

Promoting High Quality Teacher-Child Interactions:
Examining the Role of Teachers' Depression,
Perceptions of Children's Peer Relationships, and Contextual Factors

by

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ABSTRACT

The overall goal of this dissertation was to examine teacher characteristics, teachers' beliefs, and contextual factors that may motivate teachers' decisions to engage in high quality teacher-child interactions. I use two complementary studies to meet this goal. These two studies provide insight into several aspects of early childhood teachers' and children's interactions including the complexity of the conversations and teachers' supportive practices. Findings from both studies reveal that teachers are selective in how they distribute their time and attention across various types of high-quality interactions with children. Study 1 suggests that teachers' perception of how often children interact with one another motivates their decisions to engage in high quality teacher-child interactions (i.e., facilitate children's peer interactions). Study 2 suggests that teacher well-being, specifically teacher depression, limits the extent to which teachers engage in high quality interactions (i.e., complex conversations with children). Importantly, this dissertation also showed that teachers' motivation for engaging in teacher-child interactions does not stem from their own characteristics or perceptions alone. In addition to these factors, contextual aspects of teacher-child interactions also appear to influence teachers' motivation to engage in high-quality teacher child interactions. Study 1 revealed that the gender composition of the children involved in each teacher-child interaction was associated with the extent to which teachers use facilitative practices, as well as with the direction and magnitude of both quality and frequency effects on teachers' facilitation. Moreover, Study 2 revealed that the relation between teacher depression and complex conversations is changed when teachers and children are engaged in academic activities (e.g., math, books, language) relative to play or routine activities. In both Study 1 and 2, I

used a teacher-focused observational coding system. Use of this observational coding system contributes novel, objective information about teacher-child interactions, as prior work on teacher-child interactions has most often relied on teachers' self-reports of how often they interact with students. Findings from this dissertation will contribute new knowledge about teacher and contextual classroom characteristics and teacher-child interactions that will inform efforts to promote positive teacher child interactions and, in turn, student and teacher well-being.

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INTRODUCTION

In this dissertation, I consider factors that underlie early childhood teachers' motivation to interact with the children in their classroom. Understanding what guides teacher-child interactions is of interest because teachers' engagement in high-quality interactions with students is critically important for children's learning and development (Pianta & Stuhlman, 2004). High quality teacher-child interactions are indexed by teachers' frequent, positive, warm, supportive, and cognitively stimulating verbal and nonverbal interactions with students. This can be seen in moment-by-moment interactions as well as teachers' (and students') perceptions of those interactions (Fontaine et al, 2006; Gevers Deynoot-Schaub and Riksen-walraven, 2005; Rentzou & Sakellariou, 2011). High-quality teacher-student interactions are consistently linked to positive emotional, behavioral, and cognitive outcomes for children (Pianta & Stuhlman, 2004; Burchinal et al. 2010; Howes et al. 2008; Mashburn et al. 2008). Moreover, high-quality teacher-child interactions are connected to teachers' well-being and commitment to the teaching profession (Dellamatera, 2011). For instance, positive teacher-child relationships are often mentioned by teachers as one of the primary reasons for staying in the profession (O'Connor, 2008). The benefits of high-quality teacher child interactions are recognized by policy makers, educators, and researchers, and current educational policies mandate that all American children be supplied with qualified teachers who are able to interact with children successfully and provide children with high-quality teacher-child interactions (Every Student Succeeds Act, 2015).

Prior work suggests there is variability in the extent to which teachers engage in high-quality teacher-child interactions (Dickinson, 2001; Gest & Rodkin, 2011; Gest,

Madill, Zadzora, Miller, & Rodkin, 2014; Kontos, 1999; Massey, 2004; Serdiouk, Rodkin, Madill, Logis, & Gest, 2015). Identifying factors that may contribute to this variability is crucial to promoting children's learning and development, promoting positive teaching experiences, and retaining teachers. One factor that may underlie teachers' likelihood of engaging in high-quality teacher-child interactions, may be teacher well-being. Bronfenbrenner, in his bio-ecological model (2006), suggests that teacher-child interactions are determined, in part, by individual factors that teachers (and children) bring with them to the interaction. To date teachers' demographic and training characteristics, such as years of teaching experience and educational level, and motivational characteristics, such as commitment to teaching, are known contributors to teacher-child interaction quality (Kesner, 2000; Pianta, Howes, Burchinal, Bryant, Clifford, Early, & Barbarin, 2005). However, beyond these factors, little attention has been given to the multitude of other teacher level characteristics that may influence teacher-child interactions, such as teacher well-being. This is a significant limitation of prior work because teacher-child interactions are complex exchanges that cannot be determined by teachers' educational status and commitment to teaching alone. Due to this limitation, teacher training and professional development programs do not yet have sufficient information to design training tailored to teachers' individual needs. Thus, there is a need for research on a wider range of teacher characteristics that considers the interplay of multiple influences on teacher-child interactions. This dissertation fills this gap by examining the extent to which teacher depression is related to teacher-child interactions.

Another factor that may motivate early childhood teachers' engagement in high quality teacher-child interactions may be teachers' perception of the social dynamics in their classrooms. A primary goal for early childhood teachers is to expose children to pre-academic experiences that enhance their social-behavioral competence and help children develop foundational social skills (Clifford, Bryant, & Early, 2005). Given this goal it is not surprising that teachers report that they are interested in and concerned about the peer dynamics of their classrooms (e.g., teachers report that they worry about the consequences of aggression between children; Enz & Chrisite, 1994; Gest, 2006; 2011; Wittmer & Honig, 1994). And prior work has demonstrated that teachers are more likely to use supportive teacher-child interactions with isolated children's peer interactions compared to those of children with many friends (Arbeau & Coplan, 2007; Brophy & Rohrkemper, 1981; Coplan, Bullock, Archbell, & Bosacki, 2015; Cunningham & Sugawara, 1988). However, to date, research has focused on how teachers' perceptions of *individual* children's interactions with peers motivates their involvement in teacher-child interactions. This level of analysis, leaves questions unanswered about how teachers consider the social interactions between any two (or more) peers when making decisions about interacting with children. This is a significant limitation of prior work because teacher-child interactions often involve multiple children and may not be determined by teachers' perception of one child's behavior alone. Thus, there is a need for research that examines how children's social relationships may motivate teachers' engagement in teacher-child interactions. This dissertation fills this gap by examining the extent to which teacher-child interactions (with two or more children) are motivated by teachers' perceptions of these children's social relationships.

An important contribution of the dissertation is that I move beyond a main effects approach in examining factors that underlie teachers' motivation for engaging in high quality interactions. Specifically, I examine the extent to which contextual aspects of teacher-child interactions may alter teachers' motivation to engage in high-quality teacher-child interactions. Bronfenbrenner's bio-ecological model (2006) suggests that teacher-child interactions are determined, in part, by individual factors that teachers and children bring with them to the interaction. However, Bronfenbrenner further suggests that contexts (i.e., environmental influences) also influence teacher-child interactions. In this dissertation I focus on two contextual aspects of teacher-child interactions. The first is the structural context in which a teacher-child interaction occurs. Specifically, I focus on how the classroom context (i.e., free play versus structured) and the activity setting (i.e., academic, play, or routine) influences teachers' motivation to engage in high-quality teacher-child interactions. The classroom context was considered because it is salient to teachers and students and elicits different behaviors from teachers and students (Cunningham & Wiegel, 1992; Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006; Kontos, 1999). The second contextual aspects considered is the gender composition of the children involved in the teacher-child interaction. Specifically, I focus on how boys' and girls' engagement in same- and other-gender play influences teachers' motivation to engage in high-quality practices when children interact with their peers. The gender composition of the children involved in the teacher-child interaction was considered because same- and other- gender interactions are characteristically different from one another, which may influence teaching practices and strategies (e.g., Basow, 2012; Goble, Martin, Hanish, & Fabes, 2012).

To summarize, the overall goal of this dissertation is to examine teacher characteristics, teachers' beliefs, and contextual factors that may motivate teachers' decisions to engage in high quality teacher-child interactions. I use two complementary studies to meet this goal. These studies and their contribution to the literature are detailed below. Findings from this dissertation will contribute new knowledge about teacher and contextual classroom characteristics and teacher-child interactions that will inform efforts to promote positive teacher child interactions and, in turn, student and teacher well-being.

Study 1: Early Childhood Teachers' Facilitation of Peer Interactions

The objective of Study 1 is to explore teacher-child interactions and how teachers' perceptions of children's social relationships guide teacher-child interactions. Through teacher-child interactions, teachers can help children learn how to interact positively with their peers by engaging with two or more children simultaneously and making statements or raising questions that support or expand peer interactions (i.e., facilitating children's peer interactions; Ashiabi, 2007; Trawick-Smith, 2011). The goal of Study 1 is to first document how often early childhood teachers are observed to facilitate peer interactions among two or more peers. Subsequently, I will examine the factors that underlie early childhood teachers' motivation to facilitate interactions that occur among any two children. In doing so, I consider the extent to which variation in teachers' perceptions of the frequency with which any two children interact and variation in the quality of their interactions is associated with teachers' motivation to facilitate their interactions.

Understanding what factors motivate early childhood teachers' facilitation of children's interactions with peers is of interest because teachers' facilitation of peer interactions is associated with improvements in children's social skills, which in turn, predict children's

future social and academic success (Kindermann, 2007; Pianta et al., 2008; Bowman, Donovan, & Burns, 2000). I will also consider how variation in the frequency with which any two children interact and variation in the quality of their interactions is associated with teachers' facilitation of boys' and girls' same- and other-gender interactions.

Understanding what factors guide teachers' facilitation of children's interactions with boys-only, girl-only, and other-gender peer interactions is important because diversity in peer interactions is critically important for children's social success (Kawabata & Crick, 2015; Martin et al., 2012).

Study 2: The Influence of Teachers' Depressive Symptoms on Teacher-Child Conversation Quality in Early Childhood Classrooms

The objective of Study 2 is to examine the relation between teachers' characteristics and teacher-child interactions and to examine how classroom structural characteristics moderate this relation. Specifically, I will examine the extent to which depression among Head Start teachers is associated with the quality of their conversations with children – that is, the extent to which teachers are engaging in reciprocal, complex, high quality discussions with children. Teacher depression is of interest because early childhood teachers are at an elevated risk for experiencing depressive symptoms as compared to non-teaching populations (Greenglass & Burke, 2003; Whitaker et al., 2013) and teachers' depression can hinder effective teaching (Dickinson, St Pierre, & Petengill, 2004; Kishiyama, Boyce, Jimenez, Perry, & Knight, 2009; Zill & Resnick, 2006). The quality of teacher-child conversations is of interest because teachers play an important role in young children's oral language development, early literacy skills, cognitive abilities, and later academic success (Dickinson & Snow, 1987; Massey, 2004).

Furthermore, the present study moves beyond a main effect approach by examining the extent to which the relation between teachers' depression and their use of complex conversations with children is moderated by two structural characteristics: classroom context setting (free play versus teacher-led settings) and classroom activity setting (academic versus play versus routine activities). Head Start teachers' depressive symptoms are expected to be negatively related to the likelihood that a complex conversation will occur and the relation between teachers' depression and complex conversations is expected to vary across classroom contexts and across activity types. By demonstrating the range of impact of teacher depression on complex conversations, the findings of this study will contribute to efforts to support early childhood teachers who are depressed. That is, we will know whether depressed teachers would most benefit from intervention efforts that are targeted to helping them engage with students in specific classroom contexts relative to those that are generalized across school contexts.

In sum, using these two complementary studies, I will examine what factors encourage or discourage teachers' engagement in high-quality teacher child interactions. Specifically, in Study 1, I will examine how teachers' beliefs about the frequency and quality of peer interactions in the classroom predict teachers' facilitation of peer interactions. In Study 2, I will explore the association between teachers' depressive symptoms and teacher-child conversation complexity, and the moderating role of classroom context and activity setting. In both Study 1 and 2, I will use a teacher-focused observational coding system. Use of this observational coding system will contribute novel, objective information about teacher-child interactions, as prior work on teacher-child interactions has most often relied on teachers' self-reports of how often they

interact with students (Farmer et al., 2011, Gest & Rodkin, 2011; Hindelang, Hirschi, & Weis, 1979).

Together, these two studies will provide insight into several aspects of teachers' and children's interactions including the complexity of the conversations that occur, teachers' supportive practices, and the motivators that encourage and discourage teachers' engagement in high quality interactions. As such, findings from this dissertation will add to the broader literature on teacher-child interactions by providing a deeper understanding of teachers' engagement with children across numerous indicators. Importantly, findings will also contribute understanding to how a range of teacher level (i.e., beliefs about classroom social relationships, depression) and contextual- level (i.e., classroom contexts, gender-composition of children involved in teacher-child interactions) characteristics relate to teachers' and children's interactive experiences. Findings from these studies are critically important for translating empirical knowledge to teacher training and professional development programs about teacher and classroom factors that shape and promote positive teacher-child interactions. As a whole, this dissertation will contribute well-timed information relevant for educational policy and practice about factors that promote high-quality teacher child interactions.

STUDY 1

Early Childhood Teachers' Facilitation of Peer Interactions

A primary purpose for early childhood education is to expose children to pre-academic experiences that enhance their social-behavioral competence before entry to kindergarten (Clifford, Bryant, & Early, 2005). Thus, early childhood teachers are tasked with helping children develop foundational social skills. One of these foundational social skills is children's ability to interact positively with their peers (Ashiabi, 2007; Del'Homme, Sinclair, & Kasari, 1994; Egger & Angold, 2006). Teachers help children learn how to interact positively with their peers by facilitating children's interactions with one another – in other words, by engaging with two or more children simultaneously and making statements or raising questions that support or expand peer interactions (Ashiabi, 2007; Cohen & Lotan, 1995; Trawick-Smith, 1998; 2011). Indeed, teachers' facilitation of peer interactions is associated with increases in the number of children's friendships and decreases in negative peer interactions, such as victimization (Bowman, Donovan, & Burns, 2000; Cohen & Lotan, 1995; Hendrickx, Mainhard, Boor-Klip, Cillessen, & Brekelmans, 2016; Kindermann, 2007; Pianta et al., 2008).

To date, research on teachers' facilitation of peer interactions has focused on teachers' facilitation of individual children's interactions with peers, revealing that teachers are more likely to facilitate some children's interactions relative to others'. For instance, teachers are more likely to facilitate isolated children's peer interactions compared to those of children with many friends (Arbeau & Coplan, 2007; Brophy & Rohrkemper, 1981; Coplan, Bullock, Archbell, & Bosacki, 2015; Cunningham & Sugawara, 1988). This level of analysis, however, leaves questions unanswered about

how teachers make decisions about whether to facilitate interactions between any two (or more) peers. That is, when faced with a diverse classroom of children and the potential for each child to interact with every other peer, how do early childhood teachers make decisions about which interactions *among two or more peers* to facilitate?

The goal of the present study is to first document how often early childhood teachers are observed to facilitate peer interactions among any two or more peers. Subsequently, I will examine the factors that underlie early childhood teachers' facilitation of the interactions that occur among any two children. In doing so, I consider the extent to which variation in the frequency with which any two children interact and variation in the quality of their interactions is associated with teachers' facilitation of their interactions. These peer interaction characteristics were selected because they are salient aspects of children's relationships in the classroom and are readily noticed by teachers (Gest, 2006; 2011). Understanding what factors underlie early childhood teachers' facilitation of children's interactions with peers is of interest because teachers' facilitation of peer interactions is associated with improvements in children's social skills, which in turn, predict children's future social and academic success (Bowman, Donovan, & Burns, 2000; Kindermann, 2007; Pianta et al., 2008). For instance, teachers who support peer relationships (e.g., modeling or reinforcing children's appropriate social behaviors) at high levels have classrooms with more reciprocated friendships compared to teachers who support peer relationships less often (Gest & Rodkin, 2011; Hendrickx, Mainhard, Boor-Klip, Cillessen, & Brekelmans, 2016).

Moreover, I also consider teachers' facilitation of boys' and girls' interactions with members of their own gender group and with members of the other gender group.

Understanding teachers' facilitation of boys' and girls' same- and other-gender play and the factors that guide teachers' facilitation of gendered play is important. Although young children's peer interactions are characterized by a preference for same-gender play partners and same-gender play can result in such positive outcomes for children as engagement in prosocial and cooperative behaviors (for girls-only peer groups) and engagement in satisfying friendships (for boys-only peer groups; Gottman, 1983), there are also benefits of other-gender play. For instance, other-gender play promotes the development of children's social skills and decreases children's gender-stereotyped attitudes and play behaviors (Martin et al., 2012), and teachers' support of other-gender play can increase the likelihood that such benefits accrue. However, little is currently known about the extent to which teachers facilitate same and other-gender interactions.

To summarize, the purpose of the present study is to examine how the frequency and quality of peer interactions, and the interaction of these variables, predict early childhood teachers' facilitation of peer interactions. Additionally, I will explore how these factors predict teachers' facilitation when teachers are interacting with same-gender (i.e., boys-only peers *or* girls-only peers) and other-gender peers. To examine these research questions, I employed social network modeling techniques and regression analyses using data from a teacher focused observational study of Head Start teachers and their students. As such, this study adds to the broader literature on teachers' facilitation of peer interactions, which so far has demonstrated variability in the extent to which teachers facilitate individual children's peer relationships (Arbeau & Coplan, 2007; Brophy & Rohrkemper, 1981; Coplan, Bullock, Archbell, & Bosacki, 2015; Cunningham & Sugawara, 1988), by examining what factors relate to teachers' responses to peer

dynamics in the classroom and how dyad composition (e.g., peer dyad homophily; McPherson, Smith-Lovin, & Cook, 2001) relates to teaching practices.

Early Childhood Teachers' Facilitation of Children's Interactions with Peers

Early childhood teachers' facilitation of peer interactions refers to teachers' engagement with two (or more) children in ways that support or expand the ongoing peer interaction. The significance of teachers' facilitation of peer interactions stems from Vygotsky's (1978) sociocultural theory. Vygotsky suggested that teacher-child interactions are one of the primary sources of influence on children's learning and development. A central concept of sociocultural theory is *scaffolding*, in which adults help children learn new skills by finding the edge of a child's ability (the zone of proximal development) and then helping the child accomplish a task that he or she could not complete independently. Applied to the present study, the concept of scaffolding supports the idea that teachers use facilitation to promote children's social development. Teachers can scaffold children's peer interactions by supplying children with specific words to use when interacting with peers (e.g., "You could tell her that she is being nice by sharing"), alerting children to situational cues (e.g., "Sam looks sad, do you think he was using that block first?"), asking questions about what other children are doing, providing explanations for and commenting on other children's behavior (e.g., "Look he is trying to get that bike to go fast), and modeling social behaviors, problem solving skills, and language (Ashiabi, 2007; Duncan & Tarulli, 2003; Scrimsher & Tudge, 2003; Trawick-Smith, 2011; Vygotsky, 1978; Williams, Mastergeorge, Ontai, 2010). By facilitating peer interactions, teachers help children learn new social skills such as communication, self-regulation, getting along with others, and social problem solving

(Ashiabi, 2007; Brown, Odom, & Conroy, 2001; Trawick-Smith, 2011). For instance, when teachers engage in facilitative practices such as encouraging children to be friendly, to interact affectionately, and to share and use other forms of prosocial behavior, children have frequent and positive peer interactions (Brown, Odom, & Conroy, 2001).

A small body of work hints that there may be variability in the extent to which teachers use (or believe they should use) facilitative practices with preschool and elementary school children (Gest & Rodkin, 2011; Gest, Madill, Zadzora, Miller, & Rodkin, 2014; Serdiouk, Rodkin, Madill, Logis, & Gest, 2015). For instance, Dellamatera (2011) conducted a qualitative study of 61 pre-service early educators and asked teachers about what role they believed teachers should play in preschoolers' social development. Results revealed that 51% of teachers reported believing that teachers should guide preschoolers' social development with facilitative practices such as guiding, supporting, practicing, encouraging, and modeling. Of the remaining teachers, 28% believed that teachers should let preschoolers' social skills develop on their own without adult interference, for instance, by creating a supportive environment but not directly instructing children's interactions, and 21% reported teachers should directly instruct children's social interactions (e.g., punishing or telling a child how to interact with their peers; Dellameterra, 2011). Moreover, Bosacki, Woods, & Coplan's (2015) qualitative study of 29 early childhood educators revealed that 39% of teachers believed that their role within the classroom was to facilitate and encourage positive social interactions. Finally, Trawick-Smith's and Dziurgot's (2011) observational study of eight preschool teachers' play behaviors revealed that, out of the total time teachers were observed, 49.5% was spent facilitating children's play (with or without a peer present), 20.9% was

spent directing children's play, 9% was spent observing children's play, and 20.6% was spent in classroom maintenance or other tasks (not interacting with children during play).

