language outcomes (Barnes, Gutfreund, Satterly, & Wells, 1983; Shimpi, Fedewa, & Hans, 2011). Those that have found directives to be facilitative in the language acquisition process posit that directives may provide a very salient connection between words, objects, and events and place a relatively small load on the child's language processing abilities, thus freeing up other cognitive resources to devote to language comprehension and production (Barnes et al., 1983). The conflicting findings in the literature may be due in part to a lack of a consistent definition of what constitutes a directive.

Combining all commands into a single category of directives may not be a useful way to determine the role of directives in the language acquisition process. Close evaluation of maternal directives in the interactions of mothers with their young children have yielded interesting findings (Flynn & Masur, 2007; Pine, 1992; McCathren et al., 1995). For instance, McCathren et al. (1995) posit that directives that follow the child's attentional focus (i.e., refer to objects, activities, and referents that the child is currently attending to) serve to increase the saliency of the utterance and facilitate language growth. This is in contrast to other types of directives that may be less facilitative in the language acquisition process because they contain referents to which the child is not currently attending.

A study conducted by Flynn and Masur (2007) provides additional support for the division of directives into separate sub-categories based on the child's attentional focus. In their research, Flynn and Masur divided directives into two groups: 1) supportive and 2) intrusive. Supportive directives were defined as commands that

followed the child's attentional focus (e.g., saying "turn the square around" while the child was attempting to fit a square piece into a shape puzzle). Conversely, intrusive directives were defined as directives that do not take into consideration the attentional focus of the child. Intrusive directives are further subcategorized by Flynn and Masur (2007) into two types of intrusive directives: intrusive behavioral directives and intrusive attentional directives. Intrusive behavioral directives seek to modify the child's behavior, and do not take into consideration the current attentional focus of the child (e.g., the child is stacking blocks and the mother says "put the cow in the barn"). Intrusive attentional directives seek to modify the child's current attentional focus (e.g., the child is playing with a toy cow and the mother points to a pig and says "look at the pig"). In keeping with the social interactive model, the supportive directives, which follow the child's lead, would be considered responsive on the part of the mother. These types of directives are hypothesized to be beneficial in the language acquisition process by Flynn and Masur (2007), as they provide a direct connection between the child's focus and the words the child is hearing. Conversely, the intrusive directives do not follow the child's lead or provide a link between the child's focus of attention and the words he or she hears. Therefore, behavioral and attentional intrusive directives are theorized to be adverse to language development by these researchers.

Flynn and Masur (2007) examined maternal interactions with their typically developing children at 10, 13, 17, and 21 months of age in two naturalistic settings (i.e., free play and bath time). The results of their study indicated that high rates of responsive language were negatively associated with the use of intrusive directives. In contrast, supportive directives were found to occur frequently in the language of mothers that were

highly responsive in their interactions with their children. Their findings provide validation for separating directives into distinctive categories.

Masur, Flynn, and Eichorst (2005) sought to determine the relationship between different types of directives and later expressive language achievement at 10, 13, 17 and 21 months of age. They found that the use of supportive directives by mothers during play was positively associated with reported expressive vocabularies. However, it should be noted that this positive association was found only for the children between the ages 13-17 months of age. These researchers posit that these children are entering into a period of rapid vocabulary development, and may be more sensitive to maternal verbal interactions at this age than at previous ages. As expected, the use of intrusive directives was found to be negatively associated with reported expressive vocabularies. This study provides further validation for the separation of intrusive and supportive directives into two distinctive categories in future research of maternal directive use.

Rationale and Statement of the Problem

The social interactionist theory, in which child engagement and maternal responsiveness together drive the language acquisition process, provides the theoretical framework for this study. A child's sociolinguistic environment has been shown to have a profound impact on later language development. High-quality interactions with caregivers are related to more favorable language outcomes (Girolametto et al., 1999). Mothers of children born preterm may be more likely to adopt an unresponsive maternal interaction style than the mothers of children who were born at full term (Potharst et al., 2012). In particular, it has been suggested that these mothers are more directive during their play interactions with their children (Murray & Hornbaker, 1997).

However, previous studies have not evaluated directive linguistic behaviors by considering that some directive behaviors may be facilitative and some may not be facilitative. Thus, the relationship between different types of directives (i.e., supportive and intrusive) and language outcomes has yet to be determined with the preterm population. Given that children who are born preterm are already at a higher risk for language impairment, a better understanding of the complex relationship between maternal responsiveness, directive language input, preterm birth, and language outcomes is needed.

Although one other study has shown that mothers of children born preterm use more directives than mothers of children born full term (Murray & Hornbaker, 1997), this study has not evaluated closely the types of directives produced by the mothers and how they are being utilized during play. Given that it has been hypothesized that different types of directives have different implications for the language acquisition process (McCathren et al., 1995), it is important to take a closer look at the types of directives being used by these mothers. Additionally, research has indicated that supportive directives, that is, directives that follow the child's attentional focus, are associated with increased expressive vocabularies in children 13 and 17 months old (Masur et al., 2005). As previously described, children during this age of language acquisition are at the cusp of a period of rapid expressive language development, and may be sensitive to maternal interactions that provide a very salient connection between the words that they hear and their referents.

The present study seeks to add to the literature base on the mother-child interactions, particularly directiveness, of mothers with their children born preterm. This

is the first study to evaluate the specific types of directives used by mothers of children born preterm. The purpose of this study is to gain a better understanding of the role that different types of directives, supportive and intrusive, play in the language acquisition process and how these directives are used differentially in mothers of children born full term and preterm. The following research questions were addressed in the study:

Research Question 1: Do mothers of children born preterm differ from mothers of children born full term in their use of supportive, intrusive behavioral, and intrusive attentional directives?

Research Question 2: Is there a relationship between the use of supportive, intrusive behavioral, and intrusive attentional directives and the language development of children born preterm and full term?

Predictions

The mothers of children born preterm face many barriers to the formation of high-quality dyadic interactions with their children. These barriers include maternal factors such as the stress and anxiety associated with raising a medically fragile child, as well as child factors such as higher rates of language delays, attention deficits, and more frequent fussing and crying. A view that adopts the idea that mothers of children born preterm are overstressed due to the early birth of their child and its potential accompanying complications might lead to two possible scenarios. In the first, the mother may provide more intrusive directives allowing her more control over the play situation, guiding the child's play without respect to the child's attentional focus. This view would predict high proportions of intrusive directives in the utterances of the mothers in the preterm group. A differing scenario predicts that the mothers have been able to overcome the challenges associated with the preterm birth of their child, and will not use higher rates of intrusive directives. Based on the work of Potharst et al. (2012) and Murray and Hornbaker (1997),

it is predicted that the mothers of children born preterm will have a greater proportion of intrusive directives when compared to mothers of children born full term, supporting the initial scenario. It is not known if mothers of children born preterm will produce more or less supportive directives compared to mothers of children born full term.

Traditionally, the use of directives by caregivers has not been considered facilitative of language learning in young children, as directives do not provide a rich language model and result in less child engagement (Prizant et al., 1993). However, other researchers posit that certain types of directives, in particular, those that follow the child's attentional focus, provide a salient connection between the words the child is hearing and their referents, and are therefore facilitative of language growth (Flynn & Masur, 2007; McCathren et al., 1995). Based on this latter view, it is predicted that the proportion of supportive directives used by the mothers during play with their children will be positively correlated with child language outcomes on the REEL-3 (Bzoch, League, & Brown, 2003). Conversely, it is predicted that the proportion of behavioral and attentional intrusive directives used by the mothers will be negatively correlated with language outcomes on the REEL-3.

