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Dear Dean of the Bouvé College Graduate School of Health Sciences:

[Signature] Date 8/2/15
EXAMINING SOCIAL DEVELOPMENT IN YOUNG CHILDREN WITHIN A
NATURAL PLAY CONTEXT

A dissertation presented by
Elizabeth Mary Hemphill

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Abstract

This study explored social behaviors of infants and toddlers as they develop within the natural environment. The purpose was to increase our understanding of social development, which, in the future, could be used to help develop methods to identify young children who may be at-risk for future social concerns. Caregiver rating scales are the primary tools used to measure social behavior in early childhood. Few systematic direct observation systems exist to observe the social behaviors of young children within their natural environments. The majority of current observation measures monitor social interactions between peers, not between children and their caregivers; in addition, they focus on preschool age children (i.e., three to five years old), not infants and toddlers. To begin to address these gaps in the available observation measures, this study identified social behaviors based on the literature and the bioecological model, that were thought to represent social behaviors that emerge in early childhood. These behaviors were further explored, grouped into four categories (i.e., No Acknowledgement, Acknowledgement, Attention Seeking, Engagement), and operational definitions were developed by watching 15 video recordings of children ages 12, 24, and 36 months (5 video observations per age group) during a naturalistic play observation with their caregiver. Then, the identified four categories of behaviors were recorded using a 10-second partial interval coding system during a 14-minute video recording of 75 children ages 12, 24, and 36 months during play with their caregivers. Every sixth interval (once per minute) caregiver social behavior was recorded. Results from a repeated measures analysis of variance indicated a significant interaction between the four social categories and age, F (4.98,
179.24) = 21.76, \( p < .001 \), partial eta squared = .377. Specifically, 12-month-old children displayed high levels of Acknowledgement and low levels of Engagement behaviors, whereas 36-month-old children displayed high levels of Engagement and low levels of Acknowledgement behaviors. Attention Seeking behaviors increased from 12- to 24-months and decreased from 24- to 36-months, but occurred at relatively high frequencies across age groups. Positive correlations between caregiver and child No Acknowledgement, Acknowledgement, and Engagement behaviors were observed, suggesting relationships between caregiver and child interactions for these three behaviors. Acknowledgement behaviors were found to be negatively correlated with scores on the Battelle Developmental Inventory, Second Edition-Screening Test (BDI-2-ST; Newborg, 2005) and complex play scores as measured by the Developmental Play Assessment (DPA; Lifter, 2000). Engagement behaviors, in contrast, were positively correlated with BDI-2-ST and complex DPA scores. The importance of Acknowledgement and Engagement behaviors representing social development across ages is discussed. In addition, the importance of Attention Seeking behaviors as social behaviors that are present across all ages is addressed. Finally, limitations of the current study as well as future research directions to further explore the development of social behaviors are presented.
# Table of Contents

Chapter One .................................................................................................................................................. 1

Definitions and Descriptions of Social Development ................................................................. 2

- Social Behavior ........................................................................................................................................ 3
- Socialization ........................................................................................................................................... 4
- Social Development .......................................................................................................................... 6

Positive Social Interactions are Protective Factors ............................................................................. 8

Maladaptive Social Behavior and Potential Risks ............................................................................... 9

Measurements of Social Development: Limitations and New Directions .................................... 11

- Limitations ........................................................................................................................................... 11

Importance of Natural Setting ............................................................................................................. 13

- Generalization ...................................................................................................................................... 14

- Construct Validity .............................................................................................................................. 15

- Caregiver's Role ................................................................................................................................. 16

The Relationship of Social Development to Communication and Cognitive Development

- Communication Development ........................................................................................................... 17

- Cognitive Development .................................................................................................................... 18

- Play Abilities ....................................................................................................................................... 20
Bandura’s Social Cognitive Theory .......................................................... 34

Integrating Bandura’s Social Cognitive Theory with Bronfenbrenner's
Model ........................................................................................................ 35

Integrating Theory into the Definition of Social Behavior ...................... 37

Measuring Social Development .............................................................. 39

The Initial Literature Search: Assessment of Social Behavior ................. 41

Limitations of caregiver and teacher report ......................................... 46

Subjectivity. ............................................................................................ 47

Do not measure continuum of behaviors. ............................................ 48

Problematic for children with developmental delays ......................... 49

The Second Literature Search: Direct Observation of Social Behaviors.... 50

Methods of observing behavior. .............................................................. 52