It is important to note the majority of this prior work (with the exception of Trawick-Smith's and Dziurgot's 2011 study) has focused on teachers' beliefs about how often they should facilitate peer interactions. These self-report findings must be interpreted cautiously given the limitations of self-report data (Hindelang, Hirschi, & Weis, 1979). For instance, teachers may have reported their beliefs about using facilitation due to pressures from researchers, principals, or school standards and these reports may not reflect their actual practices (Adams, Soumerai, Lomas, & Ross-Degnan, 1999). Considering the limitations of self-report data, researchers have highlighted the need for objective measures of how often teachers facilitate peer interactions (Farmer et al., 2011, Gest & Rodkin, 2011; Hindelang, Hirschi, & Weis, 1979). Thus, to contribute to the broader literature on teachers' facilitation of peer interactions, I first descriptively examined the extent to which early childhood teachers facilitated peer interactions. Specifically, I examined the proportion of time teachers spent facilitating peer interactions out of their total time and the proportion of time teachers spent facilitating peer interactions out of the total time teachers spent interacting with children. In the present study, a peer interaction was operationalized as two children who were engaged in an ongoing parallel activity (e.g., playing blocks side by side) or an ongoing social activity (e.g., talking with one another). To answer this research question, I used a teacher-focused observational coding system. Use of this observational coding system contributed novel objective information about early childhood teachers' facilitation of

peer interactions, as prior work has largely relied on teachers' self-reports of how often they facilitate individual children's peer interactions.

Frequency of Peer Interactions

One factor that may underlie early childhood teachers' motivation to facilitate the interactions that occur among any two (or more) children is how often a teacher believes those children interact with one another. That is, teachers may facilitate the peer interactions that occur most often. Proximity theory provides support for why this may be. According to this theory, interactions between two (or more) people are more likely to occur if people are near or accessible to each other as opposed to distant from one another (Schneider, Gruman, & Coutts, 2012). Research has supported this idea. For instance, research from industrial psychology shows that workers are most likely to interact and collaborate if they are in frequent contact with one another and less likely to interact with those who are less proximal (Wellman & Wellman, 1992). Additionally, Howes' and colleagues (1992) observational study of preschool teachers and children revealed that children who spend more time around their peers were also more likely to spend time around their teachers, seek out their teachers for help, and share activities with their teachers, compared to children who were socially isolated. Applied to the present study, proximity theory supports that teachers may facilitate interactions with students that are in frequent contact with one another because they have increased opportunities to interact with these students.

Research on proactive and reactive teaching practices also lends support for a positive relation between peer interaction frequency and teachers' facilitation. Work on proactive and reactive teaching practices is largely focused on strategies that teachers

apply to children's inappropriate classroom behavior. For instance, proactive practices have been operationalized as those that teachers use to decrease the likelihood that a child will demonstrate an inappropriate behavior (e.g., establishing rules; praising appropriate behavior; Little et al, 2002; Safran & Oswald, 2003). Reactive practices have been operationalized as those that follow a child's inappropriate behaviors (e.g., providing consequences for inappropriate behavior, using lectures or threats; Little et al, 2002; Safran & Oswald, 2003). Prior observational investigations of elementary school teachers show that reactive strategies are more common than proactive strategies, although teachers report otherwise (Clunies-Ross, little, & Keinhuis, 2008). More specifically, when surveyed, teachers report that they use proactive teaching practice more often than reactive practices; however, observations of teachers' classroom behaviors reveal that they are more likely to use reactive strategies than proactive strategies (Martin, Linfoot, & Stephenson, 1999; Merrett & Wheldall, 1986; Poulou & Norwich, 2000). It is important to note that prior work on proactive and reactive strategies has focused on teachers' interactions with individual children and that this work may not be applicable to the peer dyad or group level. This may be because the complexity of peer groups presents a challenge to the teacher; when interacting with peers, a teacher must simultaneously manage and balance each child's social needs with the goal of maintaining a social context that encourages learning and development for both children (Ashiabi, 2007; Farmer, McAuliffe Lines, & Hamm, 2011); as such this prior literature serves as a guide for study hypotheses but must be interpreted cautiously.

Although prior work in this area has not focused on group level processes or teachers' facilitation, this work suggests that teachers use *reactive* strategies more often

than *proactive* strategies. Applied to the present study, this literature helps guide my prediction that the frequency of peer interactions will be positively related to facilitation of interactions among those same peers; teachers may be *reacting* to the peer interactions that occur frequently by facilitating these interactions more often in comparison to the peer interactions that occur less frequently. This may be because, when the classroom is functioning well, teachers tend to use teaching practices that maintain the current classroom environment, and they are less likely to use teaching practices that *proactively* change classroom patterns or relationships (Little et al, 2002; Safran & Oswald, 2003). Thus, teachers' motivation for facilitating peer interactions may come from their goals to maintain existing peer relationships in the classroom. This may indicate that when children interact often with one another, teachers are inclined to support and encourage ongoing relationships, rather than working to *proactively* facilitate the peer interactions that do not occur often.

Quality of Peer Interactions

Another factor that may predict early childhood teachers' motivation to facilitate peer interactions is teachers' perception of the *quality* of peer interactions (i.e., the extent to which the interactions between any two or more children are mostly positive versus mostly negative). Literature on the relation between individual children's behaviors and teaching practices provides support for examining peer interaction *quality* as a predictor of teachers' facilitation, suggesting a positive relation between quality of peer interactions and teachers' facilitation. Specifically, teachers are less likely to use child-centered strategies, such as explaining or supporting (and more likely to use adult-centered strategies, such as giving commands or punishments), when children are

engaged in inappropriate or low quality social behaviors (Bauman & Del Rio, 2006; Yoon & Kerber, 2003). For example, teachers are observed to use commands with children who are engaged in aggressive play behaviors (Enz & Chrisite, 1994; Wittmer & Honig, 1994). Additionally, prior work shows elementary school teachers in schools with lower levels of student behavior problems are more likely to use child-centered strategies compared to teacher in schools with higher levels of student behavior problems (Stichter, Lewis, Whittaker, Richter, Johnson, & Trussel, 2009). Taken together, this work suggests that teachers' motivation to engage in supportive and encouraging interactions with children may stem from their perception of whether or not the child/children engage in appropriate behaviors. Thus, teachers may increase the extent to which they facilitate peer interactions when children are perceived to interact well with one another.

Moreover, Gest and colleagues' (2011) interviews of elementary school teachers revealed that the most common consideration teachers have when creating classroom study groups is to separate students who might pose behavior problems. Although this study is not focused on facilitation, this work suggests that when interacting with two (or more) children who have a low quality relationship a teacher may decrease the use of facilitation and, instead, engage in more directive management practices, such as giving commands. This prior work also suggests that teachers are aware of the quality with which children interact, adapt their teaching practices to discourage opportunities for low quality peer interactions, and use teaching practices in ways that reinforce high quality behaviors and peer interactions. Thus, the quality of peer interactions is expected to be positively related to teachers' facilitation of peer interactions. Again, it is important to note that, with the exception of Gest and Rodkin's (2011) study, prior work has focused

on teachers' practices with individual children; due to the complexity of peer groups, this work may or may not be applicable at the dyad or group level. Findings from the present study will add to the broader literature on teachers' facilitation of peer interactions by examining the extent to which findings from prior studies at the individual level are consistent at the dyad or group level.

Peer Interaction Quality and Teachers' Facilitation: Moderation by Peer

Interaction Frequency

Although peer interaction quality is expected to be positively related to teachers' facilitation, this relation may vary based on the frequency with which two (or more) children interact. That is, the relation between peer interaction quality and teachers' facilitation may be moderated by peer interaction frequency. This moderation is probable because teachers recognize overlap in the quality and frequency of children's interactions. For instance, teachers' ratings of individual children's social behaviors show that children who have lower quality peer relationships also have less frequent peer interactions (compared to children who have high quality peer relationships; Rubin, Chen, & Hymel, 1993). Although this finding does not consider teachers' facilitation, it does suggest that teachers simultaneously consider both of these aspects of peer relationships. Due to a lack of guiding research, presenting specific predictions for this moderation effect are difficult. However, either of the following effects are expected to occur. First, the hypothesized positive relation between peer relationship quality and teachers' facilitation could be magnified for children who play often together. Support for this prediction comes from the previously reviewed hypothesis that teachers' motivation to facilitate peer interactions may be driven by a reactive response to children's ongoing

behaviors (Poulou & Norwich, 2000). That is, teachers' facilitation may increase because the opportunities to engage with peers who have high quality interactions is also increased as children interact more frequently with one another. Further, teachers may be particularly motivated to encourage these interactions because doing so helps to build effective classroom climates (encouraging frequent, positive peer interactions likely further increases frequent positive peer interactions). Second, the positive relation between peer relationship quality and teachers' facilitation could decrease when children play together less frequently. That is, teachers' facilitation may decrease because the opportunities to engage with peers who have high quality interactions is also decreased (as these children do not interact often).

Facilitation of Same and Other-Gender Peer Interactions

I also examined the extent to which teachers facilitated peer interactions at different rates with boys' and girls' interactions with members of their own gender group and with members of the other gender group. As well as the degree to which teachers used frequency and quality indicators to inform their facilitation of children's interactions with these peers. I focus on the gender composition of peer interaction partners because gender is a salient aspect of children's identity that is relevant to teaching practices (Lloyd & Duveen, 1992; Weinstein, Tomlinson-Clarke, & Curran, 2004). Moreover, understanding how teachers facilitate interactions with boys' and girls' same- and other-gender play partners is of interest because young children's peer interactions are characterized by a preference for same-gender play partners. Social network research shows that children are more likely to interact with homophilous others, that is, those who are similar to them on salient characteristics, and

they are less likely to interact with those that are different (e.g., children are more likely to befriend others who are of the same gender; McPherson, 2001). Thus, girls tend to interact with girls and boys tend to interact with boys (Maccoby, & Jacklin, 1987). However, other-gender interactions also occur. Martin and Fabes (2001) found that 15% of children's play is with other-gender peers and 30% of children's play involves both same- and other-gender children (i.e., mixed-gender). Thus, teachers have the naturally-occurring opportunity to facilitate both same- and other-gender peer interactions. However, because same-gender interactions are more common than other-gender interactions in preschool classrooms, proximity theory supports the idea that teachers will facilitate boys-only and girls-only interactions more often than other-gender interactions due to the increased opportunity to engage with same-gender peers (Schneider, Gruman, & Coutts, 2012). Additionally, teachers' motivation to facilitate boys-only and girls-only interactions may reflect a *reaction* to maintain existing high quality peer interactions. For instance, boys' groups are successful at generating fun and excitement, which contributes to overall satisfaction within boys' friendships and positive affect during boys-only interactions (Benenson, Morgansetin, & Roy, 1998; Gottman, 1986; Martin & Fabes, 2001). And, girls' groups are characterized by cooperation, self-disclosure, and prosocial behaviors (Rose & Rudolph, 2006). Thus, teachers may facilitate boys' and girls' same-gender interactions to reinforce and maintain peer interactions that are already occurring at a high quality.

Although comparing the rates at which teachers facilitate boys' and girls' same and other-gender interactions will contribute novel information to the broader literature on peer relationships and teaching practices, it is also important to examine what

motivates teachers' decisions to facilitate gendered peer interactions. Specifically, I examined the extent to which teachers' perception of peer interaction frequency and quality were robust predictors of teachers' facilitation of boys' and girls' same-gender and other-gender interactions. In regards to teachers' facilitation of boys-only and girls-only peer interactions, frequency, quality, and the interaction of these variables are expected to predict teachers' facilitation in a manner consistent with the previously reviewed hypotheses (both frequency and quality are predicted to be positively related to teachers' facilitation of same-gender interactions). This is expected because homophilous interactions commonly occur in the classroom and account for the majority of peer interactions (McPherson, 2001).

It is unclear if teachers' perception of peer frequency and quality will operate in the same way when teachers are interacting with other-gender peer interaction partners. As such, it is difficult to make specific predictions. On one hand, it is possible that frequency, quality, and the interaction of these variables predict teachers' facilitation of other-gender interactions in a manner consistent with facilitation of same-gender interactions. That is, the positive relations between peer interaction frequency and facilitation and between peer interaction quality and facilitation may remain when teachers interact with other-gender pairs of children. In other words, the same motivators that are expected to drive teachers' facilitation of same-gender peer interactions may also operate with regard to their facilitation of other-gender peer interactions. On the other hand, it is possible that teachers approach other-gender interactions in an opposite manner compared to same-gender interactions. As reviewed, other-gender interactions occur less frequently than same-gender interactions in the classroom and look

characteristically different than same-gender interactions. For instance, when a girl plays with boys, engagement in masculine activities occurs more often than when a girl plays alone or with other girls (Goble, Martin, Hanish, & Fabes, 2012). Due to these differences, teachers may view other-gender interactions as inherently distinct from same-gender interactions and may have different motivational tendencies for facilitating other-gender groups. For instance, teachers may be motivated to proactively facilitate infrequently occurring other-gender peer interactions in order to support or monitor when boys and girls come together in relatively unfamiliar peer interactions. This may mean that there could be a negative relation between teachers' perception of peer interaction frequency and their facilitation of other-gender peer interactions. Similarly, teachers may be motivated to proactively facilitate the other-gender peer interactions that they perceive to be of low quality to monitor how boys' and girls' play styles integrate with one another (Fabes et al., 2003). This may mean that other-gender peer quality negatively predicts teachers' facilitation of other-gender interactions. However, due to a lack of guiding research it is unclear which of these effects is most likely for teachers' facilitation of other-gender peer interactions. As such, this hypothesis is considered exploratory.

Present Study

The initial goal of the present study was to first document how often early childhood teachers were observed to facilitate peer interactions among two or more peers overall and in same- and other-gender interactions. Subsequently, I examined the extent to which variation in the frequency with which any two children interacted and variation in the quality of their interactions was associated with teachers' facilitation of their interactions. I also considered whether peer interaction frequency moderated the relation

between peer relationship quality and teachers' facilitation. Additionally, I considered the main and moderated effects of the frequency and quality of peer interactions on teachers' facilitation of boys-only, girls-only, and other-gender peers. To test these, five aims and corresponding hypotheses were proposed:

1. As a preliminary goal, the first aim was to descriptively examine the extent to which teachers facilitated peer pair interactions. Specifically, I examined the proportion of time teachers spent facilitating peer interactions out of their total time and the proportion of time teachers spent facilitating peer interactions out of the total time teachers spent interacting with children. Additionally, I examined the extent to which teachers facilitated boys-only, girls-only, and other-gender peer interactions. Same-gender groups (i.e., boys-only and girls-only peer pairs) were expected to be facilitated more often than other-gender. Due to children's preference for homophily (McPherson, 2001), teachers may facilitate children's same-gender peer pair interactions at a higher rate than other-gender peers because of increased opportunity to engage with children's groups of same-gender peers.
2. The second aim was to examine the extent to which teachers' perception of peer pair frequency was associated with facilitation of peer pairs. Frequency was predicted to be positively related to facilitation of peer interactions as early childhood teachers may have more opportunities to facilitate interactions with children who interact often with one another.
3. The third aim was to examine the extent to which teachers' perception of peer pair quality was associated with facilitation of peer pairs. Early childhood

teachers' perception of the quality of peer interactions was expected to be positively related to their facilitation of peer interactions, given that teachers report using fewer supportive strategies (e.g., facilitation) with children who engage in disruptive behaviors (Bauman & Del Rio, 2006).

4. The fourth aim was to examine the extent to which peer pair frequency served to moderate the relation between peer pair quality and teachers' facilitation. Peer relationship frequency was expected to moderate the relation between relationship quality and teachers' facilitation. Due to a lack of guiding research, hypotheses about the direction of effects were considered exploratory.
5. Finally, when teachers interact with children's groups of same-gender peers, frequency and quality were expected to predict teachers' facilitation in a manner consistent with the previously reviewed hypotheses. This is expected because homophilous interactions commonly occur in the classroom and make up the majority of peer interactions (McPherson, 2001). However, it was unclear if frequency and quality would operate in the same way when teachers are interacting with other-gender peers, as these interactions occur less frequently in the classroom. Due to a lack of guiding research this hypothesis was considered exploratory.

Methods

Participants. Participants were early childhood teachers and their students in Head Start schools in an urban southwestern city in the U.S. To recruit teachers, supervisors of eight Head Start districts were contacted and asked if their agencies would

be willing to participate in an observational study of teaching practices. Out of the eight districts contacted, five agreed and supervisors subsequently assisted in arranging in-service meetings at which 40 teachers were invited to participate. The final sample consisted of $n = 37$ teachers who volunteered to participate, signed informed consents, and provided their contact information at the in-service meetings. For a subsample of these teachers, $n = 6$, their students were also recruited for participation. Children were recruited for participation by sending letters in English and Spanish home. The letters explained the goals of the study and asked for consent from parents for their children to be observed by coders and rated by teachers. Per IRB approval, if parents did not want their child to participate, observational coders still observed the child as part of teacher-child interactions but did not record any identifying information about the child. Out of the 104 children recruited, 103 parents granted permission for their children to participate.

The current study used data from $n = 4$ of these 6 teachers and their 70 students. I chose to exclude 2 of the 6 teachers because these teachers did not report variability in children's interactions with one another (i.e., these 2 teachers reported that all the children in their class interacted often and at the highest quality; see Measures for details about teachers' reports of children's peer interactions). All four of the participating teachers were women. Two teachers were White, Hispanic/Latina, one teacher was Black/African American, and the race/ethnicity of the remaining teacher was not reported. Teachers ranged in total household income from \$25,000 to \$85,000. The four participating teachers had taught preschool for an average of 6 years (range 2-10, $SD = 3.65$). Finally, teachers ranged in education, with one teacher having earned a 2-year

technical training degree, two teachers having earned degrees from 4-year colleges, and one teacher having completed some advanced work but no graduate degree.

Of the participating children, on average there were 18 children (range, 15-20, $SD = 2.08$) per class. On average, there were 8 girls and 9 boys in each classroom (range 7-12 girls per class, $SD = 2.38$, range 7-10 boys per class, $SD = 1.41$). The majority of the children were Hispanic/Latino/a (66%). The remaining were: 14.5% White not Hispanic/Latino/a, 1% American Indian or Alaskan Native, 13.6% Black/African American, 1% Hawaiian or Pacific Islander, 1% other, and for 2.9% of the children, ethnicity was not reported. Household income information was not collected on each individual child. However, Head Start largely serves children of low socioeconomic status.

Procedures and Measures

Observational and survey data were collected from each of the 4 teachers. Each teacher was observed for three hours every morning for a period of three to four weeks. At the conclusion of the three to four weeks, teachers completed surveys about demographics, teaching beliefs, and perception of peer interactions. Teachers were given \$200 worth of classroom supplies as compensation for their participation.

Protocol for observations. Seven trained undergraduate students (71% female) observed the participating teachers using a teacher-focal observational protocol. Training was conducted by the lead researcher, with help from graduate research assistants. Coders were trained using vignettes and by observing teachers at a university preschool (that was not participating in the study) before beginning to observe in the sample classrooms. Coders were determined to be reliable if inter-observer agreement for all codes (between

the coder and the graduate student master coder), measured as kappas, were above .70. Prior to data collection, coders were also tested on their ability to match each child's name and face, and coders did not collect observational data until they could do so with 100% accuracy. Undergraduate coders were not informed about the specific goals of the study.

During each observation, trained coders observed the teacher for 10 seconds and recorded several codes on a handheld computer representing a range of teachers' behaviors (e.g., classroom maintenance, talking with other teachers, teacher-child interactions). When a teacher was observed to interact with children, coders also recorded which children were involved in the interactions using a unique identification number for each child. Once the codes for each 10-second observation were entered, the coders began the next 10-second observation. To prevent coder fatigue and data entry error, coders repeated this process for a total of 20 minutes, took a five-minute break, and then began another 20 minutes of observation. Observations occurred four days a week for three to four weeks. Observations took place indoors and outdoors.