Methods

Participants

Five children born preterm and 5 children born full term and their mothers participated in this study. The children born preterm were matched to children born full term using their age corrected for prematurity. This method of matching is a standard practice in the study of children born preterm. Participants in the preterm (PT) group were identified and recruited through an existing database of children born preterm.

These children were participants in a larger study examining the effects of patterned orocutaneous stimulation on sucking in children born preterm (S.Barlow). Exclusionary criteria for this study included chromosomal and congenital anomalies abnormal neurological status (i.e., head circumference < 10^{th} or > 90^{th} percentile, intracranial hemorrhage above a grade II, abnormal response to light or sound, or seizures), necrotizing enterocolitis, mechanical ventilation, or sepsis. The children in the PT group were born between 8 to 10 weeks preterm, with an average of 9.5 weeks premature (SD=.845 weeks). Their birth weight ranged from 1,180-2,109 grams, with an average birth weight of 1,664 grams (SD=344.59). Three female and two male children participated. At the time of testing, the children ranged in age from 9 to 15 months corrected for gestational age at birth (e.g., a child whose chronological age was 11 months old who was born two months preterm would have a corrected age of 9 months). All of the children passed a newborn hearing screening in the NICU. The mothers in this group came from a variety of SES levels. Information on occupation, family income, and the mother's education level also was gathered. One of the mothers completed high school, two completed some college, one completed an Associate's degree, and one completed a Bachelor's degree. The characteristics of the children and mothers in the preterm group can be seen in Table 1 and Table 2.

Table 1. Characteristics of the Children Born Preterm (PT)

ID	Birth Weight (g)	Days Preterm	Corrected Age (Mo)	Gender
PT 1	1660	65	13	Female
PT 2	2109	63	15	Female
PT 3	1180	72	15	Male
PT 4	1830	60	9	Female
PT 5	1541	59	14	Male

Table 2. Characteristics of the Mother/Family of Child Born Preterm.

ID	Maternal Education Level	Occupation	Household Income
PT 1	HS/GED	Homemaker	$21,000-40,000
PT 2	some college	Daycare provider	$21,000-40,000
PT 3	AA	Deputy City Clerk	$41,000-80,000
PT 4	some college	Homemaker	$41,000-80,000
PT 5	BS	District Manager	above $100,000

Note. HS is High School, GED is Graduation Equivalent Degree, AA is Associate's Degree, and BS is Bachelor's of Science Degree.

The participants in the full term (FT) group were identified and recruited through public advertisements and the Participant Recruitment and Management Core (PARC) program for the Center for Biobehavioral Neurosciences in Communication Disorders (NIH P30) at the University of Kansas. As previously described, differences in child gender, age, and maternal SES (i.e., as measured by maternal education level) are all associated with changes in maternal responsiveness. Therefore, the children and mothers who participated in the FT group were matched to the children in the PT group on three parameters: maternal education level, child gender, and child age (within one month). The age of the children in the FT group were matched to the corrected ages of the children in the PT group. Exclusionary criteria for the FT group included birth before 38 weeks GA and any known hearing, speech, language or cognitive delays or disorders. This latter information was obtained via telephone survey by the researcher. The characteristics of the children and the mothers in the FT group can be seen in Table 3 and Table 4.

Table 3. Characteristics of the Children Born Full Term.

ID	Age (Mo)	Gender
FT 1	13	Female
FT 2	15	Female
FT 3	14	Male
FT 4	9	Female
FT 5	14	Male

Table 4. Characteristics of the Mother/Family of Child Born Full Term.

ID	Maternal Education Level	Occupation	Household Income
FT 1	HS/GED	Customer service	$41,000-80,000
FT 2	some college	Manager/daycare provider	$41,000-80,000
FT 3	AA	Paraprofessional	$41,000-80,000
FT 4	some college	Student	$20,000 or less
FT 5	BS	Office assistant	$21,000-$40,000

Note. HS is High School, GED is Graduation Equivalent Degree, AA is Associate's Degree, and BS is Bachelor's of Science Degree

Data Collection

Dyadic interactions. The dyadic interactions were video- and audio-recorded during a single session either at the child's home or in the NICU Follow-up Clinic, whichever was preferable to the parent. Nine of the ten play samples were recorded in the child's home. One sample was recorded in the NICU Follow-Up Clinic (PT 3). The play sessions were recorded in a well-lit, open area. The set of standard toys made available to the dyads included a barn with animals, a set of stacking rings, a stacking peek-a-boo toy, and a set of connecting beads (Appendix A). The mother was asked to play with her child as she might normally do. The sessions were recorded for approximately 15 minutes, or until the child lost interest with the toys. The length of the play samples ranged from 9:32 to 18:12 (minutes: seconds). Play sample lengths for each

of the dyads can be seen in Table 5. A Wilcoxon Sign-ranked test revealed that there were no statistically significant differences between the PT and FT groups with respect to length of sample.

Table 5.

Participant Pair	PT	FT
1	10:44	13:18
2	10:21	16:04
3	16:57	9:32
4	17:43	16:43
5	15:00	18:12
Wilcoxon Z	-.405	
P value	.813	

REEL-3 administration. At the conclusion of the session, the researcher administered the Receptive and Expressive Emergent Language Scale-3 (REEL-3) (Bzoch, League, & Brown, 2003), a receptive and expressive language assessment. The REEL-3 contains two subtests, the Receptive Language subtest and the Expressive Language subtest. Additionally, a composite Language Ability score can be calculated to determine the child's overall language abilities. Raw scores for all subtests can be converted into standard scores, with a mean of 100 and a standard deviation of 15.

The REEL-3 is a parent report measure, meaning that the child's language abilities are assessed from information obtained from the parents instead of through direct observation. Research has demonstrated that primary caregivers are accurate reporters of

child language abilities (Meadows, Elias, & Bain, 2000). The REEL-3 focuses on the assessment of current and emergent skills, for which parents are particularly accurate reporters (Fenson et al., 1993). Using parents as the informant for assessment purposes also offers several advantages. A parent may know more about the child's language skills than what the child will demonstrate in the presence of an unfamiliar examiner. Additionally, parents interact with their child in a wide variety of situations, so parent report may be more representative of the child's actual language status.

The REEL-3 has strong psychometric qualities, as evidenced by strong validity and reliability. The assessment items were developed using a strong conceptual and theoretical framework and demonstrate adequate face validity. The items also were based on previous research of child language skills and all items were written using conventional item-writing guidelines, which serves as additional evidence for strong validity.

The REEL-3 also demonstrates strong reliability. Cronbach's coefficient alpha values were calculated for each of the subtests, with alpha values of .92 or higher for each of the subtests, well exceeding the standard alpha value of .75. Additionally, inter-rater reliability scores were determined using Cohen's kappa values. The mean kappa value for each of the subtests was .99, well exceeding the standard for "excellent" of .75.

For the purposes of administration of the REEL-3, the ages of the children in the PT group were corrected to account for their gestational age at birth. This means that if a child is 12 months old at the time of participation, but born 2 months early, their corrected age would be 10 months. The mother was also asked to fill out a demographic questionnaire at the time of participation (Appendix B).