Caregiver-child interactions .................................................................. 55

Peer-peer interactions ........................................................................... 58

Parten’s Scale (Parten, 1932). ................................................................. 59

Play Observation Scale (Rubin, 2001) ..................................................... 61

System for Observation of Children's Social Interactions (Brown et al.,
1996). ....................................................................................................... 64

Social Behavior Scale (Pierce-Jordan & Lifter, 2005). ......................... 65

Limitations of Current Measures .......................................................... 69
Identification of What Social Behavior is Exhibited by Young Children .......... 70

Purpose of Current Study ............................................................................. 70

Recording behavior. ................................................................................... 71

Coding scheme. .......................................................................................... 73

Hypotheses .................................................................................................... 75

Research Question 1 .................................................................................... 76

No Acknowledgement. .................................................................................. 77

Acknowledgement. ....................................................................................... 77

Attention Seeking.......................................................................................... 78

Engagement .................................................................................................... 78

Research Question 2 .................................................................................... 79

Research Question 3 .................................................................................... 80

Research Question 4 .................................................................................... 82

Research Question 4a ................................................................................... 82

Research Question 4b ................................................................................... 82

Research Question 4c ................................................................................... 82

Research Question 4d ................................................................................... 82

Hypothesis 4a .............................................................................................. 82

Hypothesis 4b .............................................................................................. 83
Bidirectional influence................................................................. 107
Data collection. .............................................................................. 107
Length of data collection. ............................................................. 115
Setting. .......................................................................................... 116
Data analysis. ................................................................................ 116
Weighting data. ............................................................................ 116
Credibility. ..................................................................................... 116
Fittingness. .................................................................................... 117
Confirmability.................................................................................. 118
Quantitative Procedures .................................................................. 118
Observation length........................................................................... 118
Coding the caregivers’ behaviors. ................................................... 121
Interobserver agreement................................................................. 123
Inter-Rater Reliability ...................................................................... 124
IOA. ............................................................................................... 125
ICC.................................................................................................. 126
Research Questions and Planned Analyses................................. 127
Research Question 1: ................................................................. 127
Research Question 2: ................................................................. 127
Research Question 3: .............................................................................. 129

Research Question 4: .............................................................................. 130

Chapter Four ......................................................................................... 132

Results.................................................................................................... 132

Research Question 1: Exploration of Social Behaviors....................... 133

Research Question 2: Differences among Age and Categories of Social
Behavior................................................................................................. 136

Assumptions.......................................................................................... 136

Normality............................................................................................... 136

Outliers .................................................................................................. 140

Independence of observation............................................................... 140

Linearity.................................................................................................. 140

Homogeneity of variance.................................................................... 141

Absence of multicollinearity................................................................. 141

Sphericity............................................................................................... 142

ANOVA .................................................................................................. 143

Interaction.............................................................................................. 145

Four social categories................................................................. 148

Age......................................................................................................... 149
Research Question 3: Relationship between Child and Caregiver Social Behavior ................................................. 151

Assumptions ................................................................................................................................. 152

Correlations ....................................................................................................................................... 156

Overall Sample ............................................................................................................................... 159

Samples by Age .............................................................................................................................. 159

Research Question 4: Relationship with Other Variables in Database .............................................. 160

BDI-2-ST. .......................................................................................................................................... 166

Engagement ........................................................................................................................................ 168

Acknowledgement ........................................................................................................................... 169

No Acknowledgement ..................................................................................................................... 170

Attention Seeking ............................................................................................................................ 170

DPA ................................................................................................................................................... 170

Within each age group .................................................................................................................... 174

Engagement ........................................................................................................................................ 175

Acknowledgement ........................................................................................................................... 175

Attention Seeking ............................................................................................................................ 176

No Acknowledgement ..................................................................................................................... 176

Chapter Five ...................................................................................................................................... 178