For the subsample of teachers in the present study, coders completed a total of 4,009 ten-second observations of teachers, with an average number of codes per teacher of 1,002.25 (range was 668-1,165, $SD = 244.51$). The average number of observations obtained per coder (from the 7 coders observing this subsample) was 643 ($SD = 312.86$, range was 358 – 1,230). Variability in the number of codes obtained per coder was due to variability among coders in the length of time that they participated in the project and the number of hours per week devoted to the research study.

For the purposes of the present study, only the codes obtained during teacher-child interactions are relevant. During each ten second observation, coders recorded whether a teacher-child interaction occurred. This was coded when a teacher was observed to direct her visual, verbal, or auditory attention to a child during a ten second observation period. The 4 participating teachers were observed to interact with children for an average of 608.5 (SD = 236.6, range: 423 – 920) observations. Thus, on average, teachers spent 64% of their time in teacher-child interactions. This percentage was calculated by dividing the total number of observations of a teacher's interactions with children by the total number of all observations of that teacher. Subsequently, the average proportion score was computed across teachers. If a teacher-child interaction did occur, coders then recorded if teachers were observed to facilitate peer interactions and with whom the teacher facilitated this interaction (definitions and descriptive data on each of these codes are presented below).

Reliability data were obtained by pairing a coder with a reliability coder (graduate student). Each individual independently and simultaneously coded the same teacher's behavior.

Reliability observations were conducted on 4,081 (10.4%) of the total observations from the full sample of 39,278 observations of the 37 teachers participating in the larger study. To control for by-chance agreement, we used kappas to assess inter-observer agreement. Kappas were calculated by measuring the agreement between the two raters and then subtracting out the agreement due to chance (Martin & Bateson, 1993). Kappas for the variables used in the present study ranged from .77 to .95.

Teachers' Facilitation. If the teacher was observed to engage in a teacher-child interaction, coders selected from a list of teaching behaviors (i.e., facilitating, starting or stopping a child's behavior, providing feedback, commenting on children's behavior, or other). Because I was interested in how teachers encourage children's social development by supporting or expanding an ongoing interaction, I focused on observations of teachers' facilitation. Facilitation was coded if a teacher engaged with one or more children and made statements that supported the ongoing activity or a peer interaction (e.g., "Do you need help building this tower of blocks?" or "What are you both going to do next with that toy?"; Ashiabi, 2007; Trawick-Smith, 1998; 2011). Because I was interested in teachers' facilitation of children's peer interactions, I focused on codes of teachers' facilitation that were directed toward two or more children. Of the total amount of teacher-child interactions, teachers were observed to facilitate children's peer interactions an average of 99.75 times. (SD = 22.37 range: 96 –126) observations.

The kappa was .85 for teachers' facilitation.

With whom teachers facilitated peer interactions. With whom a teacher facilitated peer interactions was coded by observing to whom the teacher directed her visual, verbal, and auditory attention during a facilitation event. When teachers were observed to facilitate peer interactions, coders recorded who was involved in the interaction using a unique identification number for each child. Interactions could include a single child, children in dyads, children in small groups (up to 5 children per group), and children in large groups. Because I was interested in peer interactions, I focused on the teacher-child facilitations which contained two or more children. It is important to note that coders did not uniquely identify children who were interacting in groups of 6

children or more (i.e., large groups) to minimize error that might arise from the need to accurately identify each child in a large group. Because I was interested in connecting children's identifiable information to observations of teacher-child interactions, codes containing large groups of children were excluded. Coders were able to reliably identify children in teacher-child interactions (kappas ranged from .77 to .95, for each unique child identification code).

Protocol for surveys. At the end of the three- to four-week observation period, teachers completed surveys that included measures of teachers' demographics, children's demographics, teaching beliefs, and perceptions of children's peer relationships. Completion of the surveys took approximately 2 hours. I used a subset of these measures including teachers' and children's demographics and teachers' perception of children's peer relationships.

Child Gender. Teachers reported on each individual child's gender as either male or female. These reports were used to assign peer pairs as boys-only, girls-only, or other-gender (i.e., male-female peer pairs).

Teachers' perception of frequency and quality of peer interactions. To assess teachers' perception of the frequency and quality of peer interactions, teachers completed two separate matrices. On each, the names of children in their classes were listed across the first row and down the first column. Each matrix asked teachers to report on the interactions they observed among each pair of children in the last three weeks. The first matrix, which tapped frequency of interaction, required teachers to rate the extent to which they observed each pair of children interacting with one another. Teachers responded on a scale from 1 *never* to 6 *multiple times a day*. The second matrix tapped

the general quality of the interactions between each pair of children, and asked teachers to rate how well pairs of children get along with each other. Teachers responded on a scale from 1 *mostly negative* to 5 *mostly positive*.

It is important to note this study is focused on teachers' perceptions of the frequency and quality of interactions among any two pairs of children and on their facilitation of interactions among each pair. However, the observations were naturalistic observations; thus, observations of teacher-child interactions focused on naturally-occurring interactions which could include more than two peers. Indeed, in each ten second observation, the identities of up to 5 peers were recorded during assessment of teacher-facilitated peer interactions. Therefore, to match teachers' reports on peer dyads, the observational data were transformed to the peer dyad level.

Data were transformed using social network projection methods (Opshal, 2013). To explain this method and how the observational data were transformed, it is helpful to first describe the structure of the observational data. The observational data in the present study are structured as a two mode network, which is also commonly called a bipartite network (Figure 1A; Opshal, 2013). In this two mode network, the first mode consists of each ten-second observation in which a teacher engaged in facilitating a peer interaction. The second mode shows the children who were connected to each ten-second observation in which a teacher engaged in facilitating a peer interaction. Figure 1A shows an example of this two mode network. In Figure 1A, each square represents a ten-second observation in which a teacher engaged in facilitating a peer interaction (mode 1). Each circle represents a child in the classroom (mode 2) and the lines between the circles (children) and squares (ten-second facilitation observation) indicate which children were connected

in a facilitation observation. For instance, Figure 1A shows that coders recorded that the teacher facilitated a peer interaction between child A, B, and C during the ten second observation labeled “1”.

Two-mode social networks are rarely analyzed in this original data structure because most network measures are defined for one-mode networks (only a few network measures have been revised to be used in two-mode networks; Borgatti and Everett, 1997; Latapy et al., 2008; Opsahl, 2013). Therefore, to analyze this type of data structure, the two-mode network was transformed into a one-mode network. The step taken to transform the data from two modes to one mode is called *projection*. Projection is done by connecting the data points at mode 2 *if* they were connected through mode 1. Figure 1B shows an example of this projection for the ten second observation of a teachers’ facilitation labeled “1”. Child A, B, and C are depicted by the blue circles and the observation in which a teacher facilitated an interaction with these children is depicted by the orange square. Projection methods remove the orange square (the observation) and instead connect the blue circles (children). The remaining connected blue circles (children) indicate that child A, B, and C were observed in a facilitative interaction with the teachers in one ten-second observation. This projection was done for every ten-second observation. This resulted in a one-mode network where children were connected to one another if they were observed together in a ten-second interaction in which the teacher facilitated their peer interaction.

After creating this one-mode network, I added how many times two children were connected together in the network. That is, I added how many times a peer pair was observed to be in a facilitation event together. This resulted in a one-mode network that

was weighted by how many times children were observed to be in a facilitation event together. An example of this network is shown in Figure 1C. This figure shows in graphic form the outcome variable, *peer facilitation*, which was a count of how many times each possible pair of peers was involved in a facilitation event with the teacher. For instance, if child A and child C were observed to be in a facilitation event with the teacher in two separate 10-second observations then the child A and child C dyad would have a score of 2 for the dependent variable *peer facilitation*. This means that each peer pair has a *peer facilitation* score and represents one row in our data, making our dependent variable (and our power) at the level of peer pairs (total peer pairs, $n = 567$; Boys-only peers, $n = 170$; Girls-only peers, $n = 116$; Other-gender peers, $n = 281$). On average, peer pairs were involved in facilitation events an average of 2.78 times ($SD = 3.96$, range = 0-26). There is a large range in facilitation events, indicating variability in how often peer pair interactions were facilitated.

Covariates: Child Reading and Writing and Language Use

Child reading and writing was included as a covariate in study models because teachers have been observed to vary their teaching practices based on their perception of children's academic abilities (Rubie, 2004). Reading and writing was assessed with a subscale from the Developmental Profile Scale (Fabes, et. al., 2003). This subscale is an eight-item measure that asks teachers to indicate children's level of reading and writing skills. Example items include, "*Child chooses books and stories during free choice activities*" and "*Child recognizes some common words*". Teachers responded on a four point scale from *1 not yet* – *4 proficient*; with a higher scoring indicating greater proficiency in reading and writing (Alpha = .89).

Child language use was also included as a covariate in study models because teachers' perceptions of children's language skills are similarly associated with teaching practices (Kuklinski & Weinstein, 2000). Child language use was also measured with a subscale from the Developmental Profile Scale (Fabes, et. al., 2003). This subscale is a three-item measure that asks teachers to rate children's language use. Example items include "*Uses language to initiate and maintain interactions with adults and peers*" and "*Uses elaborate language to describe objects and events*". Teachers responded on a four point scale from *1 not yet* – *4 proficient* with a higher score indicating greater proficiency in language use (Alpha = .87).

Statistical Approach

Estimating the effects of perceived peer pair frequency and quality, and the interaction of these variables, on the number of times a peer pair was observed to be in a facilitative interaction with the teacher was conducted using regression analyses in Mplus, version 6.1. Due to the non-independence of peer dyads, the "type=complex" specification was used. Using the type=complex specification accounts for the non-independence of peer dyads by adjusting the standard error estimates and therefore removes variance due to the repetition of children across peer pairs (Asparouhov & Muthen, 2006; Stapleton, 2006). Without accounting for the non-independence in the data, the estimated standard errors would be inflated resulting in a greater chance of committing a Type I error. Type=complex was chosen over multi-leveling modeling approaches because the research questions of interest are not specific to and do not address data at multiple levels. Therefore, accounting for the non-independence in the

data without modeling the data at multiple levels, yields the most parsimonious analyses for the research questions in the present study.

Results

First, preliminary analyses were conducted to examine the distribution of all study variables and to examine possible control variables. Next, descriptive statistics were examined to assess the extent to which teachers facilitated peer interactions overall and with boys' and girls' same- and other-gender interactions. Subsequently, a multiple regression model was conducted to examine the extent to which the main effects of peer pair frequency and quality predicted teachers' facilitation. After this model was tested, the interaction of frequency and quality was created and added to this main effect model. Next, six separate regression models (three main effects models and three interaction effect models) were conducted to assess the extent to which peer pair frequency, quality, and the interaction of these variables predicted teachers' facilitation of boys' and girls' same-gender peer interactions and other-gender peer interactions.

Preliminary Analyses

Preliminary analyses were conducted to examine the descriptive statistics, skew, and kurtosis of all study variables. Tabachnick and Fidell (2001) suggest that when levels of skew and kurtosis are two times the standard error of the variable they should be transformed. Only the variable, peer pair facilitation, did not meet normality assumptions (Tabachnick & Fidel, 2006). Thus, the Robust Maximum likelihood (MLR) estimator was used in Mplus as this estimator accounts for the non-normality of data.

Preliminary analyses were conducted to examine control variables. Because the dependent variable is at the level of peer pairs (i.e., each peer pair has a peer facilitation

score), there is sufficient power to control for child factors. *Child reading and writing abilities* as well as child *language use* were both considered as covariates. These were considered as covariates because teachers' perception of children's literacy and language abilities are associated with teaching practices (Kuklinski & Weinstein, 2000; Rubie-Davies, 2010). For instance, teachers are observed to use supportive practices (e.g., praise) with students they perceive to have high academic skills (Brophy & Good, 1970). And Rubie (2004) showed that teachers believed high achieving students could work with a wide range of peers (i.e., both low and high achieving) and that teachers should monitor but not interfere with these students' learning. Although these findings are not focused on facilitation of peer interactions, they suggest that teachers may consider literacy and language skills when making decisions about which children to interact with and how to interact with them. Therefore, it was important to consider controlling for child reading and writing and language use as these factors may be related to teachers' decisions to facilitate peer pair interactions. Moreover, Pearson product moment correlations revealed that child *reading and writing skills* and child *language use* were correlated with the dependent variable, peer pair facilitation ($r = .11, p < .01$ and $r = .15, p < .05$, respectively). See Table 1. Because these variables have previously been connected to teaching practices and because both were correlated with study variables, language use and reading and writing skills were included as covariates in all study models.

Teachers' Facilitation of Peer Pair Interactions Overall and with Boys' and Girls' Same- and Other-Gender Peer Pairs

As a preliminary goal, I descriptively examined the proportion of time teachers were observed to facilitate peer interactions out of the *total time teachers were observed*

and out of the *total time observed in teacher-child interactions*. Each of these proportion scores was created to provide two sets of unique information. The first proportion score provides information about how often teachers facilitate peer interactions during the preschool day (out of the total number of teacher observations). The second, provides information about how much time teachers facilitate peer interactions when teachers themselves are interacting with children. Out of the total time that teachers were observed, teachers facilitated children's peer interactions an average of 10% of the time (range 7%-16%, SD = 4%; this proportion score was calculated by dividing the number of observations in which a teacher facilitated a peer interaction by the total number of observations of a teacher). Out of the total time that teachers were observed to be in teacher-child interactions, teachers facilitated peer interactions an average of 17% of the time (range = 14%-25%, SD = 5%; this proportion score was calculated by dividing the number of observations in which a teacher facilitated a peer interaction by the total number of observations in which a teacher was interacting with children). These proportion scores indicate that teachers facilitate interactions between two or more children for a small portion of the preschool day and a small portion of teacher-child interactions.

Importantly, an additional goal of the present study was to examine how often teachers facilitate interactions with children's groups of same- and other-gender peers. Therefore, as a preliminary goal, I descriptively examined the proportion of time teachers were observed to facilitate boys-only, girls-only, and other-gender peer interactions out of the *total time teachers were observed* and the *total time observed in teacher-child interactions* (Table 1). Teachers facilitated children's peer interactions with boys-only

peer pairs approximately 2% of their total time and 3% of the time during teacher-child interactions. Teachers facilitated girls-only peer pairs for approximately 2% of the total time and 3% of the time during teacher-child interactions. Finally, teachers facilitated other-gender peer pair interactions for approximately 7% of the total time and 11% of the time during teacher-child interactions. A one-way ANOVA comparing the main effect of peer interaction composition on the proportion of teachers' facilitation of boys-only, girls-only, and other-gender pairs (out of time during teacher-child interactions) revealed a significant difference in the proportion of time that teachers facilitated peer pair interactions across these peer types, $F(2, 9) = 14.96, p < .05$. This significant effect was followed using Tukey's post-hoc tests. Results revealed teachers facilitated other-gender peer interactions more often than boys-only interactions, $p < .05$, and more often than girls-only interactions, $p < .05$. However, teachers did not facilitate boys-only and girls-only interactions at significantly different rates, $p = .98$ (Table 1).

Frequency and Quality of Overall Peer Pair Interactions

I first tested the hypothesis that teachers' perception of peer pair frequency and quality would be related to peer pair facilitation as follows. *Peer facilitation* (i.e., the number of times any two peers were observed to be in a facilitative interaction) served as the continuous dependent variable and peer interaction frequency and quality (the independent variables) were entered as main effects. Results revealed that only teachers' perception of peer pair frequency was significantly related to peer pair facilitation; peer pair frequency was positively associated with peer pair facilitation ($B = .49, p < .001$; Table 2).

Subsequently, to test the hypothesis that frequency would *moderate* the relation between peer pair quality and teachers' facilitation, I ran a variation of this first model. Specifically, the interaction term of frequency X quality was created and was added to the model containing the main effects of peer interaction frequency and quality. To create this interaction, teachers' perception of frequency was grand mean centered and teachers' perception of quality was grand mean centered. This was done to ease interpretability (Aiken & West, 1991). Next the interaction term was created by multiplying quality and frequency and entered into the main effects model. Again results revealed that only the main effect of teachers' perception of peer pair frequency was significantly related to peer pair facilitation; peer pair frequency was positively associated with peer pair facilitation ($B = .47, p < .001$; Table 2).

Frequency and Quality of Peer Pair Interactions: With Boys' and Girls' Same- and Other- Gender Peer Pairs

As a preliminary step, I examined the extent to which teachers' perception of peer pair interaction frequency and quality differed across boys-only, girls-only, and other-gender peer pairs (means and standard deviations for these variables split by peer pair type are presented in Table 1). A one-way ANOVA revealed significant differences in teachers' perception of peer pair frequency, $F(2, 563) = 29.90, p < .001$; teachers perceived boys-only interactions and girls-only interactions to occur more often than other-gender interactions. A second one-way ANOVA revealed that teachers also perceived significant differences in peer pair quality, $F(2, 563) = 7.35, p < .001$; teachers perceived girls-only interactions to be of higher quality than boys-only and other-gender interactions.

The same model building procedure that was previously used to estimate the direct and moderated effects of frequency and quality of peer interactions was used to test the extent to which these predictors were associated with teachers' facilitation when interacting with boys-only, girls-only, and other-gender peer pairs. Six separate models (three main effects models and three models that added the interaction effect) were conducted in which the dependent variable differed to assess how frequency, quality, and the interaction of these variables predicted teachers' facilitation of each peer dyad type (Table 2). These 3 dependent variables were the number of times a peer dyad, consisting of: 1) boys-only, 2) girls-only, 3) other-gender peers, was observed to be in a facilitative interaction with the teacher. In these models, to create the interaction of peer pair quality X frequency, variables were group mean centered to ease interpretability (Aiken & West, 1991). For example, in the model predicting boys-only peer pair facilitation, frequency and quality were centered at the means for frequency and quality of boys-only peer pairs before the interaction term was created.

For boys' interactions with other boys, none of the predictors were significantly related to peer pair facilitation (Table 2). Thus, teachers may be considering other factors when facilitating boys-only peer pair interactions.

For girls' interactions with other girls, results revealed that teachers' perception of peer pair quality was marginally and positively related to peer pair facilitation ($B = .35, p = .10$) and peer pair frequency was marginally and positively related to peer pair facilitation ($B = .53, p = .10$). However, both of these main effects were subsumed by a significant quality X frequency interaction ($B = .23, p < .05$; Table 2). To interpret this significant two-way interaction, three regression slopes (showing the association between

peer pair quality and peer pair facilitation) were examined. Specifically, regressions slopes were examined at low ($-1SD$), average, and high ($+1SD$) levels of peer interaction frequency (Jaccard, Turrisi, & Wan, 1990). These simple slopes are graphed in Figure 2; the number of times a peer dyad was observed to be in a facilitative interaction is plotted on the Y axis, quality is plotted on the X axis, and the three slopes are plotted. For girls-only peer pairs, results revealed the slope depicting the association between peer pair facilitation and peer pair quality was not significantly different than 0 at low levels of peer pair frequency ($B = .35, p = .22$). However, the slope between peer pair facilitation and peer pair quality was significantly different than 0 for average ($B = .78, p < .05$) and high ($B = 1.22, p < .001$) levels of peer pair frequency; when girls-only peer pairs interact at average and high frequencies there is a positive relation between peer pair quality and facilitation.

For other-gender peer interactions, teachers' perception of peer pair quality was not significantly related to peer pair facilitation ($B = -.28, p = .33$) and peer pair frequency was significantly and positively related to peer pair facilitation ($B = .59, p < .01$). These main effects were subsumed by a significant quality X frequency interaction ($B = -.31, p < .01$; Table 2). To interpret this significant two-way interaction, three regression slopes (showing the association between peer pair quality and peer pair facilitation) were examined. Specifically, regression slopes were examined at low ($-1SD$), average, and high ($+1SD$) levels of peer interaction frequency (Jaccard, Wan, & Turrisi, 1990). These simple slopes are graphed in Figure 3. For other-gender peer pairs, results revealed that the slope depicting the association between peer pair facilitation and peer pair quality was not significantly different than 0 at low levels of peer pair frequency ($B = -.02, p = .91$).

However, the slope between peer pair facilitation and peer pair quality was marginally different than 0 for average ($B = -.50, p = .09$) levels of peer pair frequency. And, the slope between peer pair facilitation and peer pair quality was significantly different than 0 for high ($B = -.98, p < .05$) levels of peer pair frequency. When other-gender peer pairs interact at average and high frequencies there is a negative relation between peer pair facilitation and peer pair quality.