Transcription and Coding of Dyadic Interactions

The interactions were transcribed from the videotapes and coded using standard Systematic Analysis of Language Transcripts (SALT) (Research Version 9, 2010) software and transcription procedures. The directives were coded based on definitions provided by Flynn and Masur (2007). The three groups of directives were as follows:

1) Supportive Directives (SD): Directives that follow the child's attentional focus.
    a. Example: The child is attempting to stack a ring and the mother says "Put the ring on top!"
2) Intrusive Behavioral Directives (IBD): Directives that attempt to modify the child's behavior in some way and do not follow the child's attentional focus.
    a. Example: The child is playing with a set of stacking rings and the mother says "Put the cow in the barn!"
3) Intrusive Attentional Directives (IAD): directives that attempt to modify the child's current attentional focus.
    a. Example: The child is looking at a toy pig and the mother points to a toy cow and says "Look at the cow!"

Transcription and Coding Reliability

Twenty percent of each transcript was transcribed and coded for directive types by an independent researcher in order to determine the inter-rater reliability for the transcription and coding of the interactions. The independent researcher was a student in the speech-language pathology program and was trained in transcription and coding procedures prior to transcription and coding of the samples.

Transcription reliability. Twenty percent of each transcript was transcribed independently by the independent researcher. After the independent researcher concluded her transcription, the two transcriptions were compared on a morpheme-by-morpheme basis. The number of agreements and disagreements were calculated. For example, if the primary researcher transcribed "There's the goat" and the independent researcher transcribed "Here's the goat", this would yield three agreements and one disagreement. The following formula was used to determine inter-rater transcriber reliability:

$$\frac{\text{\# of agreements}}{\text{\# of agreements + \# of disagreements}} \text{ X } 100$$

The reliability for the transcripts of the play interactions ranged from 87.7% to 96.8%, with a mean reliability of 90.9%.

Coding reliability. Twenty percent of each transcript was coded for directive use and type independently by the independent researcher using the same method as transcription reliability. For each utterance (i.e., within the 20% selected for reliability), the independent researcher determined if the utterance was a directive. If the utterance was a directive, the independent researcher determined the type (i.e., SD, IAD, IBD). The number of agreements and disagreements was calculated and the same formula described previously was utilized to determine coding inter-rater reliability. The reliability for the coding of utterances as directives or not directives was 99%. The reliability for the coding of directives into their respective category (i.e., SD, IAD, or IBD) was 89%. Categorized by directive type, the reliability for the coding of SDs was 72%, the reliability for the coding of IADs was 96%, and the reliability for the coding of IBDs was

100%. The relatively low reliability for the coding of supportive directives was attributed to their infrequent use in the samples selected for reliability analysis. Supportive directives were used only 11 times in the portions of the transcripts included in the reliability analysis, with only three being coded incorrectly. For two of the miscoded supportive directives, the child's attentional focus was difficult to determine due to the child's position relative to the camera.

Results

The purpose of this study was to determine if maternal directive use differs between mothers of children born preterm and full term. In particular, the first research question of this study focused on the maternal use of three types of directives: SDs, IADs, and IBDs during play. The second aim of the study was to further examine the relationship between maternal directive use and language outcomes in their children. Information on the play samples (e.g., MLU, number of utterances, etc.) can be found in Appendix C.

In order to answer research question one, a nonparametric version of the related samples t-test, the Wilcoxon signed-rank test, was utilized at an alpha level of .05 to analyze group differences in maternal directive use. This statistical test was chosen because the data violated the assumption of normal distribution required by the related samples t-test. The independent variable was group assignment, either FT or PT. The dependent variables were the number of directives (i.e., SDs, IBDs, and IADs) per utterance. This measurement was selected to control for sample length. Effect sizes were calculated to evaluate practical significance using the following formula: $r = z/\sqrt{n}$. Practical significance is an additional way to analyze data when sample size is small as in

the current study. The following standard values of *r* can be used to determine the magnitude of the effect and are useful when determining practical significance: .1 = small, .3 = medium, .4=large (Field, 2006).

For the second research question, the relationship between maternal directive type and child language outcomes was depicted visually using descriptive statistics. Pearson's correlation coefficients were calculated. However, these correlations were not expected to be statistically significant due to the small sample size (n=10). The statistical software IMB SPSS (version 20) was used to conduct all statistical analyses.

Results for Research Question 1

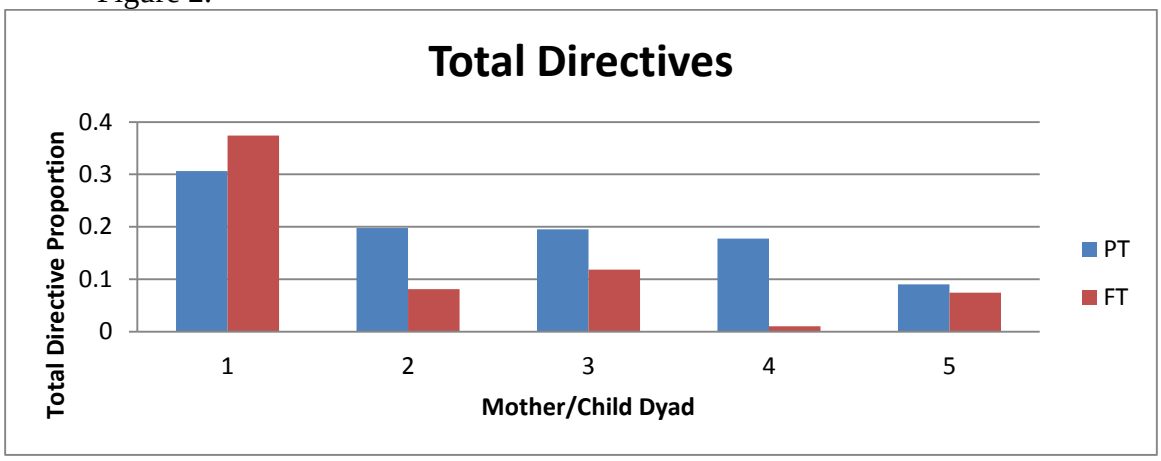
The first question addressed group difference in terms of maternal directive use. Proportions of directive use were calculated by dividing the number of directives by the total number of maternal utterances in the sample (See Appendix C). This method is the same used by Flynn and Masur (2007). Another metric, maternal directive use per minute, also was considered (See Appendix C). The data were analyzed using both metrics, with similar statistical outcomes. In this chapter, all analyses are reported using the proportion of directives in the mother's utterances.

$$\text{Proportion of directives} = \frac{\text{\# of directives (i.e., SD, IAD, or IBD)}}{\text{\# of maternal utterances in sample}}$$

Total directive use. Figure 2 displays the results of total maternal directive use for each matched FT and PT pair. A Wilcoxon signed-rank test was conducted to evaluate the differences in the proportion of directives used by the mothers in the two groups. There was no statistically significant difference between the FT and PT groups (the median total directive proportion for the PT group and FT group were .195 and .081, respectively; $Z = -1.483$, $p = .138$). The magnitude of the effect was large *(r* =.47). This