Discussion ......................................................................................................................................... 178
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usefulness of Social Categories of Behavior</td>
<td>179</td>
</tr>
<tr>
<td>No Acknowledgement</td>
<td>180</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>180</td>
</tr>
<tr>
<td>Attention Seeking</td>
<td>181</td>
</tr>
<tr>
<td>Engagement</td>
<td>183</td>
</tr>
<tr>
<td>Consistency of Results with Other Research Studies</td>
<td>185</td>
</tr>
<tr>
<td>Validity of Qualitative Results</td>
<td>187</td>
</tr>
<tr>
<td>Relationship between Child and Caregiver Behaviors</td>
<td>189</td>
</tr>
<tr>
<td>Consistency with Other Research Studies</td>
<td>192</td>
</tr>
<tr>
<td>Relationship of Social Categories with Other Variables in Database</td>
<td>193</td>
</tr>
<tr>
<td>Relationship with BDI-2-ST Personal-Social Domain</td>
<td>193</td>
</tr>
<tr>
<td>Relationship with BDI-2-ST Communication Domain</td>
<td>197</td>
</tr>
<tr>
<td>Relationship with BDI-2-ST Cognitive Domain</td>
<td>199</td>
</tr>
<tr>
<td>Relationship with DPA Scores</td>
<td>201</td>
</tr>
<tr>
<td>Relevance for School Psychology</td>
<td>203</td>
</tr>
<tr>
<td>Identification of and Intervention with Children with Maladaptive Social Behaviors</td>
<td>205</td>
</tr>
<tr>
<td>Improvement of Current Measures</td>
<td>207</td>
</tr>
<tr>
<td>Limitations and Future Directions</td>
<td>208</td>
</tr>
<tr>
<td>Study Design</td>
<td>208</td>
</tr>
</tbody>
</table>
Sample.................................................................................................................. 213

Data Collection ....................................................................................................... 215

DPA.......................................................................................................................... 215

Observation interval................................................................................................. 215

Coding....................................................................................................................... 217

Conclusion.................................................................................................................. 218

References............................................................................................................... 219

Appendix A............................................................................................................... 239

Data Collection Sheet and Social Category Definitions......................................... 239
List of Tables

Table 1 .............................................................................................................. 8
Table 2 ............................................................................................................... 44
Table 3 .............................................................................................................. 90
Table 4 .............................................................................................................. 99
Table 5 ............................................................................................................. 134
Table 6 ............................................................................................................. 139
Table 7 ............................................................................................................. 144
Table 8 ............................................................................................................. 148
Table 9 ............................................................................................................. 151
Table 10 .......................................................................................................... 154
Table 11 .......................................................................................................... 157
Table 12 .......................................................................................................... 162
Table 13 .......................................................................................................... 167
Table 14 .......................................................................................................... 174
List of Figures

Figure 1. .................................................................................................................. 146

Figure 2. .................................................................................................................. 147

Figure 3. .................................................................................................................. 152
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Chapter One

The ability to engage in positive social interactions is central to children’s development and their success in school (Cook et al., 2008; Lane, Menzies, Kalberg, & Oakes, 2012; Reynolds & Kamphaus, 2002). Accordingly, early childhood practitioners and school personnel consistently monitor and work to improve children’s social skills. Practitioners have a variety of evaluation instruments available to them, but there are serious limitations to these tools. These limitations include a reliance on elicited behaviors and caregiver/teacher reports. What appears to be missing is a clear understanding of what social behavior looks like in early childhood and how social behavior occurs in a natural context. Such information would contribute to the development of new assessment instruments.

This chapter begins with a presentation of the definitions of social behavior, socialization, and social development, followed by a discussion of the importance of social skills for young children. Then a brief review of current assessment instruments and their limitations is discussed, followed by the rationale for studying early social behaviors in a natural context with familiar caregivers. A plan for examining development of social behaviors between children and their caregivers is proposed. The relationship of social behaviors to other domains of development is
then explored. The chapter concludes with the research questions for the proposed study.

**Definitions and Descriptions of Social Development**

Defining social behavior, socialization, and social development have been difficult for psychologists, educators, and sociologists since the 1930s (Parten, 1932). These terms are used across many disciplines (e.g., psychology, sociology, and education); however, there is no consensus as to the exact definition of what is meant by "social behavior, socialization, or social development." In 1933, Parten discussed this problem, commenting that the term "social" had been used to refer to moral behavior, altruistic behavior, play behavior, or behavior within group situations. More recently, many research studies do not define "social," but instead assume the phrases "social interactions," "social competence," "social skills," or "social development" are self explanatory (e.g., Brown, Odom, & Holcombe, 1996; Elliott, Gresham, Frank, & Beddow, 2008; Rubin & Coplan, 1998). When these terms are not explicitly defined, different researchers could be using the same term, but measuring different constructs of behavior. Therefore, it is necessary to provide a definition of "social behavior," "socialization," and "social development" for the purposes of this study. Then a discussion of the protective factors associated with positive social interactions and the potential risks associated with maladaptive social behaviors is presented.
Social Behavior