Discussion

In this study, I examined the extent to which teachers facilitated peer interactions among two or more peers overall and with boys' and girls' same- and other-gender groups. In doing so, I considered the extent to which the frequency and quality of peer interactions, and the interaction of these variables, predicted teachers' facilitation of peer interactions. To examine these research questions, social network techniques and regression analyses were employed using data from a teacher-focused observational and survey study of 4 Head Start teachers and their students. It was expected that teachers would facilitate same-gender (i.e., boys-only, girls-only) peer interactions more often than other-gender interactions. Additionally, frequency and quality were each expected to positively relate to teachers' facilitation, and the interaction of these variables was expected to significantly relate to teachers' facilitation. When teachers' facilitation was examined separately for boys' and girls' same- and other-gender interactions, it was expected that quality and frequency would remain positively related to teachers' facilitation of same-gender peers. However, it was unclear if frequency and quality would operate in the same way when teachers interacted with other-gender peers, as these

interactions occur less frequently in the classroom. Therefore, this hypothesis was considered exploratory.

Results revealed that teachers facilitated peer interactions for a small portion of their time. And, teachers were more likely to facilitate other-gender peer interactions relative to both boys-only interactions and girls-only interactions. In regards to predictors of teachers' facilitation, results revealed only peer pair frequency was related (positively) to teachers' facilitation of peer interactions for the sample as a whole. When divided by boys' and girls' same- and other-gender play, none of the predictors were significantly related to peer pair facilitation for boys' interactions with other boys. However, for girls' interactions with other girls, there was a significant interaction between frequency and quality, such that when girls interact with one another at average and high frequencies there was a *positive* relation between peer pair facilitation and peer pair quality. For other-gender interactions, the interaction between frequency and quality was also significantly related to teachers' facilitation; however, there was a *negative* relation between quality and facilitation for those boy and girls who frequently interact with one another. Overall, results provided partial support for study hypotheses. In the following sections, findings, potential explanations, and implications for study results are discussed. Subsequently, strengths, limitations, and directions for future research are provided.

Teachers' Facilitation of Peer Pair Interactions: Overall and by Gender Type

As a preliminary goal, the first aim was to descriptively examine the extent to which teachers facilitated peer pair interactions. Specifically, I examined the proportion of time teachers spent facilitating peer interactions out of the total time teachers were observed and the proportion of time spent facilitating peer interactions out of the total

time teachers spent interacting with children. Out of the total time that teachers were observed, teachers facilitated children's peer interactions an average of 10% of the time (range 7%-16%). Out of the total time that teachers were observed to be in teacher-child interactions, teachers facilitated peer interactions an average of 17% of the time (range = 14%-25%). These findings imply that teachers spend a small portion of their time, both overall and in teacher-child interactions, facilitating children's peer interactions.

This finding is surprising. A primary purpose for early childhood education is to expose children to pre-academic experiences that enhance their social-behavioral competence before entry to kindergarten. As a result, early childhood teachers are tasked with helping children develop foundational social skills. For teachers, this finding suggests they may be underusing peer facilitation as a tool for encouraging children's social development. This is a missed opportunity because teachers' facilitation of peer interactions is connected to improvements in children's social skills, which in turn, predict children's future social and academic success (Bowman, Donovan, & Burns, 2000; Kindermann, 2007; Pianta et al., 2008). This finding also implies that students have few opportunities to practice interacting with their peers under guidance and support by their teacher, which are critically important experiences for helping students develop foundational social skills (Bowman, Donovan, & Burns, 2000; Hendrickx, Mainhard, Boor-Klip, Cillessen, & Brekelmans, 2016; Kindermann, 2007; Pianta et al., 2008). Because of the benefits of teachers' facilitation and the relatively low frequency at which teachers were observed to facilitate peer interactions, teacher training and supportive efforts could be aimed at helping teachers increase how often they facilitate peer interactions in the classroom.

Moreover, this finding is surprising because it is inconsistent with prior work that shows that an important goal for teachers is to encourage children's social interactions (Gest & Rodkin, 2011; Gest, Madill, Zadzora, Miller, & Rodkin, 2014; Serdiouk, Rodkin, Madill, Logis, & Gest, 2015). For instance, Dellamatera's (2011) qualitative study of 61 pre-service early educators revealed that 51% of teachers reported believing that teachers should guide preschoolers' social development with facilitative practices. One reason for the discrepancy between the present study findings and Dellamatera's (2011) finding may be because the prior work relied on teacher-reported beliefs about how often teachers should facilitate peer interactions. Given that the present *observational* study found only a small portion of teachers' time was actually spent facilitating peer interactions, teachers in prior work may have inflated the extent to which they reported that facilitating peer interactions was important, perhaps due to pressures from researchers, principals, or school standards (Adams, Soumerai, Lomas, & Ross-Degnan, 1999). The discrepancy between the present study findings and Dellamatera's (2011) may also be due to the sample characteristics of each study. The present study consisted of a small sample of in-service Head Start teachers and Dellamatera's (2011) study consisted of 61 *pre-service* teachers (of which 64% did not have experience working with preschool children). It is possible that the pre-service teachers in Dellamatera's (2011) study reported an idealistic belief that teachers should guide children's social development with facilitative practices, whereas the present study observed and reported a representative account of how often in-service preschool teachers are realistically able to facilitate children's interactions. The discrepancy between the present study and prior findings underlines that the present study contributes to the broader literature on teachers' facilitation of peer interactions by using

a teacher-focused observational coding system. Further, the present study findings hint that facilitating children's peer interactions is actually low on teachers' priority list, at least for the 4 Head Start teachers studied here. In its place, teachers may be focused on engaging children in academic content, managing problem behaviors, stopping children from engaging in behaviors or activities, encouraging children to start a new behavior or activity, or working on classroom tasks (e.g., paperwork, cleaning the classroom, talking with parents). To better understand how managing peer interactions fits into a preschool teacher's day and if there is variation in how teachers manage children's peer interactions, future work should assess a wider range of teaching behaviors (e.g., giving feedback, praising children, giving directions, cleaning the classroom, talking with parents) that teachers employ during the day and when interacting with two or more children.

I also descriptively examined the extent to which teachers facilitated boys' girls', and other-gender peer interactions. Same-gender groups (i.e., boys-only and girls-only peer pairs) were expected to be facilitated more often than other-gender groups. Results did not support this hypothesis. Instead, teachers were more likely to facilitate other-gender interactions compared to girls' interactions with other girls and boys' interactions with other boys. This result is unexpected because other-gender interactions occur less frequently compared to same-gender interactions; only about 15% of children's play is with other-gender peers and 30% of children's play involves both same- and other-gender children (i.e., mixed- gender; Martin and Fabes, 2001). Moreover, teachers in the present study also reported that other-gender interactions occurred less often than boys-only and girls-only interactions. Because other-gender interactions do not occur often, this finding

implies that teachers may be intentional about seeking opportunities to support children's peer interactions when they involve both boys and girls. Considering that teachers also reported that they perceived other-gender interactions to be of lower quality than girls-only (but not boys-only) interactions, it may be that teachers' motivation for facilitating other-gender peer interactions is a responsive attempt to manage problems that might arise when girls and boys interact together. That is, teachers' motivation for facilitating other-gender peer interactions may come from a desire to manage peer interactions that do not occur often and that may be of low quality (i.e., those that are between between boys and girls).

Frequency and Quality of Overall Peer Interactions as a Predictor of Facilitation

Aims 2-4 were designed to examine the extent to which teachers' perception of peer pair frequency and quality, and the interaction of these variables, was associated with facilitation of peer interactions. Both frequency and quality were predicted to be positively related to facilitation of peer interactions for the sample as a whole.

Additionally, peer interaction frequency was expected to moderate the relation between relationship quality and teachers' facilitation. Findings partially supported these hypotheses; peer pair frequency was positively related to teachers' facilitation. However, peer pair quality and the interaction of frequency and quality did not relate to teachers' facilitation.

That peer pair frequency was positively related to facilitation suggests that teachers are focused on maintaining the pre-existing relationships in the classroom instead of supporting or encouraging new interactions or those that do not occur often. For instance, if children frequently interact with one another, teachers may perceive the

class to be functioning well. Under these circumstances, a teacher may not be motivated to change the classroom social environment and instead may work to maintain an already well-functioning classroom. This finding is consistent with prior work (focused on individual children) that shows teachers are more likely to use practices that maintain the status quo of the classroom as opposed to proactive practices that seek to change or alter children's behaviors before they occur. Additionally, these findings suggest that proximity may be a guiding factor in teachers' motivation to facilitate peer interactions. That is, teachers may be motivated to facilitate peer interactions that occur most often because these are the easiest peer interactions to facilitate due to increased opportunities to interact with these peers. For students, this finding means there are few opportunities for teacher-supported interactions with unfamiliar peers, making it more challenging for students to expand their social networks to include a diverse array of peers. Thus, students may benefit if teachers are reminded in training about the importance of supporting infrequent peer interactions, as this training may encourage teachers to seek out and guide peer interactions that do not occur often.

For the sample as a whole, peer pair quality was not related to teachers' facilitation, and peer pair frequency did not moderate the relation between quality and facilitation. This was an unexpected set of findings. Prior work shows that teachers use information about individual children's behavioral qualities (e.g., disruptive behavior) to guide their use of supportive strategies (e.g., facilitation) with those children (Bauman & Del Rio, 2006), yet quality did not seem to guide teachers' facilitation across the whole sample. However, it is important to note that when divided by gender type of peer group, results revealed that peer pair quality was related to facilitation and there were

differences in the direction of the peer pair quality effect, such that relations were null for facilitation of boys' same-gender interactions, positive for facilitation of girls' same-gender interactions, and negative for facilitation of other-gender interactions. Differences in the direction of this effect may explain why peer pair quality was not related to facilitation across the whole sample. That is, it may be that teachers *are* using peer pair quality in their facilitation decisions but they use this information differentially depending on the peers they are interacting with (i.e., all boys, all girls, or boys and girls). Thus, quality may differentially motivate teachers to use facilitation when interacting with boys' and girls' same and other gender peer pairs. A breakdown of how quality influences teachers' facilitation by gendered peer pair type is discussed below.

Frequency and Quality of Peer Pair Interactions with Boys-Only, Girls-Only, and Other-Gender Peer Pairs

The last aim was to consider how peer pair frequency, quality, and the interaction of these variables predicted teachers' facilitation of boys' and girls' same- and other-gender play.

When teachers interact with children and their same-gender peers, frequency and quality were expected to positively predict teachers' facilitation, similar to the previously reviewed hypotheses. This was expected because homophilous interactions commonly occur in the classroom and make up the majority of peer interactions (McPherson, 2001). It was unclear if frequency and quality would operate in this same way when teachers were interacting with other-gender peers, as these interactions occur less frequently in the classroom. Due to a lack of guiding research this hypothesis was considered exploratory.

Results revealed that none of the predictors were significantly related to peer facilitation for boys' interactions with other boys. Prior work shows that boys are less likely than girls to seek help for peer relationship stress from teachers and boys are less likely than girls to play near teachers (Bernzweig, Eisenberg, & Fabes, 1993; Eisenberg, Shepard, Fabes, Murphy, & Guthrie, 1998). Thus, teachers may not be motivated by frequency and quality of boys' interactions with other boys because they might view boys' interactions with boys as autonomous relationships that are self contained and require little support from teachers. However, teachers facilitated boys' and girls' same-gender interactions at approximately the same rate. This may mean that other factors, beyond frequency and quality are motivating teachers' facilitation of boys' interactions with other boys. One of these factors may be the activity that boys are engaged in. For instance, prior work shows that teachers are more likely to encourage boys' engagement in masculine (e.g., bikes, blocks, trucks) activities compared to feminine (e.g., dolls, dress up, art) or gender-neutral activities (e.g., books, board games, music; Granger, Hanish, Kornienko, & Bradley, 2017). This finding hints that teachers may consider the activity type that boys are engaged in during peer interactions as a basis for deciding what interactions to facilitate with boys. Future work might consider if the activity that boys engage in when interacting with other boys guides teachers' facilitation of their peer interactions.

In contrast, teachers *do* appear to be motivated by peer interaction frequency and quality when facilitating girls' interaction with other girls. Results revealed that, for girls' interactions with other girls, there was a significant interaction between frequency and quality, such that when girls interact with one another at average and high frequencies

there was a *positive* relation between peer pair facilitation and peer pair quality. This finding is consistent with the hypothesis that teachers would be more likely to facilitate interactions between peer pairs that occur most often, especially when the interactions are positive, in efforts to maintain existing relationships and well-functioning classroom social environments. Further, this finding supports the hypothesis that teachers' motivation to use facilitative practices (e.g., child centered) stems from children's engagement in appropriate social behaviors. This finding is consistent with prior work at the individual child level which shows that teachers are more likely to use child centered practices with children who are engaging in appropriate classroom behaviors (Bauman & Del Rio, 2006; Yoon & Kerber, 2003). Taken together, findings suggest that when girls are interacting with other girls they are most likely to experience teacher supported peer interactions if they are paired with a girl they play with often and well. This means girls are missing opportunities to experience teacher guided peer interactions with girls with whom they do not often play or with whom there may be conflicts. This is problematic as children's interactions that do not occur often or at a high quality may be in the most need of teacher support, modeling, and guidance. This finding implies that teacher training efforts could emphasize a need for teachers to proactively facilitate interactions between girls (and, likely, boys) that do not happen often or that are of low quality.

Results revealed the opposite effect for other-gender peer pairs. The interaction between frequency and quality was significantly related to teachers' facilitation, but there was a *negative* relation between quality and facilitation for those boy and girls who frequently interact with one another. Thus, teachers were most likely to facilitate frequent low quality other-gender interactions. This suggests that teachers approach facilitation of

other-gender peer interactions from a different motivational framework compared to same-gender peer interactions. This framework may be due to differences in other-gender and same-gender interactions. For instance, other-gender interactions occur in the classroom less frequently than same-gender interactions and look characteristically different than same-gender interactions (e.g., Goble, Martin, Hanish, & Fabes, 2012). Due to these differences, teachers may view other-gender interactions as inherently distinct from same-gender interactions. In fact, teachers did report that they perceived differences in the quality and frequency of same and other-gender interactions; teachers reported that other-gender interactions occurred less often than boys-only and girls-only interactions and that other-gender interactions were lower in quality than girls-only interactions. Thus, teachers seem to be attuned to other gender peers who interact often but poorly and feel the need to facilitate these interactions, perhaps to support children or to prevent classroom disruption.

Strengths and Limitations

To date, literature on teachers' facilitation of peer interactions has focused on teachers' facilitation of individual children's interactions with peers. The present study adds to this body of literature by documenting how early childhood teachers make decisions about which interactions *among two or more peers* to facilitate. This is an important contribution because teachers' decisions to facilitate peer interactions do not seem to be limited to perceptions about one child but rather also involve a careful balance of simultaneously managing each child's social needs with the goal of maintaining a social context that encourages learning and development for both children. Indeed, results from the the present study presented novel information that prior work on teachers'

facilitation of individual children's peer interactions could not provide. Specifically, findings suggest that teachers consider how often and how well two children interact when making decisions about which peer interactions to facilitate but, importantly, the direction of these effects depends on the gender composition of the peer group. Additionally, this study is strengthened by using social network modeling approaches to quantify how often two children were observed to be involved in a facilitative interaction with the teacher. This is a strength of the study because it enabled me to connect teachers' reports on peer dyads to observations of peer interactions.

However, this study is not without limitations. First, findings were based on a sample of four teachers in Head Start classrooms, which significantly limits the generalizability of the research findings. Collecting observational data on teachers and their children is expensive. In the present study, decisions were made to limit the subsample of teachers for whom data on individual children were available due to the resource demands in recruiting and assessing a large sample of teachers and their children. Yet, future work should look to overcome this limitation by evaluating these practices among a larger sample of teachers from diverse backgrounds. Additionally, because we only had four teachers, we were limited in our ability to model teacher level factors that may have influenced teachers' facilitation of peer interactions. Important factors to consider are teachers' years of experience, education level, teachers' behavior management efficacy (e.g., the extent to which a teacher believes she can regulate disruptive student behavior), teachers' belief about how to encourage children's social development (e.g., through punishment, letting children work it out, or supporting children's behavior), and teachers' perception of boys' and girls' ability to interact with

other-gender peers. Each of these variables should be considered in future work because they have been previously connected to teaching practices and are relevant to facilitating peer interactions (Rimm-Kaufman, & Sawyer, 2004; Serdiouk, et al., 2015). For instance, teachers with high behavior management efficacy are more positive and responsive to students, spend more time devoted to students' needs, and praise students more readily (Birch & Ladd, 1997; Brouwers, Evers, & Tomic, 2001). Additionally, several classroom level variables may have influenced teachers' ability or willingness to facilitate peer interactions. Classroom level variables that should be considered in future work are the number of students in a classroom, the proportion of boys in a classroom, the average level of children's social development in a classroom (e.g., the extent to which students in a class can use appropriate strategies when interacting with peers) and the average level of children's inhibitory control in a classroom. Each of these variables should be considered because they have been connected to teaching practices and teachers' attitudes towards children in their classrooms (Francis, 2000; Nurmi, Viljaranta, Tolvanen, & Aunola, 2012; Nurmi et al., 2013). For instance, classroom-level externalizing behavior is positively associated with teachers' use of emotionally supportive teaching practices, such as facilitation (Friedman-Krauss, Raver, Morris, & Jones, 2014).

Conclusion

Findings from the present study have three specific implications for how we can improve early childhood teacher training focused on helping teachers promote children's foundational social skill development. First, teachers are in need of training that builds their capacity to increase how often they facilitate peer interactions. This training is needed because teachers, at least in the present study, rarely used facilitation as a tool for

supporting children's social skill development and early peer experiences. Additionally, to date, teachers receive little training about how to manage classroom social dynamics. Therefore, educating teachers about how to facilitate peer interactions will help to fill a current gap in teachers' social management training needs. Moreover, training teachers to increase the rate at which they facilitate peer interactions is critically important for student well-being because facilitation is connected to improvements in children's social skills, which in turn, predict children's future social and academic success (Bowman, Donovan, & Burns, 2000; Kindermann, 2007; Pianta et al., 2008). Second, findings suggest this training should specifically focus on instructing teachers about the importance of expanding children's social repertoires. For the four teachers in the present study, motivation for facilitating peer interactions stemmed from their perceptions of how often children interacted with one another; teachers were more likely to facilitate peers who interact often together. This implies that teachers may need additional incentives or reasons to facilitate peer interactions between children who do not interact often. Finally, findings show that teachers' consideration of how often and how well children interact is dependent on the gender composition of the peer interaction and that these perceptions are differentially related to teachers' facilitation of peer interactions. Specifically, findings suggest that teacher training about facilitation should also target building teachers' motivation to facilitate the peer interactions of *same-gender* children who interact infrequently or at a low quality as well as other-gender children who have more positive interactions. Each of these changes to teacher training, informed by the present study, will promote classroom experiences in which students are exposed to teacher

supported social interactions across a range of peer group compositions (e.g., low quality, infrequently occurring, same- and other-gender).

STUDY 2

The Influence of Teachers' Depressive Symptoms on Teacher-Child Conversation Quality in Early Childhood Classrooms

Early childhood teachers are at an elevated risk for experiencing depressive symptoms as compared to non-teaching populations (Greenglass & Burke, 2003; Whitaker et al., 2013). This may be due to the high-pressured nature of teaching. Early childhood teachers must manage large groups of 3- and 4-year-old children, ensure that children are well cared for, and promote children's development, all while dealing with various stressors, including low pay, poor benefits, and limited support (Whitebook, Phillips, & Howes, 2014). Not surprisingly, many early childhood teachers report feeling overwhelmed, overworked, and underappreciated (Chaplain, 2008; De Nobile & McCormick, 2005; Greenglass & Burke, 2003; Kyriacou, 2000; 2001). Moreover, among early childhood teachers, rates of depression are even higher for those teachers who work in Head Start classrooms, which serve a socioeconomically disadvantaged population of students. A recent study revealed that 25% of Head Start teachers are clinically depressed (Whitaker et al., 2013); this rate is considerably higher than that of the general adult population (about 6-7%), and it is more than double the rate of depression among the broader population of teachers (about 10%; U. S. Department of Health and Human Services, 2015).