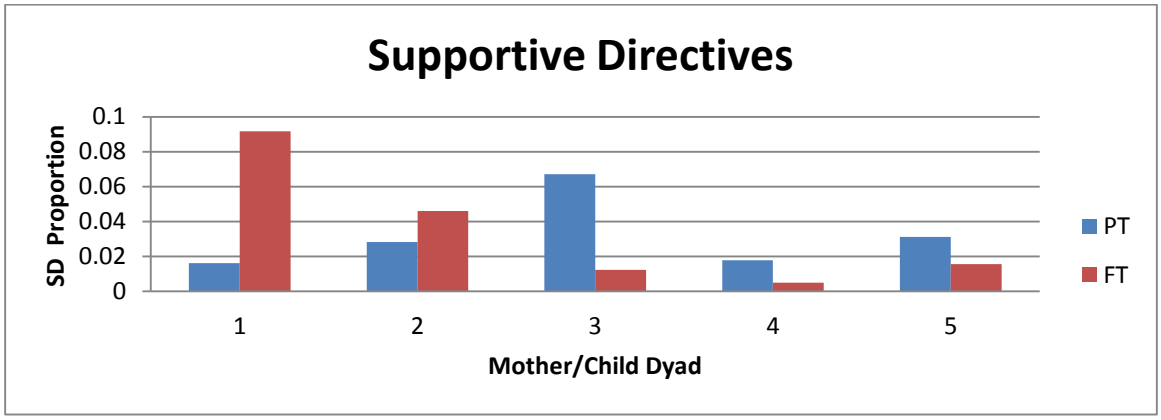
effect size exceeded the minimum recommended effect size for practical significance of .2 as reported by Ferguson (2009). A trend was present, with 4 of the 5 dyads showing a higher proportion of directives for the mothers of children born preterm. The only pair that differed was FT1, with 37% of her utterances being directives compared to PT1, who used directives in 31% of her utterances.

Figure 2.



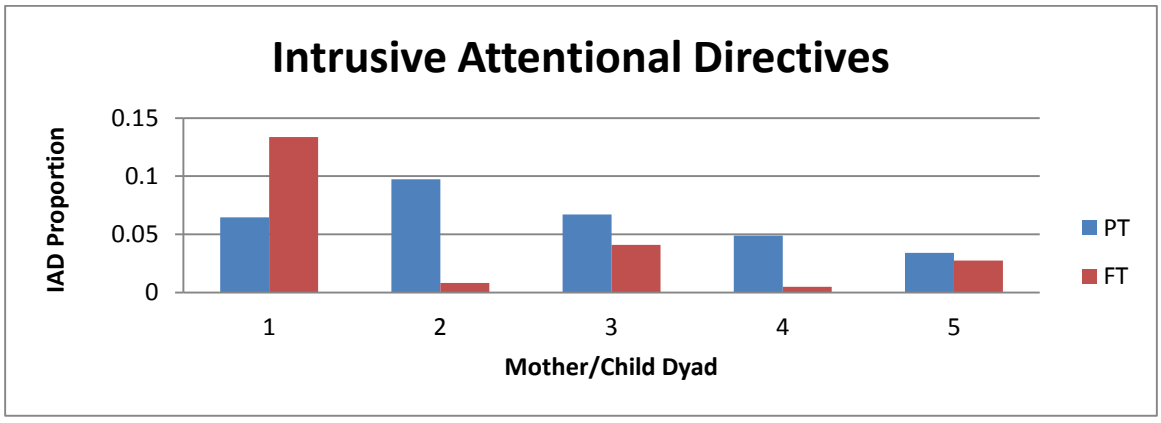
Supportive directives. Figure 3 displays the proportion of SDs in the utterances of the mothers in both groups. A Wilcoxon signed-rank test was conducted to evaluate the differences in SD use by the mothers in the two groups. There were no statistically significant differences between the FT and PT groups (the median SD proportion for the PT group and FT group were .028 and .015, respectively; $Z = -0.135$, $p = .893$). The practical significance of the magnitude of the difference yielded an effect size that was negligible ($r = .04$). Three of the PT dyads produced more than their matched FT dyads; however, the reverse was evident in the remaining two matched dyads.

Figure 3.



Intrusive attentional directives. Figure 4 displays the proportions of IADs in the utterances of the mothers in the FT and PT groups. A Wilcoxon signed-rank test was conducted to evaluate the differences in IAD use by the mothers in the two groups. The data revealed no statistically significant difference between the FT and PT groups (the median intrusive attentional proportion for the PT group and FT group were .065 and .027, respectively; Z = -.944, p = .345). Practical significance was achieved with a moderate effect size (r =.30).

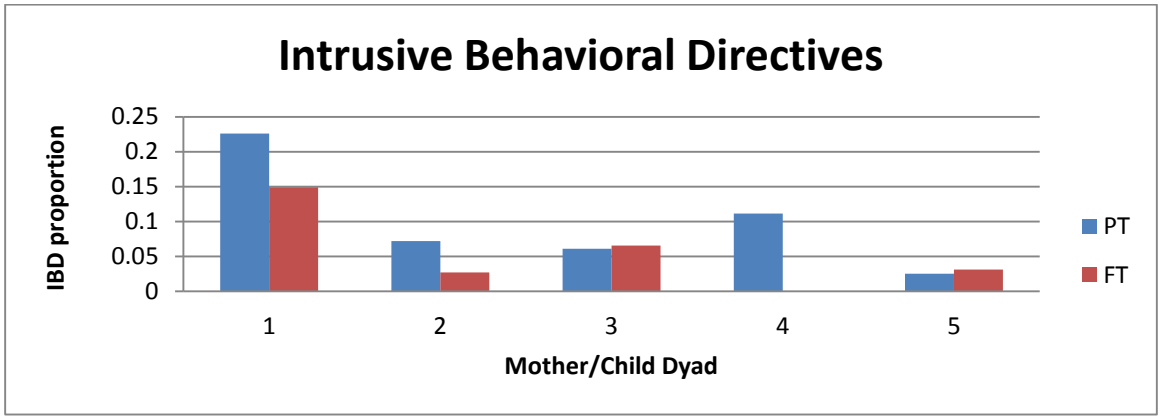
Figure 4.



Intrusive behavioral directives. Figure 5 displays the proportions of IBDs in the utterances of the mothers in the FT and PT groups. A Wilcoxon signed-rank test was

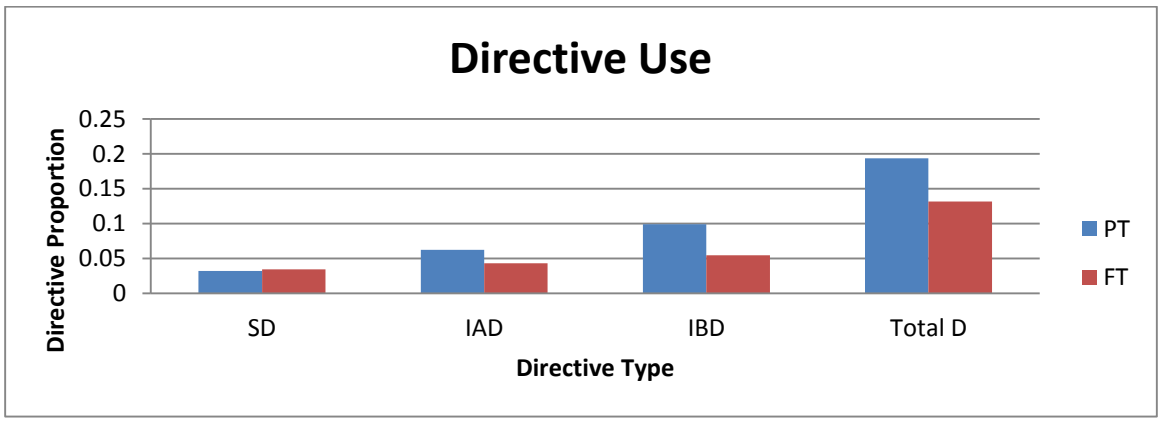
conducted to evaluate the differences in IBDs used by the mothers in the two groups. Again, no statistically significant differences were evident between the FT and PT groups (the median IBD proportion for the PT group and FT group were .072 and .031, respectively; Z = -1.214, p = .225). The magnitude of the effect size was moderate (r=.38) which met guidelines for practical significance.