A specific definition of social behavior is difficult to find in the literature because many researchers and organizations define social behavior through examples. For instance, the National Association of School Psychologists (NASP; 2002) separates social behaviors into positive and negative behaviors. Specifically, NASP defines positive behaviors as social skills (e.g., communication skills, social problem solving abilities, conflict management) or behaviors that will strengthen interpersonal relationships (e.g., sharing, participation), whereas maladaptive behaviors are defined as behaviors where a child has difficulty performing appropriate social behaviors (e.g., aggression, teasing; National Association of School Psychologists, 2002).

Similarly, Parten (1932) defined social behavior with examples. She characterized social behavior as the degree of participation within various social activities (i.e., social participation). She then provided examples of her six categories of social participation: unoccupied behavior, solitary play, onlooker behavior, parallel play, associative play, and cooperative or organized supplementary play. These descriptions of social participation included examples of what social behavior looked like including (a) no social behaviors or playing alone (solitary play), (b) playing alone, but observing others in the environment (onlooker), (c) playing alone, but in close proximity to other children (parallel), and (d) playing with others (associative play).
and cooperative play). Despite these examples of specific social behaviors, she did not provide a definition of what social behavior is.

Because there is no explicit definition of "social behavior" in the literature, the definition developed for this research study was designed to include all of the above examples of social behavior. Central to all of the examples of social behavior was that social behaviors do not occur in isolation, but occur in relation to other individuals in the environment. "Social behavior" is defined for this study as "an interaction between or among people, which can range from simply acknowledging the presence of another to engaging in shared activities." This definition includes all interactions between people, which can be both positive social behaviors, such as sharing, as well as maladaptive social behaviors, such as teasing and arguing.

**Socialization**

Socialization is another term that is used frequently in the social psychology, sociology, and development literature. From a socio-behavioral approach, Bandura (1991) described socialization as the process through which individuals internalize social standards of behavior or change their behavior to adapt to social cues. He described how individuals are not independent from their environment; instead, they are enmeshed with their social environments. People are influenced by social factors, such as standards for moral behavior and consequences for inappropriate conduct, and
often change their behavior to conform to socially appropriate acts (Bandura, 1991). Depending on the social influences, people may make different choices about how to act in certain situations, suggesting that societal standards provide a powerful influence on behavior (Bandura, 1989). Despite this description of the process of socialization, he does not adequately provide a specific definition of socialization.

Bugental and Grusec (2006), in their chapter reviewing socialization processes, reviewed psychoanalytic, attachment, social learning, and cognitive theories of socialization. After acknowledging these various theoretical approaches, they took a sociocultural approach and defined socialization as "(1) the ability to develop and maintain close interpersonal relationships and (2) the growth of self-definition or autonomy" (p. 393). To better understand this definition, it is important to clarify what Bugental and Grusec (2006) meant by "the ability to develop and maintain close interpersonal relationships" and autonomy.

Bugental and Grusec (2006) described that socialization occurs within the context of relatedness to others. It is through interactions, relationships with others, and cognitive processes such as person permanence (i.e., the understanding that objects and other people are separate from themselves) that infants, children, and adolescents acquire the skills necessary to develop autonomy (i.e., the ability to independently make one's own decisions). Bandura (1991) argued that people do not
operate as independent autonomous agents. He clarified that people are influenced by the societal standards and social environments in which they live, and these environmental factors influence people's ability to make their own decisions. Caregivers try to teach children what is acceptable behavior and then hope that their children's autonomous or self-directed behavior will represent this appropriate behavior (Bugental & Grusec, 2006). Therefore, autonomy is influenced by an individual's development of a sense of self, and socialization is the process of learning how to behave autonomously within a specific society.

Bugental and Grusec's (2006) definition of socialization omits Bandura's (1989) description of how socialization takes place within a specific society or environment. Therefore, the definition of socialization developed for the purposes of this research study is "the process of acquiring social behaviors (i.e., close interpersonal relationships or interactions) through cultural norms and participation within a society."