Head Start teachers' depression is of concern because the socioeconomically disadvantaged students who make up the Head Start population are at relatively high risk for underperforming academically, and teachers' depression can hinder effective teaching (Dickinson, St Pierre, & Petengill, 2004; Kishiyama, Boyce, Jimenez, Perry, & Knight,

2009; Zill & Resnick, 2006). Depression may affect how teachers interact with students because it is associated with flattened or negative affect toward others, negative interpretation of verbal and non-verbal interactions, decreased energy and concentration, withdrawal from regular activities, and reduced motivation (Nolen- Hoeksema, Wisco, & Lyubomirsky, 2008). In other words, depression, and its behavioral manifestations, are incompatible with the level of engagement, presence, and energy needed to work effectively with young children. Thus, the overall quality and impact of teaching may be diminished when early childhood teachers are depressed (Hamre & Pianta, 2004; Jeon, Buettner, & Snyder, 2014; Whitaker, Dearth-Wesley, & Gooze, 2015).

In the present study, I consider the extent to which depression among Head Start teachers is associated with the quality of their conversations with children – that is, the extent to which teachers are engaging in reciprocal, complex, high quality discussions with children. The quality of teacher-child conversations is of interest because teachers play an important role in young children’s oral language development, early literacy skills, cognitive abilities, and later academic success by modeling, listening, responding, taking turns, and encouraging children to think in complex ways (Dickinson & Snow, 1987; Massey, 2004; Wasik & Bond, 2001; Wasik, Bond, & Hindman, 2006). As such, this study adds to the broader literature on the effects of teachers’ depressive symptoms on early childhood teaching practices, which thus far has demonstrated negative effects of teacher depression on teachers’ sensitivity in teacher-child interactions and student-teacher relationships (Li Grining, Raver, Sardin, Metzger, & Jones, 2010).

Furthermore, the present study moves beyond a main effect approach in examining the relation between depression and teaching practices by considering the

extent to which the relation between teachers' depression and their use of complex conversations with children varies across classroom contexts. Early childhood classrooms are fluid environments in which teachers and students move back and forth from free choice time and teacher-led learning tasks and across a range of activities (e.g., academic, play, and routine activities such as personal care and eating snacks) throughout the school day. Thus, a secondary goal of this study is to examine whether classroom setting (free choice versus teacher-led settings) and classroom activities (academic versus play activities and routine activities) moderate the relation between teachers' depression and complex conversations. As such, the findings from this study will contribute new knowledge about how the relation between Head Start teachers' depressive symptoms and teaching practices may vary across the preschool day. This is important because, to date, work has focused on documenting the main effect of depression on teaching practices. By demonstrating the range of impact of teacher depression on complex conversations, the findings of this study will contribute to efforts to support early childhood teachers who are depressed. That is, we will know whether depressed teachers would most benefit from intervention efforts that are targeted toward helping them to engage with students in specific classroom contexts relative to those that are generalized across school contexts.

Early Childhood Teachers' Depressive Symptoms and Teacher-Child Conversation Quality

To contribute knowledge to the broader literature on the effects of teachers' depressive symptoms on early childhood teaching practices, in the present study I will first test for an association between teachers' depression and the likelihood that complex

conversations occur in Head Start classrooms. In the present study, complex conversations are conceptualized as extended and reciprocal talk in which a teacher asks open ended questions as a means to promote children's learning (e.g., "*How do you think that bird got there?*"; "*What do you think will make that work?*"). Complex conversations are an important teaching practice because teachers are one of the main conversationalists in young children's lives, and they teach children by modeling listening, responding, and taking turns (Massey, 2004). In particular, high quality conversation experiences are important for Head Start children who, on average, enter Head Start with receptive vocabulary scores that are about one standard deviation below national norms (Dickinson, St Pierre, & Petengill, 2004; Zill & Resnick, 2006). This deficit makes the language support that Head Start teachers provide critically important for children's learning.

Observations of early childhood teachers reveal that there is variability in the extent to which complex conversations occur between teachers and students (Dickinson, 2001; Dickinson, Darrow, & Tinubu, 2008; Dickinson, DeTemple, Hirschler, & Smith, 1992; Dickinson & Smith, 1991; Kontos, 1999; Massey, 2004). For instance, Massey and colleagues' (Massey, Pence, Justice, & Bowles, 2008) observations of teachers revealed that preschool teachers engage in complex conversations in approximately 23-34% of their interactions with children. However, Dickinson and colleagues' (2008) in depth analyses of the extent to which four Head Start teachers engaged in complex conversations revealed a smaller range across teachers (0-11% of teachers' interactions with children were categorized as complex). Differences between these studies may be because Massey and colleagues (2008) collapsed observations of lead and assistant

teachers, potentially inflating estimates. Additionally, differences in findings may be due to the populations of interest; Dickinson and colleagues' (2008) study focused on a population of Head Start teachers and Massey and colleagues' (2008) study focused on teachers from both Head Start and publically funded preschool programs. However, both of these studies indicate variability in the extent to which teachers use complex conversations. This variability suggests that there may be individual differences among teachers that drive the extent to which they engage in complex conversations.

One of these individual differences may be the extent to which teachers experience depressive symptoms. Specifically, teachers' depressive symptoms may decrease their use of complex conversations in the classroom. Literature on workers' depression and work impairment lends support to this hypothesis. This literature reveals that depressive symptoms are associated with decreases in job performance and at-work productivity (Lerner, et al., 2004; Stewart, Ricci, Hahn, & Morganshein, 2003). For instance, depression is connected to decreases in energy levels while working and the willingness to invest effort in one's work (Bakker, Schaufeli, Leiter, & Taris, 2008; Gonzalez-Roma, Schaufeli, Bakker, & Lloret, 2006). Moreover, depression is associated with decreases in feelings of enthusiasm, inspiration, and pride about work (Gonzalez-Roma, Schaufeli, Bakker, & Lloret, 2006). Interestingly, several studies report the negative influence of depression on interpersonal activities, cognition, energy, and affect is consistent across individuals experiencing only a few symptoms of depression, short durations of depression, and clinical levels of depression (Ayuso-Mateos et al., 2010; Lahoz, El-Gabalway, Kinley, Kirwin, Sareen, & Pietrzak, 2014); although, individuals with clinical levels of depression report highest impairment and lowest quality of life

compared to those with sub-clinical levels of depression (Rodrigues, Nuevo, Chatterji, & Ayso-Materos, 2011). These findings hint that depression at any level can influence workers' motivation, energy level, and commitment to their profession. Although the literature on workers' depression and job performance spans a range of jobs (e.g., nurses, flight attendants, dentists), this literature helps guide my prediction about the relation between teachers' depression and complex conversations by suggesting that depression may make it difficult for teachers to maintain the levels of energy and motivation needed to engage in complex conversations with children which, by nature, are intense teacher-child interactions that require attention and engagement from teachers.

Research on mothers' depression and mother-child interactions also lends support to this hypothesis. It is well documented that maternal depressive symptoms are associated with difficulties in parenting practices such as less responsive and complex interactions with children (Jennings & Greenberg, 2009). For instance, Lovejoy and colleagues' (2000) meta-analysis of 46 observational studies on mothers' interactions with young children revealed associations between maternal depression and disengaged parenting behaviors (i.e., the mother ignored, withdrew from, or silenced the child). Researchers hypothesized that depressed mothers are less present in interactions with children and less sensitive to children's needs because they are emotionally unavailable and withdrawn (Goodman & Brumley, 1990). The literature on mothers' depression and mother-child interactions is a useful guide for the present study because there are similarities between mothers' and teachers' interactions with young children. For instance, both mother-child and teacher-child interactions involve dependency, protection, and teaching/learning needs of children (Pianta, 1994). Thus, prior work on

mothers' depression and mother-child interactions hints that teachers' depression may also decrease the likelihood that teachers engage in complex conversations with children. This may be because depressed teachers, similar to depressed mothers, are likely to be emotionally unavailable and withdrawn.

Furthermore, associations between teachers' depressive symptoms and a range of teaching behaviors are documented throughout a small body of work. This work consistently shows that teachers who experience high levels of depressive symptoms have decreased sensitivity and greater withdrawal, negativity, and harshness in teacher-child interactions relative to teachers with lower levels of depressive symptoms (Hamre & Pianta, 2004; Jeon, Buettner, & Snyder, 2014; Whitaker, Dearth-Wesley, & Gooze, 2015). For example, in samples of elementary school teachers, prior work shows a connection between high depressive symptomatology and low classroom learning quality (i.e., high levels of conflict and disruptive behavior, low levels of respectful communication and problem solving, supportiveness and responsiveness to individual differences and students' needs), low instructional support scores (i.e., teachers' ability to provide feedback and scaffolding to children), and low ratings of teachers' ability to manage children's behavior effectively (Castle et al., 2016; Kyriacou, 2001; Li-Grining et al., 2010; McLean and Connor, 2015). In samples of early childhood teachers, teacher depression is connected to less sensitive and more withdrawn interactions with children, and increases in the likelihood of punitive, minimizing reactions to children's negative emotions (Buettner, Jeon, Hur, & Garcia, 2016; Hamre & Pianta, 2004; Jeon, Buettner, & Snyder, 2014). Two recent studies have examined depression in Head Start teachers. Whitaker, Dearth-Wesley, & Gooze's (2015) cross sectional online survey of Head Start

teachers demonstrated that teacher depression negatively predicted teacher reports of teacher-child closeness and positively predicted teacher-child conflict. Similarly, Castle and colleagues' (2015) study of 71 Head Start teachers revealed that beginning teachers who reported depressive symptoms were observed to use low quality teaching practices (i.e., low levels of language modeling and poor feedback quality).

Although this prior work is focused on a wide range of teaching behaviors, this literature helps guide my predictions about the relation between depression and complex conversations. Across this small body of literature, depression is consistently linked to withdrawal and less sensitive teaching behaviors. These findings suggest that teachers who experience depression may have problems meeting the cognitive, social, and emotional demands of teaching and, relatedly, may lose motivation and enthusiasm for engaging in high quality teaching practices, such as complex teacher-child conversations. That is, depressed teachers may not be willing to engage in interactions with children that extend beyond the minimum behaviors or interactions needed to maintain the classroom flow, monitor children's health and safety, and preserve a baseline level of classroom functioning (McIntyre, Liauw, & Taylor, 2011). As such teachers' depression is expected to negatively relate to the likelihood that teachers use complex conversations.

Classroom Context and Activity Setting as Moderators

Although teacher depression is expected to be negatively related to engagement in complex conversations, teacher depression may not be exhibited uniformly across the school day. Rather, it may have stronger effects on complex conversations during some classroom activities relative to others. Two separate theories, Bronfenbrenner's bio-ecological model (2006) and Person by Situation theory (Diener, Larsen, & Emmonds,

1984; Endler & Madnussion, 1976) provide support for examining variation in teacher depression across the school day. An application of Bronfenbrenner's bio-ecological model (2006) suggests that teacher-child interactions, such as complex conversations, are determined, in part, by individual factors that teachers and children bring with them to the interaction. In the present study, teacher depression is identified as a meaningful individual factor that influences teacher-child interactions (as reviewed above). An application of Bronfenbrenner's model further suggests that contexts (i.e., environmental influences) interact with individual factors to influence teacher-child interactions. Applied to the present study, this means that different contexts (e.g., classroom or activity settings) may influence the nature of the connection between teacher depression and teacher child conversations. The Person by Situation model similarly supports the idea that the connection between individual characteristics and behavior may vary across situations (Diener, Larsen, & Emmonds, 1984; Endler & Madnussion, 1976). For instance, Diener and Larson's (1984) study of college students, which tested the Person by Situation model, showed that students' feelings of sociability and their social behavior were inconsistent across situations (i.e., social or isolated situations, work or play settings, novel or familiar settings). Applied to the present study, this suggests that the connection between teacher depression and their teaching behaviors may vary from classroom situation to classroom situation.

Thus, the second goal of the present study is to move beyond a main effects approach and examine whether classroom setting (free choice versus teacher-led settings) and classroom activities: academic (e.g., books, math, language), play (e.g., music, art), and routine (e.g., personal care, snacks) activities, moderate the relation between

teachers' depression and complex conversations. Classroom setting and classroom activities were chosen as moderators because they are salient aspects of the preschool day; teachers are aware of the classroom setting and report different behavioral expectations for themselves and for their children depending on the classroom setting (Cunningham & Wegell, 1992; Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006; Kontos, 1999). For instance, teachers report that children should be goal focused during structured settings but should have opportunities for self-guided activities during free choice, and teachers use complex conversations more often in academic activities compared to play activities (Cunningham & Wegell, 1992; Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006). Moreover, observations of teaching practices show that early childhood teachers vary their practice depending on the activities in which children are engaged. For instance, Kontos (1999) observed preschool teachers and found that teachers spent most of their time encouraging and supporting children's play in constructive and manipulative activities and that they were less likely to engage children in fantasy play or to interact with children in dramatic play.

Classroom context as a moderator. In the present study, I will examine two types of classroom contexts: free choice (i.e., teachers give children autonomy in deciding what activity to play with and with whom they will play) and structured settings (i.e., teachers decide what activity children will do and with whom they will participate). These two contexts were selected because they account for the majority of the preschool day. Chien and colleagues' (2010) study of 700 early childhood education classrooms revealed that children spent approximately 30% of their time in free choice with the remaining time spent in structured activities (i.e., individual, small group, large group;

50%) and classroom procedures such as signing in and putting coats away (20%). Moreover, teachers report that they associate free choice and structured contexts with different behavioral expectations for themselves and for children. For instance, early childhood teachers describe free choice as a time for children's free exploration of materials with few expectations or evaluations by the teacher (Cunningham & Wegell, 1992). In contrast, structured settings are used by teachers to direct learning activities that are focused on a goal (e.g., helping children learn a skill; Cunningham & Wegell, 1992). These differences in early childhood teachers' expectations about free choice and structured contexts are associated with variation in the extent to which teachers engage in complex conversations. For instance, Massey's (2008) observational study of teachers' use of cognitively challenging questions in low SES preschools revealed that early childhood teachers used cognitively challenging questions (e.g. open ended questions) during structured settings (i.e., teacher-directed activities) at a significantly greater rate as compared to free choice settings (34.32% for structured settings and 23.19% for free choice).

Although prior work has examined how teachers' use of complex conversations changes across setting, to my knowledge, there is no work available that has examined how the relation between depression and teaching practices may vary across classroom contexts. However, because rates of teachers' use of cognitively challenging questions are lower during free choice compared to structured settings, it is possible that the negative relation between depression and complex conversations will be magnified in free-choice settings. One explanation for this may be that depressed teachers avoid using complex conversations during child-directed free choice settings in order to conserve

energy for engaging in complex conversations in contexts that are more teacher-centered and structured. Additionally, teachers may perceive there is less demand for complex conversations during free choice because free choice is less adult-directed compared to structured settings. Thus, teachers may feel less motivated to engage in complex conversations during free choice. However, this may not be the case during structured contexts. Structured contexts may buffer the negative relation between teachers' depression and engagement in complex conversations. This may be because structured contexts are teacher-led, goal oriented settings (e.g., circle time) in which teachers may be prone to using complex conversations (e.g., open ended conversations) as a way to guide the structured activity and engage children. Because teachers must serve as the leader of these contexts, it may be difficult for depressed teachers to decrease their use of complex conversations during these settings. Additionally, depressed teachers may be able to maintain their energy and motivation to engage in these complex conversation during structured settings because they are in a leading role.

Activity setting as a moderator. I will also examine the following activities as potential moderators of the link between teacher depression and complex conversations: academic activities (e.g., books, language, math), play activities (e.g., balls, bikes, digging, art, blocks, board games, music), and routine activities (e.g., personal care, clean up, snacks). This activity categorization was chosen because these activities are nearly universal components of preschool programs, have been shown to make contributions to children's development, and are outlined as key curriculum activities on the Head Start website (Office of Head Start, 2015). For instance, books and math are categorized as activities that contribute to cognition and general knowledge, and art and music are

categorized as play activities that contribute to children's approach to learning (Office of Head Start, 2015).

The relation between depression and complex conversations is expected to be buffered (i.e., lessened) during academic activities. This is because recent changes in educational policies have placed new pressures on early childhood teachers to ensure that their interactions with children are encouraging young children's academic growth and preparing them with foundational pre-academic skills (Miller & Almon, 2009; National Association for the Education of Young Children, 2015). In response to these changes, early childhood teachers consider children's engagement in academic activities to be particularly important, not only for children's development, but also for evaluations of their teaching effectiveness (National Association for the Education of Young Children, 2015). As a way to ensure that their children are establishing academic skills, early childhood teachers may be motivated and incentivized to increase their engagement in complex conversations (which promote children's learning growth) when children are engaged in activities that are clearly connected to academic learning. Prior work supports this hypothesis. Multiple studies show that rich and complex conversations are common during academic activities such as book reading (e.g., Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006). Therefore, although depressive symptoms may typically decrease the likelihood of complex conversations, depressed early childhood teachers may be motivated and likely to engage in complex conversations when engaged in academic activities to promote children's academic learning. That is, classroom activities that are most strongly tied to academic learning may be least susceptible to the effects of teacher depression on complex conversations.

Present Study

The purpose of the present study was to examine whether Head Start teachers' depressive symptoms were associated with the likelihood that they engaged in complex conversations with children. A secondary goal was to consider whether the relation between teachers' depression and complex conversations was consistent across classroom settings and activities. To test these research aims, four aims and hypotheses were proposed:

- 1) As a preliminary goal, the first aim was to descriptively examine the extent to which teachers use complex conversations in the classroom and the extent to which use of complex conversations varied across free choice and structured contexts as well as academic, play, and routine activities. This information will add to the broader literature on teacher-child interactions, which so far has demonstrated variability across teachers in use of complex conversations, by using an observational study to document in detail how often teachers use complex conversations and how this use differs across the school day.
- 2) The second aim was to examine the relation between teachers' depressive symptoms and complex conversations. Head Start teachers' depressive symptoms were expected to be negatively related to the likelihood that a complex conversation occurred during a teacher-child interaction. This is because depressive symptoms may make it difficult for teachers to maintain the levels of energy and motivation needed to engage in complex conversations with children (Bakker, Schaufeli, Leiter, & Taris, 2008; Gonzalez-Roma, Schaufeli, Bakker, & Lloret, 2006).

- 3) The third aim was to examine the extent to which the relation between teachers' depression and complex conversations varied across contexts. This relation was expected to vary across classroom contexts as teachers associate different contexts with different behavioral expectations for themselves and for children (Cunningham & Wegell, 1992; Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006; Kontos, 1999). Specifically, when in free choice, it was expected that the slope of the relation between depression and complex conversations would be negative. When in structured settings, it was expected that the slope of the relation between depression and complex conversations would be flat.
- 4) The fourth aim was to examine if the relation between early childhood teachers' depression and complex conversations varied by activity type. Specifically, during academic activities (e.g., books, language, math) the slope of the relation between depression and complex conversations was expected to be flat. This is because depressed early childhood teachers may be more motivated and likely to engage in complex conversations when engaged in activities that directly promote children's academic learning. The relations between depression and complex conversations during play activities (e.g., balls, bikes, digging) and routine activities (e.g., clean up, personal care, eating snacks) were expected to remain negative.

Method

Participants

Participants were preschool teachers in Head Start classrooms in an urban southwestern city in the US. To recruit teachers, Head Start supervisors from eight

districts were contacted from an online list of Head Start centers within the city and asked if their districts or agencies would be willing to participate in a study of teaching practices and teacher-student interactions. Out of the eight districts contacted, five agreed. District supervisors subsequently assisted in arranging in-service meetings at which teachers and researchers met and discussed an overview of the project. Forty teachers were asked to volunteer. The project was introduced as a study of naturally occurring teaching practices and teacher-child interactions.

The final sample consisted of $N = 37$ female teachers who volunteered to participate, signed informed consents, and provided their contact information at the in-service meetings. The sample was relatively diverse in ethnicity. Just under half of the participating teachers self-identified as Hispanic/Latino White (43.2%) and just over one-fourth self-identified as non-Hispanic/Latino White (24.3%). In addition, 13.5% were Black/African American and 2.7% were Hawaiian or Pacific Islander. Race/Ethnicity was other or unknown for the remaining 16.3% of the sample. Teachers ranged in household earnings, with 51.4% earning below \$55,000, 81.1% earning less than \$75,000, and 97.3% earning less than \$105,000. On average, teachers had taught preschool for 10.57 years (range 2-27 years; $SD = 6.851$). A majority of teachers had completed at least a bachelor's degree (78.4%; approximately 2.7% of these teachers earned a master's degree), and 21.6% of teachers completed a two-year college or technical school.