Figure 5.



Summary of directive results. Figure 6 depicts a summary of the mean proportions for the PT and FT groups for each of the directive types and total directive use.

Figure 6.



Results for Research Question 2

The second question of the current study addressed the relationship between maternal directive use (i.e., SD, IAD, IBD) and language outcomes on the REEL-3. Tables 6 and 7 display the REEL-3 scores for each of the participants, as well as average scores and standard deviations for each of the groups. Wilcoxon signed-rank tests indicated no statistically significant differences between the FT and PT groups on any of the REEL-3 subtests or the REEL-3 language ability score.

Table 6. REEL-3 Standard Scores of the Children Born Preterm

	REEL-3 Subtests		
Participant Pair	Receptive Language	Expressive Language	Language Ability
PT 1	102	83	91
PT 2	100	90	94
PT 3	93	102	97
PT 4	112	109	112
PT 5	123	115	123
Mean(SD)	106 (11.68)	99.8 (13.22)	103.4 (13.61)

Table 7. REEL-3 Standard Scores of the Children Born Full Term.

	REEL-3 Subtests		
Participant Pair	Receptive Language	Expressive Language	Language Ability
FT 1	107	103	106

FT 2	103	98	101
FT 3	125	138	138
FT 4	93	107	100
FT 5	105	97	101
Mean(SD)	106.6 (11.61)	108.6 (16.92)	109.2 (16.27)

The relationship between REEL-3 scores and maternal directive use was explored using Pearson correlation coefficients. Table 8 displays Pearson correlation coefficients for the variables of interest. Note that the PT and FT groups have been combined for this analysis. No correlation coefficients above a weak relationship (i.e., <0.4) were present.

Table 8. Correlation Matrix (Full Term and Preterm combined).

Correlations

		SD	IAD	IBD	REEL_E	REEL_R	REEL_LA
SD	Pearson Correlation	1	.643*	.195	-.171	-.147	-.166
	Sig. (1-tailed)		.022	.295	.319	.342	.323
	N	10	10	10	10	10	10
IAD	Pearson Correlation	.643*	1	.617*	-.052	-.243	-.178
	Sig. (1-tailed)	.022		.029	.443	.250	.311
	N	10	10	10	10	10	10
IBD	Pearson Correlation	.195	.617*	1	.001	-.378	-.240
	Sig. (1-tailed)	.295	.029		.498	.141	.252
	N	10	10	10	10	10	10
REEL_E	Pearson Correlation	-.171	-.052	.001	1	.700*	.894**
	Sig. (1-tailed)	.319	.443	.498		.012	.000
	N	10	10	10	10	10	10
REEL_R	Pearson Correlation	-.147	-.243	-.378	.700*	1	.945**
	Sig. (1-tailed)	.342	.250	.141	.012		.000
	N	10	10	10	10	10	10
REEL_LA	Pearson Correlation	-.166	-.178	-.240	.894**	.945**	1
	Sig. (1-tailed)	.323	.311	.252	.000	.000	
	N	10	10	10	10	10	10

*. Correlation is significant at the 0.05 level (1-tailed).
**. Correlation is significant at the 0.01 level (1-tailed).

To determine if the relationship between maternal directive use and language outcomes on the REEL-3 varied based on group membership (i.e., PT or FT), Pearson correlation coefficients were calculated with regard to group membership. The results of this analysis are displayed in Table 9. When the PT and FT groups were analyzed separately, four of the correlations that were previously considered weak became strong, negative correlations in the mother/preterm dyads only. Specifically, a strong, negative relationship was found between maternal IAD use and outcomes on all three REEL-3 measures in the mother/preterm dyads. A strong, negative relationship also was found between maternal IBD use and the receptive language subscores on the REEL-3 in the mother/preterm dyads. No strong correlations were observed between any of the variables of interest in the FT group.

Table 9. Correlation Matrix (PT and FT separated).

Correlations

			SD	IAD	IBD	REEL_E	REEL_R	REEL_LA
PT	SD	Pearson Correlation	1	.111	-.525	-.489	.216	-.118
		Sig. (1-tailed)		.430	.182	.202	.363	.425
		N	5	5	5	5	5	5
	IAD	Pearson Correlation	.111	1	.146	-.761	-.738	-.820*
		Sig. (1-tailed)	.430		.407	.068	.077	.045
		N	5	5	5	5	5	5
	IBD	Pearson Correlation	-.525	.146	1	-.287	-.725	-.575
		Sig. (1-tailed)	.182	.407		.320	.083	.155
		N	5	5	5	5	5	5
	REEL_E	Pearson Correlation	-.489	-.761	-.287	1	.665	.902*
		Sig. (1-tailed)	.202	.068	.320		.110	.018
		N	5	5	5	5	5	5
	REEL_R	Pearson Correlation	.216	-.738	-.725	.665	1	.922*
		Sig. (1-tailed)	.363	.077	.083	.110		.013
		N	5	5	5	5	5	5
	REEL_LA	Pearson Correlation	-.118	-.820*	-.575	.902*	.922*	1
		Sig. (1-tailed)	.425	.045	.155	.018	.013	
		N	5	5	5	5	5	5

FT	SD	Pearson Correlation	1	.827*	.834*	.002	-.343	-.211
		Sig. (1-tailed)		.042	.039	.499	.286	.366
		N	5	5	5	5	5	5
	IAD	Pearson Correlation	.827*	1	.981**	.271	.011	.120
		Sig. (1-tailed)	.042		.002	.330	.493	.424
		N	5	5	5	5	5	5
	IBD	Pearson Correlation	.834*	.981**	1	.416	.112	.247
		Sig. (1-tailed)	.039	.002		.243	.429	.344
		N	5	5	5	5	5	5
	REEL_E	Pearson Correlation	.002	.271	.416	1	.785	.922*
		Sig. (1-tailed)	.499	.330	.243		.058	.013
		N	5	5	5	5	5	5
	REEL_R	Pearson Correlation	-.343	.011	.112	.785	1	.964**
		Sig. (1-tailed)	.286	.493	.429	.058		.004
		N	5	5	5	5	5	5
	REEL_LA	Pearson Correlation	-.211	.120	.247	.922*	.964**	1
		Sig. (1-tailed)	.366	.424	.344	.013	.004	
		N	5	5	5	5	5	5
*. Correlation is significant at the 0.05 level (1-tailed).								
**. Correlation is significant at the 0.01 level (1-tailed).								

Figure 7 displays a scatter plot depicting maternal IBD use and language scores on the receptive language portion of the REEL-3. A line of best fit has been applied for both subgroups to demonstrate the difference in slopes for the FT and PT groups. Figures 8, 9, and 10 display a scatter plot depicting maternal IAD use and language scores for all three subscores of the REEL-3. A line of best fit has been applied for both subgroups to demonstrate the difference in slopes for the FT and PT groups.

Figure 7.

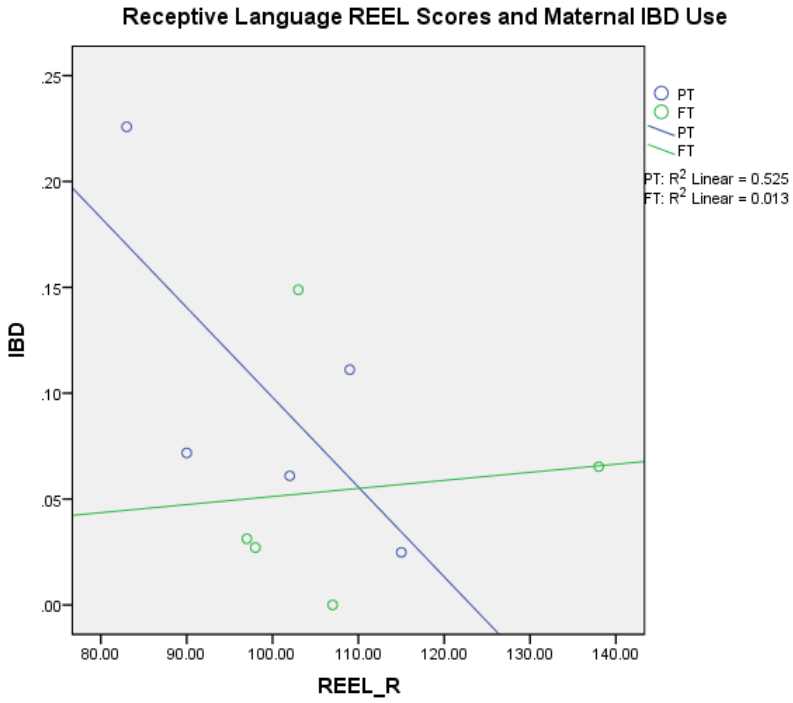


Figure 8.

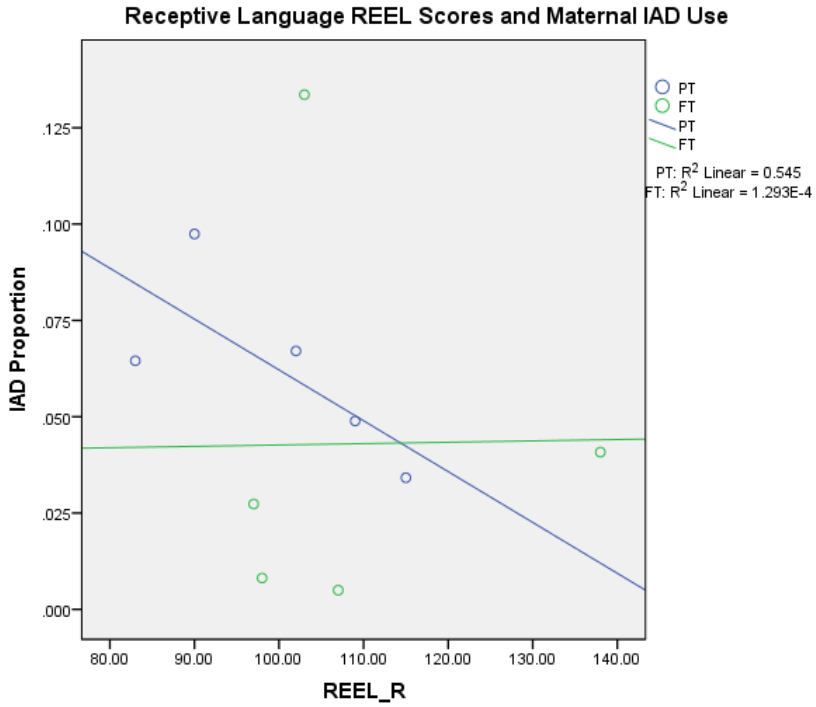


Figure 9.

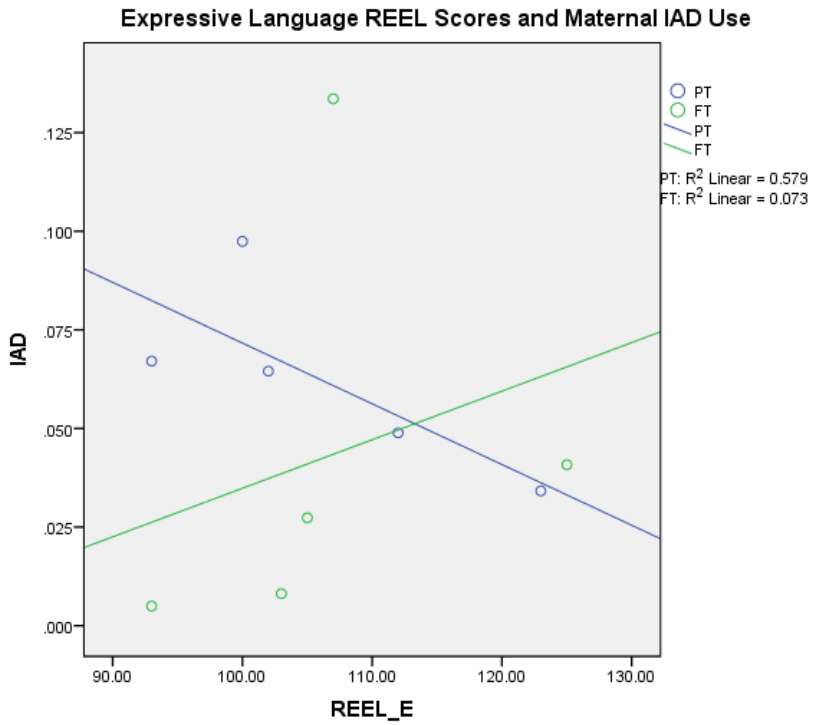
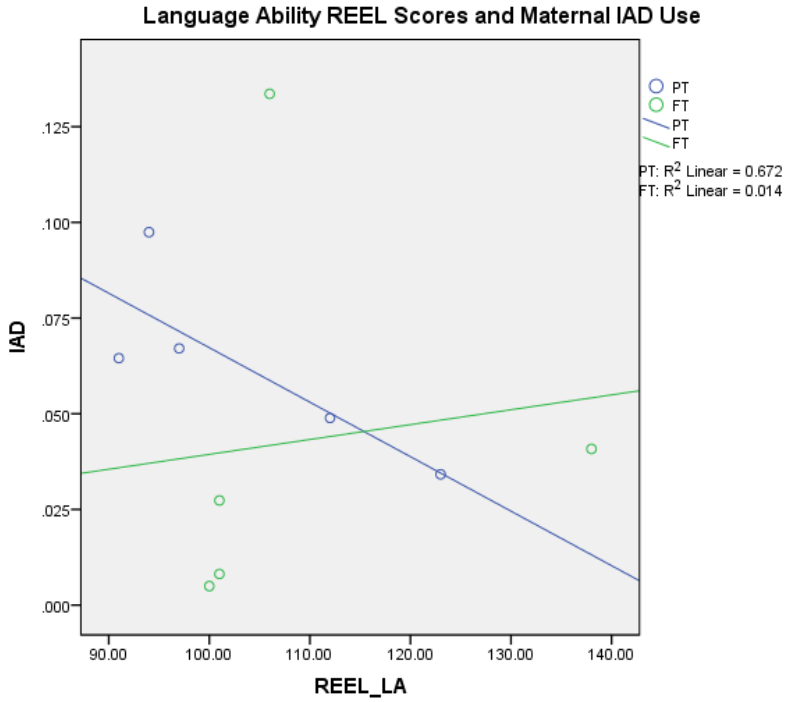


Figure 10.