Participating classrooms were comprised of, on average, 17 children (range, 15-20, $SD = 1.47$). Approximately half (52.3%) of the children were boys (range per classroom was 4-14, $SD = 9.05$). Nearly three-fourths of the children were Hispanic/Latino White (73.3%) (range per classroom was $N = 0-19$, $SD = 12.6$) and

13.6% were Black/African American (including both Hispanic/Latino and not Hispanic/Latino). In addition, 7.2% were White, not Hispanic/Latino, 3.8% were American Indian or Alaskan Native, and .5% were Hawaiian or Pacific Islander. Race/Ethnicity was other or unknown for the remaining 1.35% of the children. Additionally, that the sample consisted of Head Start classrooms is noteworthy, as the children of participating teachers were largely of low socioeconomic status.

Procedures and Measures

Observational and survey data were collected from each of the 37 teachers. Each teacher was observed for three hours in the morning for a period of three to four weeks. At the conclusion of the three-to-four week observation period, teachers completed surveys asking about demographics, teaching beliefs, and depressive symptoms. Teachers were given \$150 to \$200 worth of classroom supplies as compensation for their participation. Compensation for teachers varied as 6 of the 37 teachers filled out additional measures (these measures are not relevant to the present study).

Protocol for observations. Thirty trained undergraduate students (90% female) observed the participating teachers using a teacher-focal observational protocol. Training was conducted by the lead researcher, with help from graduate research assistants. Coders were trained using vignettes and by conducting practice observations. At the end of training, coders were determined to be reliable if inter-observer agreement (i.e., kappas) for all codes (between the coder and the graduate student master coders) were above .70. Undergraduate coders were not informed about the specific goals of the study.

During each observation, trained coders observed the teacher for 10 seconds. Several codes were recorded on a handheld computer representing a range of teachers'

behaviors (e.g., classroom maintenance, talking with other teachers, teacher-child interactions). For the purposes of this study, only the codes obtained during teacher-child interactions are relevant. A teacher-child interaction was coded when a teacher was observed to direct her visual, verbal, or auditory attention to one or more children during a ten-second observation period. If the teacher was observed to interact with a child, coders recorded the complexity of the teacher-child conversation, the classroom context, and the activity setting. Each of these codes are defined in detail below. Once the codes were entered, the coders began the next 10-second observation. To prevent coder fatigue and data entry error, coders repeated this process for a total of 20 minutes, took a five-minute break and then began another 20 minutes of observation. Observations occurred four days a week for three to four weeks. Observations took place indoors and outdoors.

Coders completed a total of 39,278 ten-second observations of teachers, with an average number of codes obtained per coder of 1,402.71 (range was 180 – 3,910).

Variability in the number of codes obtained per coder was due to variability among coders in the length of time that coders participated in the project and the number of hours per week devoted to the research study. For the 37 teachers participating in the present study, an average of 1,061.57 (range: 556-1,886, $SD = 301.89$) 10-second observations were collected per teacher.

Reliability data were obtained by pairing a coder with a reliability coder (graduate student). Each individual independently and simultaneously coded the same teacher's behavior. Reliability observations were conducted on 4,081 total observations (10.4% of the total observations). To control for by-chance agreement, kappas were used to assess inter-observer agreement. Kappas were calculated by measuring the agreement between

the two raters and then subtracting out the agreement due to chance (Martin & Bateson, 1993). Kappas for variables used in the present study ranged from .63 to .98.

Teacher-child interactions. In each ten-second coding interval, coders recorded whether a teacher-child interaction occurred. This was coded when a teacher was observed to direct her visual, verbal, or auditory attention to a child during a ten-second observation period. Teachers were recorded to interact with children for an average of 552.11 (range: 318 –989, SD = 167.25) observations. On average, the proportion of time teachers spent in teacher-child interactions was 56% of the total number of observations. This percentage was created by dividing the total number of observations of a teacher's interactions with children by the total number of all observations of that teacher. In the present study, the teacher-child interaction code is not of direct interest, but the proportion of time teachers were observed to be in teacher-child interactions (out of the total number of observations) was used as a covariate. The proportion of teacher-child interactions was included as a covariate in all study models because preschool teachers who report more depressive symptoms engage in significantly fewer interactions with children (Hamre & Pianta, 2004; Jennings, 2015; McLean & Connor, 2015).

Complexity of conversations during teacher-child interactions. In the present study, complex teacher-child interactions were operationalized as extended and reciprocal talk in which a teacher asks open-ended questions to promote children's learning. To capture the complexity of teachers' conversations during teacher-child interactions, coders recorded whether the teacher encouraged reciprocal exchanges with a child (or group of children) and/or if the teacher helped to extend a child's (or group of children's) thinking beyond what they could accomplish on their own (e.g., by using open ended

questions). Example statements include: “*What color are these crayons?*”, “*Could you tell me what has happened here?*”, and “*What are your ideas about this book?*”. All other teacher-child interactions were coded as *minimal* (i.e., these included interactions that were entirely nonverbal and those in which verbal interactions were not reciprocal, such as those involving one-word responses to a child or giving a child directions). Presence or absence of complex conversation was coded whenever a teacher-child interaction was coded. The outcome variable represents when a complex conversation *did* occur in a ten-second interaction. Specifically, the outcome variable is scored as either 1, which means that a complex conversation *did* occur, or as a 0, which means that a complex conversation *did not* occur in a 10-second observation. Because the outcome variable is at the observation level, the sample size for all study models is the number of complex conversations observed (and not the number of teachers). For the 37 teachers participating in the study, teacher-child interactions were coded as complex (scored as a 1) an average of 402.05 times ($SD=162.88$, range: 161-864). On average, the proportion of teacher-child interaction time that teachers spent in complex conversations was 71%. This percentage was created by calculating the total number of observations of complex teacher-child conversations (for each teacher) and dividing by the total number of teacher-child observations of that teacher. Subsequently, I computed the average proportion score across teachers. The kappa was .71 for the complex teacher-child conversation code.

Classroom context. To measure the classroom context in which teacher-child interactions occurred, coders recorded if the class was engaged in free choice or structured learning during each ten-second observation. In free choice, the teacher

allowed children to freely decide what to do, with whom, and where to do it. Teachers in this sample provided free choice opportunities for children both indoors and outdoors. In structured settings, although children still interact with one another and the teacher, children's free choices were limited and the teacher provided children with a limited set of activities from which to choose or a single activity (i.e., children are sitting in a circle for book reading). In the present study, a binary variable represents classroom context; each ten-second observation was assigned either a 1 (indicating the classroom context was structured during the ten-second observation) or a 0 (indicating the classroom context was free choice during the ten-second observation). For the 37 teachers participating in the study, teacher-child interactions were coded as occurring during free choice an average 162 times ($SD=76.19$, range: 72-434), and they were coded as occurring during structured contexts an average of 389 times ($SD=130.2$, range: 191-746). Kappas were .96 for free choice codes and .89 for structured codes.

Activity setting. To measure the activity setting in which teacher-child interactions occurred, coders recorded the activity referenced or engaged in by the teacher (i.e., what activity the teacher talked about with the children or what activity the teacher and/or students engaged in). Coders selected from a list of 24 activities (e.g., books, board games, art, dress up) which reflected nearly universal components of preschool programs. These activities were categorized as academic (e.g., books, language, math), play (e.g., balls, bikes, digging, board games), and routine (e.g., clean up, personal care, eating snacks). Activities were assigned to these categories according to key curriculum components outlined on the Head Start website (Office of Head Start, 2015). Additionally, prior work provides support for categorizing activities in this

manner (Dodge, Colker, & Heroman, 2002; Neuman, 1995). For instance, Neuman (1995) demonstrated that children's exposure to books and writing materials in libraries were associated with early literacy skills, emphasizing that these are activities that are connected to children's pre-academic skills. A breakdown of activities into each category is presented in Table 3. Kappas ranged from .63 to .98 for all individual activity codes.

Protocol for surveys. At the end of the three- to four-week observation period, teachers completed surveys that included measures of teachers' demographics, classroom practices, teaching beliefs, and depressive symptoms. Completion of the surveys took approximately 2 hours. In the present study, I use a subset of these measures, including teachers' demographics and reports on teachers' depressive symptoms.

Teachers' depressive symptoms. Teachers' depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (Radloff, 1977). This scale is a 20-item measure that asks teachers to rate how often over the past week they experienced symptoms associated with depression. Example items include, "I was bothered by things that usually don't bother me" and "I could not get going". Each statement was rated using a 5-point scale ranging from "rarely or none of the time (less than 1 day)" to "most or all of the time (5-7 days)", with higher scores indicating greater depressive symptoms (Alpha = .86).

It is important to note that teachers were not assessed for meeting clinical levels of depression. In this study, teacher depression was operationalized as a collection of self-reported depressive symptoms based on prior work which sets a precedent for assessing teachers for a general risk for depression based on the presence of self-reported

symptoms (McClean & Connor, 2015). Thus, it is beyond the scope of the study to base measures and evaluation of depression on a clinical diagnosis.

Statistical Approach

To test all study hypotheses, generalized estimating equations (GEEs) were used. GEEs are the ideal type of analyses to use to examine the hypothesized relations for two reasons. First, this modeling technique allows for a robust estimation of repeated observations nested within a teacher (Liang & Zeger, 1986). This is possible because GEEs estimate the correlation between each nested observation by using a robust estimator to specify a working correlation matrix based on the data. Without estimating this correlation structure, the estimated standard errors would be inflated resulting in a greater chance of committing a Type I error. However, by including the specified correlation matrix, the standard errors are accurately estimated. Additionally, by including the specified correlation matrix, GEEs are equipped to model predictors in a multilevel framework. That is, predictors at both the teacher level and at the observation level can be included in a GEE model (McCulloch, & Neuhaus, 2001). The second reason is that GEEs have more flexible assumptions than comparative models (Liang & Zeger, 1986). GEE methods do not make assumptions about the distribution of the dependent variables and thus allow for the number of observations per teachers to vary. This is important for the present study because a similar but unequal number of observations was collected for each teacher.

In all study models, the binary coded variable complex conversations (i.e., 1 = a complex conversation did occur, 0 = a complex conversation did not occur), served as the dependent variable. Because complex conversations were coded to either have occurred

or not occurred, I used logistic generalized estimating equations (Liang & Zeger, 1986). To test study hypotheses, five separate models were run. In all models, the proportion of time teachers engaged in teacher-child interactions was included as a covariate (this covariate is at the teacher level; each teacher had 1 proportion score indicating how often she interacted with children). In the first model, teacher depression served as the independent variable (this independent variable is also at the teacher level; each teacher had 1 score representing their experience with depressive symptoms).

In the second and third model, teachers' depression, classroom context (i.e., 1 = structured setting, 0 = free choice), and the interaction of teachers' depression X classroom context served as the independent variables (classroom context is at the observation level; each 10-second observation was assigned a classroom context). To set up the second model, the main effects of depression and classroom context were entered. To set up the third model, first, the interaction term was created for teacher depression X classroom context. To do this, teacher depression was centered by grand mean centering to ease interpretability (Aiken, West, & Reno, 1991). Subsequently, the interaction term was created by multiplying teacher depression by classroom context (coded as 0 = free choice and 1 = structured setting). Next, the model was constructed by entering the main effects of depression and classroom context and then the interaction.

In the fourth and fifth model, teachers' depression, activity setting and the interaction of teachers' depression X activity setting served as the independent variables. In this model, the goal was to compare academic activities with play activities (e.g., balls, bikes, digging), and routine activities (e.g., clean up, personal care, eating snacks). Therefore, the activity setting variable was scored as 0 = academic activity and 1 = play

activity and 2 = routine activity (academic activity served as the reference group). In this model, activity setting is at the observation level; each 10-second observation was assigned an activity type. To set up fourth model the main effects of depression and activity were entered. To set up the fifth model, the interaction terms were created for teacher depression X play activity setting and teacher depression X routine activity setting. Again, teacher depression was grand mean centered and the interaction terms were created by multiplying teacher depression by activity setting. The model was constructed by entering the main effects of depression, play activity setting, and routine activity setting, and then entering the interaction terms.

To interpret findings, I present the Odds Ratio (OR) for each independent variable in all study models. The OR is a measure of effect size used to examine the degree of association between two variables. For instance, in the present study the OR represents the odds that a complex conversation will occur in a ten-second observation given teachers' depression. To ease interpretability, I also calculate and present the equivalent probability ($EP = OR/(1+OR)$), which in the present study represents the percent increase or decrease in the odds of a complex conversation occurring (Hosmer, Lemeshow, & Sturdivant, 2013). For instance, in the present study an EP of .37 indicates there is either a 37% increase or decrease (depending on the direction of the estimated Beta coefficient) in the likelihood of a complex conversation occurring given teachers' depression.

Results

First, preliminary analyses were conducted to examine the distribution of all study variables and to examine correlations between possible control variables and teachers' use of complex conversations. Next descriptive statistics were examined to assess the

extent to which complex teacher-child conversations occurred overall, across free-choice and structured settings, and across academic, play, and routine-activity types.

Subsequently, one GEE model was conducted to examine the extent to which teachers' depression predicted the likelihood of a complex conversation occurring. Following this analysis, four GEE models were tested to examine the extent to which the relation between teachers' depression and complex conversations varied across classroom context and activity setting.

Preliminary Analyses

Preliminary analyses were conducted to examine the descriptive statistics, skew, and kurtosis pertaining to all study variables (see Table 4). Tabachnick and Fidell (2001) suggest that when levels of skew and kurtosis are two times the standard error of the variable they should be transformed. Only the skew and kurtosis for the independent variable, teachers' depression, exceeded this level (Skewness = 2.421, std error = .388; Kurtosis = 9.071, std error = .759). Thus, teacher depression was log transformed and this transformed variable was used in all subsequent analyses.

Preliminary analyses were also conducted to identify possible control variables. A Pearson product moment correlation revealed no significant association between teachers' years of teaching experience and the proportion of time teachers were observed to use complex conversations ($r = -.16, p = .38$). A one-way ANOVA did not reveal a significant effect of teachers' ethnicity on teacher's use of complex conversations, $F(4,31) = .8, p = .57$. A Spearman's rho correlation revealed that teachers' education level was not related to teachers' use of complex conversations ($r_s = .270, p = .11$). Therefore, teachers' year of teaching experience, teachers' ethnicity, and teachers'

education level were not included as covariates. However, the proportion of time teachers were observed to interact with children was significantly correlated with the proportion of time teachers were observed to use complex conversations ($r = .48, p < .001$). Thus, the proportion of time teachers were observed to interact with children was included as a covariate in all study models. It is important to note I planned to include the proportion of time teachers were observed to interact with children as a covariate because teachers' depressive symptoms are negatively related to the proportion of time they spend interacting with children. However, the moderate correlation between the proportion of teacher-child interactions and the proportion of complex conversations provides additional support for including this proportion score as a covariate.

How Often do Teachers Use Complex Conversations?

As a preliminary goal, I descriptively examined the proportion of time teachers were observed to use complex conversations out of the *total time* teachers were observed and out of the *time teachers were observed to interact with children*. Each of these proportion scores was created to provide two sets of unique information. The first proportion score provides information about how often teachers engage in complex conversations during the preschool day (out of the total number of teacher observations). The second provides information about how much time teachers engage in complex conversations when they are interacting with children.

Out of the total time that teachers were observed, teachers used complex conversations with children in an average of 64% (range .39-.76, SD= .10) of observations. Out of the total time that teachers were observed to be in teacher-child interactions, teachers used complex conversations with children an average of 71% of the time (range .50-.93, SD =

.10). It is important to note both of these proportion scores have large ranges, indicating variability in use of complex conversations across teachers.

Comparing across contexts, descriptive statistics revealed that complex conversations occurred most often in structured contexts (approximately 71% of the time teachers were observed to be in complex conversations was during structured contexts; Table 4). Because classroom context was coded as a binary variable this means complex conversations occurred during free choice contexts approximately 29% of the time. Moreover, a repeated measures ANCOVA, controlling for the proportion of time that teacher-child interactions occurred in both structured settings and free-choice, revealed that teachers were significantly more likely to use complex conversations during structured settings compared to free choice settings, $F = 380.19, p < .001$.

In regards to activity settings, descriptive statistics revealed that complex conversations occurred most often during *routine* activities, such as personal care, snacks, and clean up (approximately 46% of the time teachers were observed to be in complex conversations was during routine activities). Complex conversations occurred during play activities approximately 33% of the time; complex conversations occurred least often during academic activities (approximately 21% of teacher-child interactions occurred during academic activities). However, a repeated measures ANCOVA, controlling for the proportion of time that teacher-child interactions occurred in academic, play, and routine activities did not reveal significant differences between how often teachers used complex conversations during academic, play, and routine activities, $F = .23, p = .80$. This suggests that differences in the descriptive statistics may be due to the overall time

teachers spend engaging with children in academic, play, and routine activities instead of a greater tendency to use complex conversations in any of these activity settings.

Teachers' Depressive Symptoms and Complexity of Teacher-Child Conversations

To test the hypothesis that teachers' depressive symptoms would be significantly and negatively related to the likelihood of a complex teacher-child conversation occurring, one GEE model was conducted. In this model, complex teacher-child conversations (coded as 0 = a complex conversation did not occur or 1 = a complex conversation did occur) served as the dependent variable and teacher depression served as the independent variable. The proportion of time teachers were observed to interact with children was included as a covariate. Results revealed that teacher depression negatively predicted the likelihood that a teacher engaged in a complex conversation during a teacher-child interaction ($B = -.54, p < .001$; OR = .58; Equivalent Probability = .37; Table 5, Model 1). Thus, teachers' depressive symptoms were related to a 37% decrease in the likelihood that a complex conversation occurred in a ten-second observation.

Moderation by Classroom Context

To test the hypothesis that the relation between teachers' depressive symptoms and complex conversations would be moderated by classroom context, two GEE models were conducted (a main effects model and an interaction effect model; Table 5, Model 2). In the main effects model, results revealed a significant main effect for teachers' depression ($B = -.54, p < .001$; OR = .59; Equivalent Probability = .37); teachers' depression was negatively related to use of complex conversations. Results did not reveal a significant main effect for classroom context ($B = .05, p = .37$; OR = 1.05; Equivalent Probability = .51). When the teacher depression X classroom context interaction was

created and entered, results revealed there was not a significant teacher depression X classroom context interaction ($B = .23, p = .16$; OR = 1.25; Equivalent Probability = .56). These findings hint that the negative effect of teacher depression on complex conversations does not vary across free choice or structured classroom contexts. However, the OR and EP for classroom context and teacher depression X classroom context are similar to the OR and EP obtained for teacher depression. Therefore, these findings should be interpreted cautiously; with a larger sample size it is possible these effects would approach significance.

Moderation by Activity Setting

To test the hypotheses that the relation between teachers' depressive symptoms and complex conversations would vary when comparing academic activities to play activities (e.g., balls, bikes, digging) and routine activities (e.g., clean up, personal care, eating snacks), two GEE models were conducted (a main effects model and an interaction effect model; Table 5, model 3; academic activities served as the reference group). In the main effects model, results revealed a significant main effect for teachers' depression ($B = -.53, p < .001$; OR = .59; Equivalent Probability = .37). Additionally, results revealed a significant main effect for play activities ($B = -.93, p < .001$; OR = .40; Equivalent Probability = .29) and for routine activities ($B = -.52, p < .001$; OR = .60; Equivalent Probability = .38). Thus, results revealed use of complex conversations varied across activity setting. In the interaction model, results revealed the main effects were subsumed by a significant teacher depression X play activity setting interaction ($B = -.49, p < .01$; OR = .61; Equivalent Probability = .38) and a significant teacher depression X routine activity setting interaction ($B = -.56, p < .01$; OR = .57; Equivalent Probability = .36). To

interpret these significant two-way interactions, the significance of the regression slopes depicting associations between depression and complex conversations was examined for academic activities, play activity, and routine activity settings (Jaccard, Turrisi, and Wan, 1990). These simple slopes are graphed in Figure 4; the predicted likelihood of a complex conversation occurring is plotted on the Y axis, teacher depression is plotted on the X axis, and the three slopes (one for academic settings, one for play settings, and one for routine settings) are plotted. It is important to note the regression lines are not linear because the predicted likelihood of a complex conversation is plotted as it occurs for every combination of teacher depression and an activity setting. Results revealed the slope depicting the association between teacher depression and complex conversations was not significantly different than 0 for academic activities ($B = -.12, p = .56, OR = .89, \text{Equivalent Probability} = .47$). However, the slope depicting the association between teacher depression and complex conversations was significantly different than 0 for play activities ($B = -.62, p < .001, OR = .54, \text{Equivalent Probability} = .35$). Additionally, the slope depicting the association between teacher depression and complex conversations was significantly different than 0 for routine activities ($B = -.58, p < .001, OR = .56, \text{Equivalent Probability} = .36$). Thus, the negative effect of teacher depression on complex conversations was evident during play activities and routine activities but was not evident during academic activities.

Discussion

In this study, I examined whether Head Start teachers' depressive symptoms were associated with the likelihood that they engaged in complex conversations with children. A second goal was to consider whether the relation between teachers' depression and

complex conversations was consistent across classroom contexts and activities. Observations of Head Start teachers' complex conversations with children were conducted using a teacher-focal coding system. The structure of the classroom context was observed and recorded as either free-choice or structured settings. Additionally, classroom activities (n = 24) were observed and subsequently categorized as academic activities, play activities, and routine activities. Teachers reported on the extent to which they experienced symptoms of depression. Generalized estimating equations were used to test study hypotheses. It was expected that teachers' depressive symptoms would be negatively related to the likelihood that a complex conversation would occur during a teacher-child interaction. Moreover, it was expected that the negative relation between teachers' depressive symptoms and complex conversations would vary across classroom contexts and activity settings.

Results supported the hypothesis that teachers' depressive symptoms were negatively associated with the likelihood that a complex conversation occurred in a ten-second observation. Results partially supported the hypotheses that the relation between teacher depression and complex conversations would vary across classroom contexts and activities. Specifically, the relation between teacher depression and complex conversations remained negative during both structured settings and free choice settings. Additionally, this relation remained negative during play (e.g., art, music) and routine (e.g., personal care, clean up) activities. However, the relation between teacher depression and complex conversations was not significant during academic activities (e.g., math, books, language). These findings are partially consistent with Bronfenbrenner's bio-ecological model and person X situation theory in that they suggest

that teachers' engagement in complex conversations occurs in response to their own characteristics as well as factors in the classroom environment (i.e., academic activity setting). In the following sections, findings and potential explanations for study results are discussed. Subsequently, the strengths and limitations of the present study are considered. Finally, implications and directions for future research are provided.

How Often Do Teachers Use Complex Conversations?

The first goal of the present study was to descriptively examine how often teachers use complex conversations during the preschool day and during teacher-child interactions. Results revealed variability in teachers' use of complex conversations; on average 64% (range = 39% to 76%) of observations of teachers included complex conversations. This variability was slightly increased when examining how often teachers used complex conversations during teacher-child interactions; on average 71% (50% to 93%) of teacher-child interactions included complex conversations. These findings are consistent with prior work which has also demonstrated variability across teachers in use of complex conversations, however the present study found teachers used complex conversations at a higher rate than the means reported in prior studies (Dickinson, 2001; Dickinson, Darrow, & Tinubu, 2008; Dickinson, DeTemple, Hirschler, & Smith, 1992; Dickinson & Smith, 1991; Kontos, 1999; Massey, 2004). For instance, Massey and colleagues (2008) revealed that preschool teachers engaged in complex conversations in approximately 23-34% of their interactions with children and Dickinson and colleagues (2008) reported that Head Start teachers engaged in complex conversations in 0-11% of their interactions with children. These difference may be due to the contexts and activity settings under which prior work assessed teacher-child interactions and complex

conversations. For example, Dickinson and colleagues (2008) observed teachers and coded for complex conversations only when children were playing in blocks and dramatic play centers. Further, Dickinson and colleagues (1992) only observed teachers' conversations during book reading and Kontos (1999) observed teachers only during free play. By focusing on these specific contexts, prior work may have underestimated the amount of time teachers were observed to use complex conversations. The present study adds to this body of literature by observing teachers across a range of contexts and activity settings and, as such, provides a holistic description of how often teachers use complex conversations with children.

Divided by context, results revealed complex conversations occurred most often in structured contexts compared to free choice contexts; approximately 71% of teachers' complex conversations occurred in structured contexts. Importantly, this finding held even when accounting for the proportion of time that teacher-child interactions occurred in both structured settings and free-choice contexts. This finding is consistent with prior work that has examined teachers' use of cognitively challenging questions across structured settings (i.e., teacher-directed activities) and free-play. Although mean levels of complex conversations were lower in prior work compared to the present study, this work also shows that teachers engage in complex conversations at a significantly greater rate during structured settings as compared to free choice settings (Gest et al., 2006; Massey, 2008). This difference may exist because structured settings are used by teachers to direct learning activities that are focused on a goal (e.g., helping children learn a skill; Cunningham & Wegell, 1992) and free-choice is described by teachers as a time for children to freely explore materials with few expectations or evaluations by the teacher

(Cunningham & Wegell, 1992). As a result, teachers may be motivated to use complex conversations in structured contexts to engage children in class activities and to accomplish a learning goal. Because teachers spend approximately 50% of the preschool day in structured settings (Chien, et. al., 2010), these results suggest that children may have a large amount of exposure to complex conversations.

In regards to activity settings, results revealed that complex conversations occurred during routine activities (e.g., personal care, snacks, and clean up) approximately 46% of the time, during play activities approximately 33% of the time, and during academic activities approximately 21% of the time. However, these proportion scores were not significantly different when accounting for the proportion of time teacher-child interactions occurred during academic, play, and routine activities. This suggests that differences in the descriptive statistics may be due to the overall time teachers spend engaging with children in academic, play, and routine activities instead of a greater tendency to use complex conversations in any of these activity settings. That is, teachers may be equally motivated across each of these activity types to engage in complex conversations with children.

This finding is inconsistent with prior work which shows that rich and complex conversations are most common during academic activities (compared to activities such as art and music; Massey, et. al., 2008; Gest, et. al., 2006). One explanation for these differences may be because prior work examining activity setting and complex conversations has focused on teachers' use of complex *questions*. In the present study coding of complex conversations were not limited to teachers' questions and could also include teachers' comments about the ongoing activity that encouraged or supported

children's thinking or activity engagement. It may be that teachers adapt their use of complex conversations when in different activity types (e.g., in academic activities it may be easiest to use complex conversations in the form of questioning but in play it may be easiest to use complex conversations in the form of prompting or encouraging children). By accounting for complex conversations that encompass practices beyond questioning, the present study may accurately reflect teachers' use of complex conversations across activities. Prior studies have also excluded routine activities (e.g., clean up, snacks). As such the present study is the first to assess teachers' use of complex conversations across a broader range of preschool activities. Additionally, it is interesting to note that teachers appear to differ in their use of complex conversations across classroom contexts but not during activity types. This may mean that teachers' interactional styles (i.e., complex conversations) with children are driven by the classroom context (e.g., whether teachers are in a leading role or whether children are given free choice in playmates and activities) and not by specific learning activities.

Early Childhood Teachers' Depressive Symptoms and Teacher-Child Conversation Quality

The second goal was to examine the relation between teachers' depressive symptoms and complex conversations. Head Start teachers' depressive symptoms were expected to be negatively related to the likelihood that a complex conversation occurred during a teacher-child interaction. This was hypothesized because depressive symptoms may make it difficult for teachers to maintain the levels of energy and motivation needed to engage in complex conversations with children (Bakker, Schaufeli, Leiter, & Taris, 2008; Gonzalez-Roma, Schaufeli, Bakker, & Lloret, 2006). Results supported this

hypothesis. Teachers' depressive symptoms were found to decrease the likelihood that a complex conversation occurred by 37%. These findings lend further support to previous work demonstrating that teachers' depression limits the extent to which teachers can remain motivated to engage in high quality interactions with children.

This finding paints a picture of the classroom experiences of depressed teachers and their students. Depression decreases the likelihood that teachers interact with children in engaging and stimulating conversations. As a result, it may be difficult for teachers to form close and positive teacher-child relationships (Goodman & Brumley, 1990). This would be problematic for both teachers and students. Positive teacher-child relationships are important for teachers' well-being, provide internal rewards for teachers, and give meaning to teaching (Dellamatera, 2011; Hargreaves 2000; Spilt, Koomen, Thijs, 2011). For instance, interviews with 60 teachers revealed that teachers' relationships with students were a source of enjoyment and motivation for teachers (Hargreaves, 2000). Moreover, positive teacher-child relationships are often mentioned by teachers as one of the primary reasons for staying in the profession (O'Connor 2008). When depressed teachers disengage from teacher-child interactions it may add to the stresses that early childhood educators experience (e.g., low pay, poor benefits, and limited support; Whitebook, Phillips, & Howes, 2014), may further limit the extent to which teachers gain enjoyment from teaching, and, in turn, may increase teachers' depression (creating a transactional process). Future studies should examine how to motivate depressed teachers to engage in supportive and engaging interactions with children, as these interactions may serve to increase satisfaction with teaching and buffer against symptoms of depression.

For students of depressed teachers, this finding implies that the leading adult in their school context is less likely to engage with children in ways that help them develop oral language, early literacy skills, and cognitive abilities (by modeling language, listening, and responding) compared to teachers who are not depressed (Dickinson & Snow, 1987; Massey, 2004; Wasik & Bond, 2001; Wasik, Bond, & Hindman, 2006). At its extreme, this may mean that children of depressed teachers are less likely to develop skills that are derived from complex conversation, such as rich vocabularies, accelerated word learning, and later reading comprehension (Arnold, Lonigan, Whitehurst, & Epstein, 1994; Han, Roskos, Chrisite, Mandzuck, & Vukelich, 2009; Justice, Meier, & Walpole, 2005) as compared to those without depressed teachers. This is particularly problematic for Head Start children because they enter preschool with receptive vocabulary scores that are about one standard deviation below national norms (Dickinson, St Pierre, & Petengill, 2004; Zill & Resnick, 2006). Additionally, Head Start children have fewer-learning related resources at home relative to children from higher SES backgrounds (Lewis et al., 2016), which may mean that a deficit in exposure to complex conversations at school further increases student risk for delays in early language and literacy skills.

Classroom Context as a Moderator

The third aim was to examine the extent to which the relation between teachers' depression and complex conversations varied across contexts. This relation was expected to vary across classroom contexts as teachers associate different contexts with different behavioral expectations for themselves and for children (Cunningham & Wegell, 1992; Gest, Holland-Coviello, Welsh, Eicher- Catt, & Gill, 2006; Kontos, 1999). Specifically,

when in free choice, it was expected that the slope of the relation between depression and complex conversations would be negative. When in structured settings, it was expected that the slope of the relation between depression and complex conversations would be flat. Results did not provide support for this hypothesis. Classroom context did not significantly moderate the relation between teacher depression and complex conversations. That is, the relation between teachers' depression and complex conversations remained negative when teachers were in free choice settings and when teachers were in structured settings.

One explanation for this finding is that depressed teachers may not differentiate their interactions with children based on structured settings and free choice settings. This may be because specific classroom contexts do not provide enough incentives for depressed teachers to overcome feelings of low energy and motivation and engage in complex conversations. That is, whether or not a context is teacher led (i.e., structured) or children have freedom to choose which activities and who they play with, *depressed* teachers appear to remain removed from complex conversations. This finding suggests that teachers who experience depression may have problems meeting the cognitive, social, and emotional demands of teaching across classroom contexts; in both structured settings and free-choice settings depressed teachers may not be willing to engage in interactions with children that extend beyond the minimum behaviors or interactions needed to maintain the classroom flow, monitor children's health and safety, and preserve a baseline level of classroom functioning (McIntyre, Liauw, & Taylor, 2011). This finding implies that when trying to support depressed teachers, efforts should be targeted across the preschool day instead of focusing on use of complex conversations during

certain classroom contexts (e.g., when children are engaged in free-choice activities). Additionally, this finding suggests that it may be that what drives depressed teachers' interactions with children is not the degree of control that teachers provide to children in a context but rather their specific learning goals or activities. A discussion of the relation between teacher depression and complex conversations across activity types follows.

Activity Setting as a Moderator

The final goal was to examine if the relation between Head Start teachers' depression and complex conversations varied by activity type. Specifically, during academic activities (e.g., books, language, math) the slope of the relation between depression and complex conversations was expected to be flat. The relations between depression and complex conversations during play activities (e.g., balls, bikes, digging) and routine activities (e.g., clean up, personal care, eating snacks) were expected to remain negative. Results supported this hypothesis. The relation between teachers' depression and complex conversations was not significant when teachers were in academic activities. However, this relation remained negative when teachers were in play activities and routine activities.

One explanation for these findings is that early childhood teachers may be motivated and likely to engage in complex conversations when engaged in activities that directly promote children's academic learning, even in the face of depressive symptoms. This may be the case because early childhood teachers are pressured by educational policies to ensure that their interactions with children are encouraging young children's academic growth and preparing them with foundational pre-academic skills (Miller & Almon, 2009; National Association for the Education of Young Children, 2015). Indeed, these

findings support the idea that depressed teachers increase the extent to which they use complex conversations when children are engaged in academic activities.

These findings also suggest that depressed teachers may be missing opportunities to use complex conversations with children during routine activities and during non-academic activities. Complex conversations are beneficial for children because they promote oral language development, early literacy skills, and cognitive abilities (Dickinson & Snow, 1987; Massey, 2004; Wasik & Bond, 2001; Wasik, Bond, & Hindman, 2006). Providing children with opportunities to practice these skills in areas outside of academics is important for encouraging higher-order thinking and language use throughout the preschool day. Moreover, prior work supports a dosage effect in children's exposure to complex conversations; higher rates of engagement in complex conversations are connected to increases in children's oral skills (Hindman & Wasik, 2017). One way teachers can increase the extent to which children are exposed to these types of conversations is by using complex conversations across all activity types. These findings suggest that depressed teachers would benefit most from interventions or support designed to help them increase their motivation or ability to use complex conversations specifically during routine activities and during non-academic activities. Future work should examine *how* we can increase depressed teachers' motivation and incentives to engage in complex conversations during these activities. For instance, teacher training efforts might explain to teachers the importance of engaging in complex conversations throughout the preschool day (and not only during academic activities) in order to increase children's exposure to conversations that will develop language and literacy skills.

Strengths and Limitations

A major strength of the present study is the use of naturalistic observational methods, which allowed us to objectively record teachers' naturally occurring practices and behaviors. The majority of observational studies on teacher-student interactions have used child-focused scan observations, in which coders rotate observations on each child in the classroom (Rudasill, 2011; Booren, Downer, & Vitiello, 2012) and observations of the classroom as a whole (Pianta, LaParo, & Hamre, 2008). Although child scan data provide important information at the child level and classroom observational data provide important information about the entire context, both of these methods preclude fine grained assessment of the extent to which teachers engage in complex conversations. By employing a teacher-focused observational coding system, the current data capture teacher-child interactions from the perspective of a teacher (compared to child-focused or global classroom-level assessments) and accurately reflect the amount of time teachers spend interacting with students. Moreover, this study expands upon the few existing studies using teacher-focused observational methods by following teachers for extended periods of time (3 hours) on multiple days. Prior work has generally been limited to observation of brief segments of teachers' interactions with children (e.g., Kontos, 1999). Thus, the present study provides more detailed, robust, and generalizable (across days and classroom settings) data than are available in extant datasets.

Although this study provides meaningful information about teachers' depression and use of complex conversations to the broader literature on teacher-child interactions, it is not without limitations. First, although teachers in the present study ranged in their levels of depression, most teachers experienced a low number of depressive symptoms

and only one teacher reached a score high enough to be categorized as clinically depressed. Thus, findings from the present study may not be generalizable to teachers who experience high or clinical levels of depressive symptoms. Although prior work supports that, at any level, depression can negatively influence well-being (Ayuso-Mateos et al., 2010; Lahoz, El-Gabalway, Kinley, Kirwin, Sareen, & Pietrzak, 2014), a better understanding of how the dosage or thresholds of depression influences teaching practices is warranted. By better understanding these thresholds we can learn whether there is a tipping point, at which teachers have sufficient depressive symptoms to change their motivation to engage in certain teaching practices. This would allow us to target teachers who may be in need of specialized support. Second, teachers in the present study were observed during the first three hours of each day. It is possible that observations of teachers across the *entire* school day would yield larger effects as teachers and students begin to lose energy and motivation toward the end of the day, which may exaggerate the influence of depression on teaching behaviors. Future work would benefit from coding teacher behavior throughout the day and examining change in the influence of depressive symptoms on complex conversations across each day. Finally, the cross-sectional nature of the data, collected over a three-week time frame, limits information about teachers' depression and complex conversations. Depressed teachers' engagement in complex conversations may vary based on a number of factors such as their academic goals, educational philosophies, and views about teacher-child interactions. In order to obtain a more comprehensive view of depressed teachers' use of complex conversations, future work should look to collect an increased number of observations over a longer period. For instance, future work could investigate how changes in depression from the

beginning of the school year to the end influence teachers' engagement in complex conversations.

Conclusion

To date, literature on the effects of teachers' depressive symptoms on early childhood teaching practices has focused on identifying the negative effects of teacher depression on teachers' sensitivity in teacher-child interactions and student-teacher relationships (Li Grining, Raver, Sardin, Metzger, & Jones, 2010). The present study adds to this body of literature by examining the influence of teacher depression on a novel outcome variable, teachers' use of complex conversations. Specifically, the present study shows teachers' depression is related to a decrease in the likelihood that teachers engage in complex conversations. This finding adds further support to the literature on teacher depression, which identifies depression as a risk factor for low quality teaching practices. Moreover, this finding speaks to the importance of supporting depressed Head Start teachers, as depression limits the extent to which teachers expose children to conversations that encourage vocabulary growth, reading comprehension, and later academic success (Dickinson & Snow, 1987; Massey, 2004; Wasik & Bond, 2001; Wasik, Bond, & Hindman, 2006). Given that 25% of Head Start teachers are clinically depressed, findings from this study have the potential to influence a large portion of the Head Start teaching population (Whitaker et al., 2013). Additionally, the present study expands on prior work by moving beyond a main effects approach to consider variation in the relation between depression and complex conversations by classroom contexts and activity setting. As such, the findings from this study contribute new knowledge about how the relation between Head Start teachers' depressive symptoms and teaching

practices varies across the preschool day. Specifically, findings highlight that depressed teachers may benefit most from intervention efforts that are targeted toward helping them to engage with students in both structured and free-choice classroom contexts and during non-academic and routine activities.

GENERAL DISCUSSION

The two studies in this dissertation provide insight into several aspects of early childhood teachers' and children's interactions including the complexity of the conversations and teachers' supportive practices. Findings from both studies reveal that teachers are selective in how they distribute their time and attention across various types of high-quality interactions with children. Although the dissertation did not directly compare teachers' engagement in complex conversations against teachers' facilitation of peer interactions, the rate at which teachers engage in these practices appears quite different; in the present studies teachers spent approximately 71% of their time in teacher-child interactions using complex conversations but only 17% of their teacher-child interaction time was spent facilitating peer interactions. Thus, early childhood teachers make choices about how to direct their energy during interactions with children, and these choices appear to lead to greater engagement in some types of interactions relative to others. Perhaps teachers spent relatively more time in complex conversations because engagement in this type of high-quality interaction is easier to implement throughout the day. In contrast, facilitating peer interactions requires a specific setting in which two or more children are interacting and in which the teacher must have the time and energy to support children's social-emotional needs.

These two studies also provide new knowledge about what promotes or hinders teachers' engagement in high quality teacher-child interactions. Study 1 suggests that teachers' perception of how often children interact with one another motivates their decisions to engage in high quality teacher-child interactions (i.e., facilitate children's peer interactions). Study 2 suggests that teacher well-being, specifically teacher

depression, limits the extent to which teachers engage in high quality interactions (i.e., complex conversations with children). Importantly, this dissertation also shows that teachers' motivation for engaging in teacher-child interactions does not stem from their own characteristics or perceptions alone. In addition to these factors, contextual aspects of teacher-child interactions also appear to influence teachers' motivation to engage in high-quality teacher child interactions. Study 1 revealed that the gender composition of the children involved in each teacher-child interaction was associated with the extent to which teachers use facilitative practices, as well as with the direction and magnitude of both quality and frequency effects on teachers' facilitation. Moreover, Study 2 revealed that the relation between teacher depression and complex conversations is changed when teachers and children are engaged in academic activities (e.g., math, books, language) relative to play or routine activities.