Discussion

Little is known about the mother-child interactions of children born preterm. Because this population is at risk for many neurodevelopmental delays, it is important to study the language input directed to these children and its contribution to their language development. The purpose of this study was to gain a better understanding of one type of language input provided to children, directives, and the role that different types of directives, supportive and intrusive, may play in the language acquisition process. The contributions of this study were threefold. First, as predicted, the mothers of children born preterm used more directives during their dyadic interactions than the mothers of children born full term. Second, the examination of different subtypes of directives in the preterm population led to the new finding that the mothers of children born preterm used intrusive directives more than their full term counterparts. Last, this research creates a bridge between the previous research timeline of directiveness during dyadic interaction in mothers of preterm children. The new data from this study show that intrusive directives are prevalent during late infancy and early toddlerhood. These data extend previous findings of Muller-Nix et al. (2004) and Potharst et al. (2012).

Although no statistically significant differences were evident between the PT and FT groups in terms of maternal directive use, there was a trend that indicated mothers of children born preterm produced more directives and specifically more IADs compared to the mothers of full term children. Taking into consideration the trends predicted by previous literature and the practical significance of the effect size, a larger sample might result in achieving statistical significance. As previously discussed, many factors predict variation in maternal directive use. The researcher carefully controlled for factors

previously found to influence maternal interaction styles, such as maternal education, and the age and gender of the child. Predictably, overall directive use was highest for the two mothers with the least amount of education. This finding is consistent with previous research (Potharst et al., 2012).

The only major factor studied that separated the two groups was the birth status of the child: preterm or full term. The finding that a majority of the mothers of children born preterm used more overall directives and IADs despite language scores that were within normal limits for their children, suggests that overall directive use at this age may be mitigated by something other than the child's language skills. Based on the findings of this study, it is evident that the effects of birth status (i.e., preterm or full term) on maternal interaction style moderate directive use and type. However, it is possible that there were additional child-related factors and maternal factors that were not included in this study that may have moderated the maternal production of intrusive directives.

Maternal stress is one maternal-related factor not directly measured in this study that may have moderated the maternal use of intrusive directives. Research has indicated that the preterm birth of a child can lead to high levels of both stress and anxiety in mothers. This stress and anxiety experienced by the mother has important implications for the formation of high-quality dyadic interactions between the mother and child, as a highly stressed mother is more likely to adopt a controlling and intrusive interaction style (Muller-Nix et al., 2004). The differences found between the PT and FT groups in terms of intrusive directive use may be attributed to higher levels of maternal stress and anxiety in the mothers of the children born preterm.

The child's ability to maintain episodes of joint attention is a child-related factor that may moderate the maternal production of directives, particularly the IADs, and was not measured in this study. The mother of a child who is frequently diverting his or her attention away from an episode of joint attention may use IADs (i.e., "look", "watch") in an attempt to regain her child's attentional focus. Children who are born preterm have been found to divert their attention away from episodes of joint attention more frequently than their full term counterparts (Landry, 1986). This factor may help explain why 4 out of the 5 mother-child dyads in the PT group produced more IADs than their matched FT dyad.

In addition, there are other possible factors that may have influenced the language behavior of one of the mothers in the study. The mother of FT1 differed in overall directive use and IAD use compared to the other mothers of children born full term. She produced a high proportion of directives during her interactions with her daughter. Although the child scored within normal limits on the REEL-3, there was a history of language impairment present in the child's immediate family. It may be that the mother used different language input because of her experience with one of her other children who had a language impairment. This might explain this mother's high use of SDs. However, this would not explain her higher use of IADs. The high use of IADs may be the result of this mother's high school education level along with the general recommendation that many families of children with language impairment are given to talk more with their children. Thus, history of language impairment in the family may have influenced this mother's interaction patterns and use of some types of directives.

This study found no group differences in the maternal production of SDs. Mothers in both the FT and PT groups used SDs a comparable amount of time, with the exception of FT1. This finding suggests that mothers of children born preterm are sensitive to their children's attentional focus at times during the interaction, just as the mothers of full term children are.

One mother that produced a high proportion of SDs was PT3. It is not known why this mother produced such a high proportion of SDs in her utterances. One possibility is that the high number of SDs was related to where the language sampling took place. This dyadic interaction was the only one to be recorded in the laboratory setting, which may have influenced the maternal behavior. A mother who is interacting with her child in a laboratory may feel that her interactions are being monitored to a higher degree than a mother who is being observed at home, and may be overly cognizant of her interactions. This in turn may result in the production of a greater number of SDs.

Relationship between Maternal Directive Use and Language Outcomes

The second aim addressed in the current study was to gain a better understanding of the relationship between maternal directive use and language outcomes on the REEL-3. Directives have not been considered in the past to be a type of responsive language input that would facilitate language. The hypothesis that SDs would be strongly, positively correlated with language abilities was not realized in either group. In this study, no statistically significant relationship was found between the maternal use of SDs and language outcomes on the REEL-3, and the correlations that were found were not strong. This finding is in contrast with the findings of Masur et al. (2005), who found that maternal use of SDs was associated with better language outcomes. This finding may be

attributed to methodological differences between the two studies. Masur et al. (2005) averaged directive use during two naturalistic settings, play and bath time. Additionally, the language measure utilized in the Masur et al. study was an expressive vocabulary checklist. The REEL-3 is a more comprehensive language measure, which assesses language development in more domains than lexicon alone. It may be that maternal SD use is most influential on a child's lexical development, which is not overtly measured by the REEL-3.

The hypothesis that intrusive directives would be negatively correlated with language abilities was supported; however, only in the children born preterm. Joint attention and the engagement of the child have important theoretical implications in the social interactive model of language development. This may help explain the strong negative correlations between IAD use and language outcomes that were seen in the PT group. A child born preterm may frequently divert his or her attention away from an episode of joint attention and as a result may be more difficult to engage than a child who maintains longer periods of joint attention. The mother may respond to this difficulty with maintaining joint attention by using many IADs, as was seen in the PT group. However, this may further exacerbate the problem by impeding natural language acquisition. IADs have been cited as being particularly disruptive in the language acquisition process because they disrupt the natural flow of the establishment of joint attention (Masur et al., 2005). Theoretically, a child whose attentional focus is shared with the speaker has a much greater ability to match the words being spoken to their referent, a process that is critical in the building of the lexicon. A mother who is often redirecting her child's attention away from the child's current attentional focus disrupts

this process. The child is tasked with the difficult situation of matching the words he or she is hearing to referents that are not the current focus of his or her attention.