Overall, this dissertation informs teacher training and professional development focused on improving teachers' engagement in high-quality teacher child interactions in three ways. First, findings imply that *some* teachers would benefit from training that helps them use complex conversations more often in the classroom and that *all* teachers would benefit from training that helps teachers facilitate peer interactions. Teacher training in how to facilitate peer relationships will be particularly important for today's early childhood teacher because, currently, teachers receive little pre-service training or professional development in how to support and manage peer relationships (Kennedy, et al., 2017). Second, findings imply that teacher training may be most effective if we can target the factors that are associated with increasing teachers' motivation and ability to engage in high-quality teacher child interactions. Currently, teacher training programs are

not designed to meet teachers' individual needs or perceptions about their classroom (Darling-Hammond, 2017). This dissertation helps to fill this gap by studying the extent to which teacher well-being and perceptions of children's social interactions are related to teacher-child interactions. For instance, we now know that one way to support teachers' high quality interactions with children is to target and alleviate teachers' depressive symptoms, and those who are depressed, would benefit from targeted efforts to increase their use of complex conversations in the classroom. Additionally, we now know that all teachers will need additional incentives or reasons to facilitate peer interactions that do not happen often (as their tendency is to facilitate those interactions that commonly occur).

Finally, when training teachers to engage in high-quality interactions, we must carefully consider how the contextual factors that surround the teacher-child interaction may influence the likelihood that teachers engage in these interactions. For example, depressed teachers may benefit most from intervention efforts that are targeted to help them engage with students across all classroom contexts and during play and routine activities. However, intervention efforts may not effectively change depressed teachers' use of complex conversations during academic activities given the lack of observed effect of depression on complex conversations during academic activities. Additionally, it will be important to instruct teachers about facilitating children's peer interactions with reflection about the gender composition of the peer group. Specifically, teachers may need additional motivation to facilitate boys' interactions with other boys and girls' interactions with other girls that do not occur often or that are of low quality as well as the interactions of other-gender children who have more positive interactions.

In sum, this dissertation adds to the broader literature on teacher-child interactions by providing a deeper understanding of teachers' engagement with children across numerous indicators. Additionally, findings contribute new knowledge about how teacher characteristics, teachers' perceptions, and contextual factors motivate teachers' decisions to engage in high quality teacher-child interactions. And, they provide empirical knowledge to teacher training and professional development programs about how early childhood teachers can be better supported in the classroom and the ways in which teachers (and their students) might benefit from support in building high quality interactions.

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Table 1

Correlations and Descriptives for All Study Variables

	Frequency of Peer Pair Interactions	Quality of Peer Pair Interactions	Peer Pair Facilitation			
<i>Correlation Between Study Variable and Covariates</i>						
Frequency of Peer Pair Interaction	-					
Quality of Peer Pair Interaction	.57**	-				
Peer Pair Facilitation	.24**	.14**	-			
Reading and Writing	.07	.20**	.11**			
Language Use	.22**	.19**	.15**			
<i>Percentages of Time of Teachers' Facilitative Interactions</i>						
	Boys-Only		Girls-Only		Other-Gender	
	<i>M(SD)</i>	Range	<i>M(SD)</i>	Range	<i>M(SD)</i>	Range
% of total observations	2(1)	1-4	2(2)	0-5	6(2)	5-9
% of teacher-child interactions	3(1) _a	2-5	3(3) _b	0-7	11(3) _{ab}	8-15
<i>Means and Standard Deviations of Teacher Reported Peer Pair Frequency and Quality</i>						
	Boys-Only		Girls-Only		Other-Gender	
	<i>M(SD)</i>	Range	<i>M(SD)</i>	Range	<i>M(SD)</i>	Range
Frequency of Peer Interaction	4.50(1.30) _a	0-6	4.31(1.60) _b	0-6	3.46(1.52) _{ab}	0-6
Quality of Peer Interaction	3.68(1.29) _c	0-6	4.26(1.16) _{dc}	0-6	3.77(1.36) _d	0-6

Note. * $p < .05$. ** $p < .01$. *** $p < .001$. Matching subscripts indicate significant differences at $p < .05$. Percentages of time of teachers' facilitative interactions adds to the total proportion score for the amount of time teachers facilitate peer pair interactions out of total observations (10%) and the proportion score for the amount of time teachers facilitate peer pair interactions out of the time teachers were observed to interact with children (17%).

Table 2

Peer Pair Quality and Frequency as Predictors of Peer Pair Facilitation

	Overall Main Effects Model		Overall Interaction Model		Boys-Only Main Effects Model		Boys-Only Interaction Model		Girls-Only Main Effects Model		Girls-Only Interaction Model		Other Gender Main Effects Model		Other-Gender Interaction Model	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Reading and Writing	.28	.35	.26	.35	-.19	.69	-.32	.67	1.96**	.75	1.89*	.75	-.28	.50	-.12	.45
Language Use	.46	.28	.47 [†]	.28	.91	.64	1.0	.61	.44	.80	.41	.75	.61 [†]	.33	.59 [†]	.34
Frequency	.49***	.13	.47**	.13	.19	.24	.19	.23	.53 [†]	.32	.57 [†]	.32	.59**	.22	.67**	.22
Quality	-.07	.14	-.11	.14	-.28	.23	-.28	.23	.35 [†]	.22	.49 [†]	.20	-.28	.28	-.50 [†]	.30
Quality X Frequency	-	-	-.05	.05	-	-	.10	.11	-	-	.23 [†]	.12	-	-	-.31**	.13

Note. [†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3
Observed Activities Categorized as Academic, Play, and Routine

Academic	Books/reading Language Math Science Computers
Play	Art Balls Bikes, wagons, other ride-on toys Blocks, Lincoln Logs, other construction materials Board Games Clay , play-dough sculpting Digging Dress Up Pretend play Large motor activities Manipulative Music Nature Sensory Play
Routine	Clean-Up Other Personal Care /Instrumental Help Snack or meal Talk, Social Conversation

Table 4

Descriptives for All Study Variables

	<i>M</i>	<i>SD</i>	Range
Teacher Depression	5.08	4.83	0-26
Complex Conversations			
% of Total Time	.64	.10	.39-.76
% of Teacher-Child Interactions	.71	.10	.50-.93
% in Structured Settings	.71	.10	.50-.92
% in Academic Activities	.21	.08	.06-.42
% in Play Activities	.33	.09	.18-.53
% in Routine Activities	.46	.08	.33-.65

Note. Structured Settings is coded as 0= Free Choice and 1 = Structured Settings

Table 5
Predicted Likelihood of Teachers' Use of Complex Conversations by Teacher Depression, Classroom Context, and Activity Setting

	Main Effects Model				Interaction Effects Model			
	<i>B</i>	Std. Error	Odds Ratio	EP	<i>B</i>	Std. Error	Odds Ratio	EP
Model 1								
Proportion of Teacher-Child Interactions	.85**	.30	2.34	.70	-	-	-	-
Teachers' Depression	-.54***	.12	.58	.37	-	-	-	-
Model 2								
Proportion of Teacher-Child Interactions	.86**	.30	2.36	.70	.85**	.30	2.34	.70
Teachers' Depression	-.54***	.12	.59	.37	-.71***	.16	.49	.33
Classroom Context (Free Choice vs Structured Setting)	.05	.06	1.05	.51	.05	.06	1.05	.51
Depression X Context (Free Choice vs Structured Setting)	-	-	-	-	.23	.16	1.25	.56
Model 3								
Proportion of Teacher-Child Interactions	.88**	.30	2.41	.71	.88**	.30	2.40	.71
Teachers' Depression	-.53***	.12	.59	.37	-.08	.19	.92	.48
Play Activities	-.93***	.08	.40	.29	-.93***	.07	.40	.29
Routine Activities	-.52***	.08	.60	.38	-.51***	.07	.60	.38
Depression X Play Activities	-	-	-	-	-.49**	.18	.61	.38
Depression X Routine Activities	-	-	-	-	-.56**	.20	.57	.36

Note. ** $p < .01$. *** $p < .001$. EP = Equivalent Probability

In model 2 Classroom Context is scored 0 = Free Choice and 1 = Structured Setting (Free Choice serves as the reference group). In model 3 Academic Activity serves as the reference group

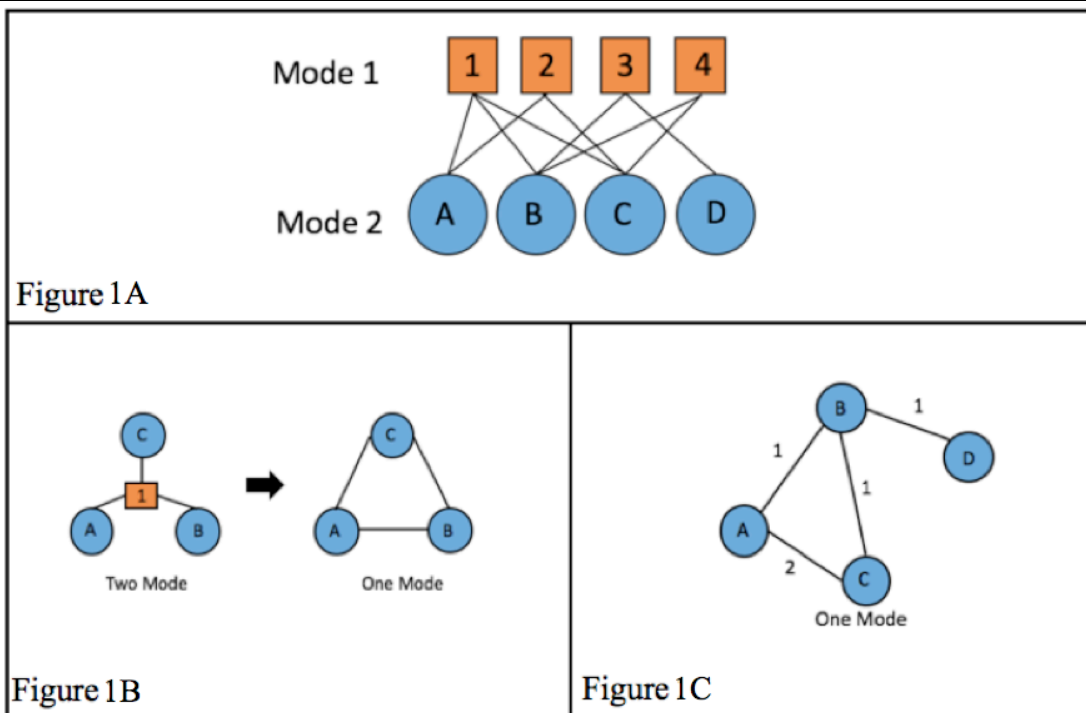


Figure 1. Example of observational data transformation using social network project methods (Opshal, 2013). Figure 1A depicts a two-mode social network. Each square represents a ten-second observation in which a teacher engaged in facilitating a peer interaction (mode 1). Each circle represents a child in the classroom (mode 2) and the lines between the circles (children) and squares (ten-second facilitation observation) indicate which children were connected in a facilitation observation. Figure 1B show an example of how the observational data was projected from a two-mode network to a one-mode network. Child A, B, and C are depicted by the blue circles and the observation in which a teacher facilitated an interaction with these children is depicted by the orange square. Projection methods remove the orange square (the observation) and instead connect the blue circles (children). The remaining connected blue circles (children) indicate that child A, B, and C were observed in a facilitative interaction with the teachers in one ten-second observation. Figure 1c shows in graphic form an example of the outcome variable, *peer facilitation*, which was a count of how many times each possible pair of peers was involved in a facilitation event with the teacher. Each circle represents a child, the lines connecting circles represent children were connected in a peer pair facilitation, and the numbers on the lines indicate how many times the peer pair was involved in a facilitation with the teacher.

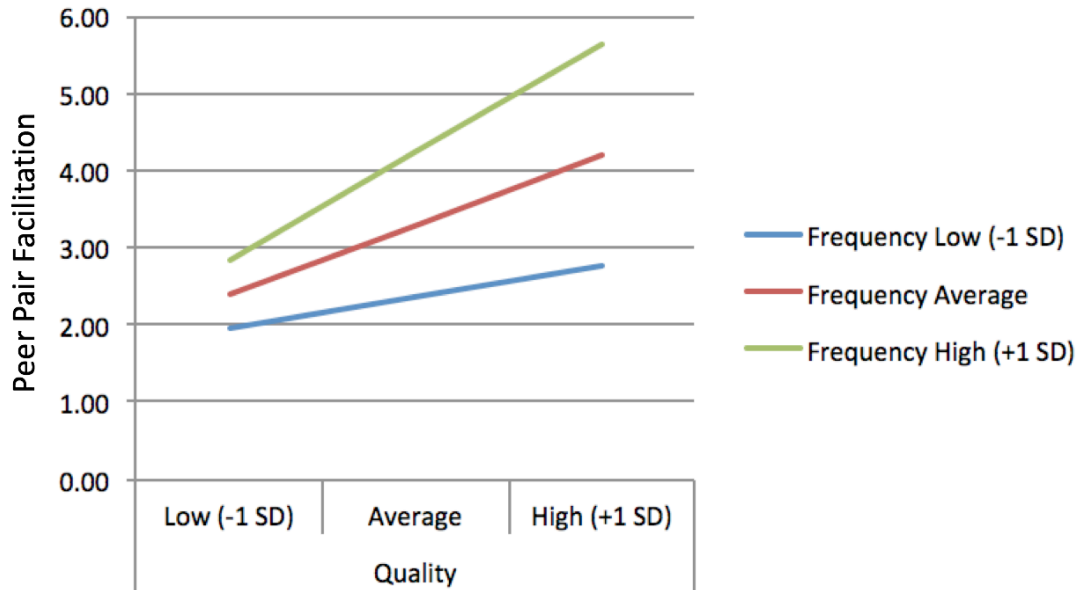


Figure 2. Graph of the association between girls-only peer pair facilitation and peer pair quality at low, average, and high levels of peer pair frequency. *Note.* The slope at low peer pair frequency is not significantly different than 0 at $p < .05$. The slopes at average and high levels of peer pair frequency are significantly different than 0 at $p < .05$.

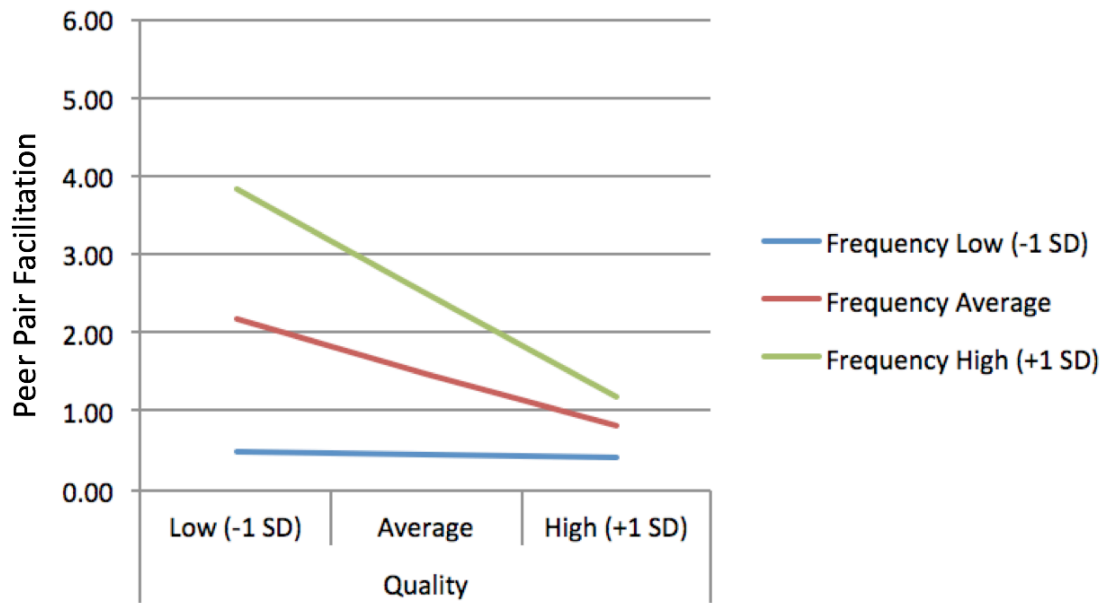


Figure 3. Graph of the association between other-gender peer pair facilitation and peer pair quality at low, average, and high levels of peer pair frequency. *Note.* The slope at low peer pair frequency is not significantly different than 0 at $p < .05$. The slopes at average and high levels of peer pair frequency are significantly different than 0 at $p < .05$.

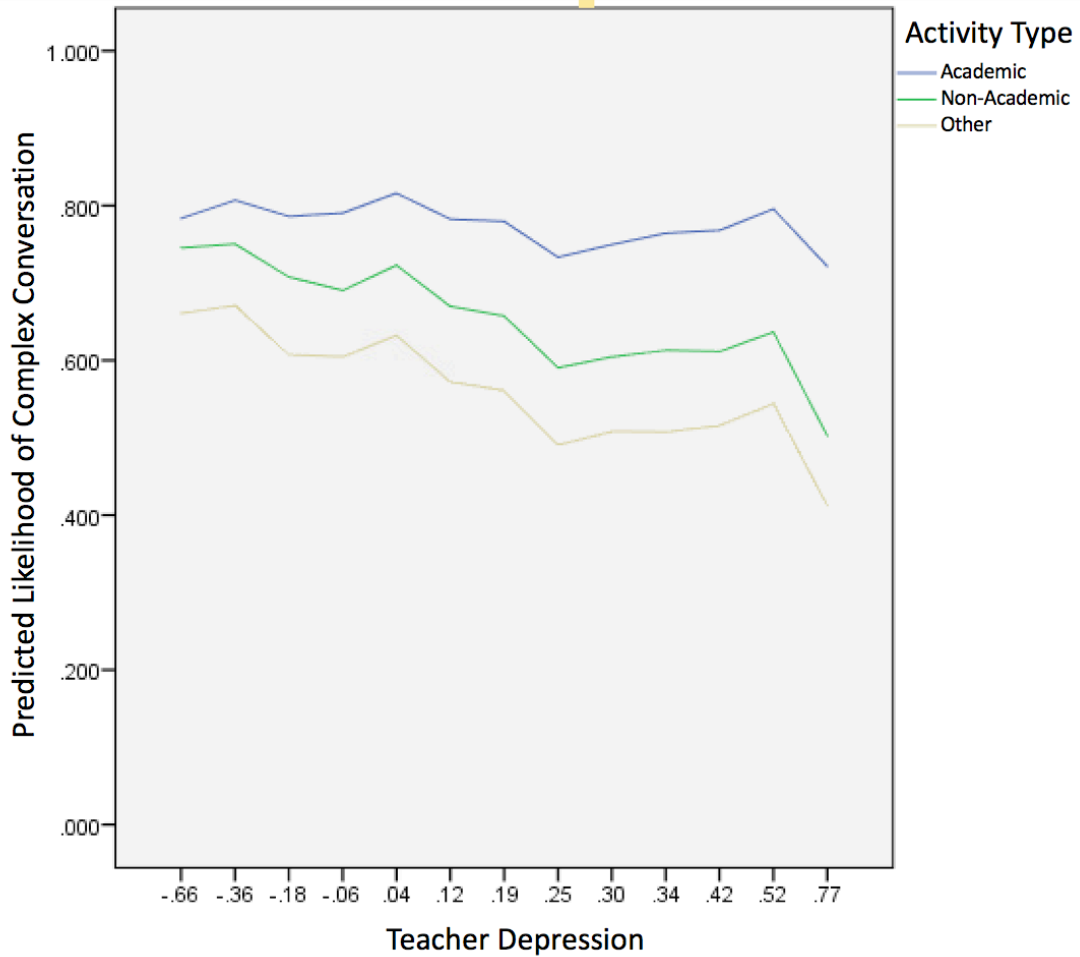


Figure 4. Graph of the association between teachers' depression and predicted likelihood of engaging in complex conversations during academic, play (i.e., dress-up, figure play, trucks, bikes), and routine (i.e., clean-up, snack, personal care) activities. *Note.* The slope for academic activities is not significantly different than 0 at $p < .05$. The slopes for play activities and routine activities are significantly different than 0 at $p < .05$