The use of IBDs also has important implications in terms of the social interactive model of language acquisition. In this model, the engagement of the child plays a central role along with caregiver responsiveness in the language acquisition process. Intrusive behavioral directives seek to modify the behavior of the child (e.g., "put that down" or "stop banging that toy") and therefore may result in less engagement of the child (Prizant et al., 1993). This decreased engagement of the child as a result of the maternal use of IBDs explains the strong, negative relationship between maternal IBDs and receptive language scores in the PT group.

The lack of strong negative correlations between scores on the REEL-3 and the maternal use of directives in the FT group was in contrast with our predictions and some previous findings (e.g., Nelson, 1973). Although traditionally directives have been viewed as non-facilitative, the relationship between directive use and language outcomes has been disputed (Tomasello & Todd, 1983; Carpenter et al., 1998). The results of this study indicate that maternal directive use was not related to child language outcomes as found by some researchers, particularly for children who are not at risk. However, due to the small sample size of the current study, this result should be interpreted with caution.

Implications

A directive maternal interaction style has been associated with less favorable language outcomes in some studies. Thus, the finding in this study that mothers of children born preterm have a tendency to use more intrusive directives and that this use

was negatively related to language abilities has important implications. These implications are relevant in the areas of assessment, intervention, and research.

Some language interventions target parental-child interactions (e.g., Girolametto & Weitzman, 2006). Based on this study, clinicians should take into consideration the types of directives a mother is using when assessing a mother's interaction style and when planning goals for intervention. Because intrusive directives pattern differently than SDs in terms of predicting language outcomes, a mother who uses intrusive directives frequently to control the play situation might be shown ways to decrease these directives in favor of strategies that would facilitate joint attention and child engagement.

Given the results that attentional and behavioral directives patterned differently than SDs in terms of their relationship with language outcomes, particularly in the PT group, it may be beneficial for researchers who study maternal directiveness to differentiate between supportive and intrusive directives. From a theoretical perspective, directives that follow the child's attentional focus are very different from directives that are given without regard to the child's attentional focus. This theoretical difference was supported by the results of this study.

Study Limitations

Although this study provided insight about the relationship between preterm birth, maternal directive use, and language outcomes, the current study does have some limitations. First and foremost, the small sample size of the current study limited the power and types of statistical analyses that could be conducted with the data. This study would have been improved by including more dyads in both the PT and FT groups.

A second limitation of this study was that it did not adequately address the contribution of maternal stress to maternal interactive style. Maternal stress has been considered an important factor in predicting maternal interactions (Muller-Nix et al., 2004).

A third limitation of the current study was that a language outcome measure that relies on parent report was utilized instead of an alternative measure that relies on direct observation. Although the REEL-3 demonstrates adequate validity and reliability, implementing a parent report measure in a study of maternal behavior may have confounded the relationship between maternal reported language abilities of the child and maternal use of directives. That is, a parent who uses more intrusive directives may know less about child development and may under-report her child's language abilities. Additional information about the child's language abilities gained through direct observation would have reduced this potential bias.

Future Directions of Study

Conducting a similar study to the current study with a larger sample size would allow for analyses to determine which child and maternal factors moderate the mother's interaction style. Important variables to take into consideration in a future study that were not controlled in this study include maternal stress and the child's ability to maintain joint attention. Future studies that utilize a larger sample size would benefit from using statistical methods such as multiple regression that would allow researchers to further examine the relationship between important maternal and child-related characteristics and maternal directive use. It could then be determined if the birth status (i.e., PT or FT) of

the child contributes any unique variance to maternal directive use after controlling for other important variables statistically.

Conclusion

The relationship between preterm birth, maternal directive use, and language outcomes is clearly a complex one. Certainly, the mothers of children born preterm face many obstacles to achieving high-quality interactions with their children, including separation from their child during early infancy, associated stress and anxiety, and the child's difficulty with maintaining joint attention. The purpose of this study was to determine if directive use, one aspect of maternal interaction style, differed in mothers of children born preterm when compared to mothers of children born full term. The relationship between maternal directive use and language outcomes in their children also was studied. From the perspective of practical significance, the results of this study supported the hypothesis that mothers of children born preterm use more intrusive directives during their dyadic interactions with their children than mothers of children born full term. This frequent use of intrusive directives was negatively related to language outcome, as the redirection of the child's attention theoretically diverts cognitive resources away from the language learning process.

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Appendix A

Stimuli for play interaction
Barn with animals and farmer, stacking frog toy, connecting animal beads, stacking toy ring set

Appendix B

Parent Questionnaire

Child ID _____ Date _____

About Your Child

1. Your child's birth date: ____/____/____ (mm/dd/yy)

2. Your child is: ____ Male ____ Female

3. Is any language other than English spoken in the home? ____ Yes ____ No
   If yes, is your child bilingual? _____Yes _____No

4. Has your child been diagnosed with any of the following?
   _____ Language Impairment or Language Disorder
   _____ Learning Disability
   _____ Attention Deficit Disorder (ADD)
   _____ Attention Deficit Hyperactivity Disorder (ADHD)
   _____ Autism or Autism Spectrum Disorder
   _____ Pervasive Developmental Disorder
   _____ Conduct Disorder
   _____ Central Auditory Processing Disorder
   _____ Mental Retardation
   _____ Down Syndrome

   _____ Emotional Disorder (ex: Schizophrenia, Oppositional Defiant Disorder)
   _____ Oral Motor or Neuromuscular Dysfunction
   _____ Any other medical condition or syndrome
   Please specify:_____

5. Has your child ever received speech-language services? ____ Yes ____ No

6. Has your child ever had hearing screening? ____ Yes ____ No
   When? _____
   If yes, did your child pass the hearing screening? ____ Yes ____ No

About You

For the mother:

1. What was the highest level of education that you completed?
____ Less than high school
____ High school graduate/GED
____ Some college but no degree
____ Associate's/Technical degree
____ Bachelor's degree
____ Graduate degree (M.A., Ph.D., M.D., etc.)

2. What is your current occupation? _____

3. How many live in your household?_____
How many children below the age of 18 live with you? _____

4. What is your yearly family income?
_____$20,000 or less
_____$21,000 – $40,000
_____$41,000 – $80,000
_____$81,000 – $100,000
_____Above $100,000

Appendix C

	# of Maternal Utterances		# of Utterances per Minute		# of child Vocalizations per Minute		Maternal MLU		TTR		# of Different Word Roots	
	PT	FT	PT	FT	PT	FT	PT	FT	PT	FT	PT	FT
1	62	262	5.78	20.15	.65	2.23	3.69	3.21	.40	.16	86	128
2	390	369	37.68	22.97	2.32	2.37	2.56	4.15	.17	.15	155	205
3	164	245	9.68	27.22	1.00	9.78	3.60	2.45	.23	.23	129	125
4	225	201	12.70	12.02	.40	2.09	3.49	3.50	.22	.21	152	125
5	322	256	21.47	14.07	4.07	.88	3.79	3.40	.20	.24	216	193
Wilcoxon Z	-.405		-.135		-.944		-.405		-.730		-.405	
P value	.813		1.000		.438		.813		.625		.813	

Note: MLU is mean length of utterance in morphemes, TTR is type token ratio