Social Development

Bugental and Grusec (2006) emphasized that as development occurs children interact differently with others in the environment, but they did not clarify how social relationships among people develop. Bronfenbrenner and Morris (2006) defined development as "stability and change in the biopsychological characteristics of
human beings over the life course and across generations" (p.796). This definition emphasizes that development includes both continuities and changes that occur over the lifespan. Cognitive processes, including the development of a sense of self, are one aspect of development that change across the lifespan.

Bronfenbrenner and Morris (2006) proposed that proximal processes, or the processes of progressively more complex reciprocal interactions with people and objects in a child's environment, influence social development. Based on this point, the definition of social development for the present study is "the continuity and change in social behaviors that occur across time and among people." The definitions of social behavior, socialization, and social development are presented in Table 1.
Table 1

Definitions of Social Behavior, Socialization, and Social Development

<table>
<thead>
<tr>
<th>Social Behavior</th>
<th>An interaction between or among people, which can range from simply acknowledging the presence of another to engaging in shared activities</th>
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<tbody>
<tr>
<td>Socialization</td>
<td>The process of acquiring social behaviors (i.e., close interpersonal relationships or interactions) through cultural norms and participation within a society</td>
</tr>
<tr>
<td>Social Development</td>
<td>The continuity and change in social behaviors that occur across time and among people</td>
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</table>

Positive Social Interactions are Protective Factors

Positive social interactions have been identified in the literature as protective factors for children (Ainsworth & Bowlby, 1991; Cook et al., 2011; Waters, Corcoran, & Anafarta, 2005). Specifically, preschool-age children who engage in more cooperative social interactions (e.g., sharing, helping) have been shown to be less aggressive and withdrawn at nine-years-old (Howes & Philipsen, 1998). In addition, social skills such as social initiative have been associated with strengthening interpersonal relationships with family members, peers, and other adults (i.e.,
teachers; Bender, Ferguson, Thompson, Komlo, & Pollio, 2010). The caregiver-child relationship has been identified as a strong predictor of high school completion, suggesting that early childhood interactions are related to academic outcomes (Jimerson, Egeland, Sroufe, & Carlson, 2000).

Social skills have also been shown to provide children effective strategies to cope with stressful situations and manage their emotions by using conflict management and social problem solving skills (Cook et al., 2008). Teaching children how to respond to stressful situations in a pro-social ways has been shown to be beneficial to children's emotional development. Although it is difficult to determine causation, knowing that there is a positive relationship between positive social behaviors and future interpersonal relationships, academic success, and emotional development helps illustrate why it is important to study social development (Ainsworth & Bowlby, 1991; Jimerson et al., 2000).

**Maladaptive Social Behavior and Potential Risks**

Maladaptive social behaviors occur when children have not fully developed appropriate social skills. Children who engage in maladaptive social behaviors have difficulty creating relationships with their family members, peers, and teachers. Maladaptive social behaviors have been associated with lower academic achievement (e.g., Campbell, 1997; Jimerson et al., 2000), poorer communication and cognitive
skills (e.g., Craig-Unkefer & Kaiser, 2002; Fantuzzo & McWayne, 2002), attention difficulties (Greenberg, 1999), and a greater degree of peer rejection (Natriello, 1992). Peer rejection has also been shown to be related to school violence and delinquency (Natriello, 1992). Although it is difficult to determine causation, knowing that there is a relationship between maladaptive social behavior and future negative peer relationships, poor academic achievement, communication, and cognitive abilities illustrates why it is important to identify deficits in social behavior in early childhood.

Similarly, although causation is not known, an association between some maladaptive social behaviors and mental health disorders, such as depression, anxiety, and aggression have also been identified in the literature (Greenberg, 1999). Almost half of the students classified as Emotionally Disturbed (ED) in the National Longitudinal Transition Study-2 (2006) were reported as having social skills deficits according to their caregivers' and teachers' reports. The Department of Education (2005) reported that the greatest proportion of students identified as ED is during high school when students are between the ages of 13 and 15 years. Compared to all other special education categories, children with ED are frequently placed in restrictive environments because their maladaptive behavior becomes so severe that they are unable to remain in the mainstream classroom (U.S. Department of Education, 2005).
It is likely these students have a long history of social or emotional difficulties that could have been identified at a younger age (Cook et al., 2008; U.S. Public Health Service, 2000).

**Measurements of Social Development: Limitations and New Directions**

**Limitations**

Currently, progress in social development of young children is evaluated through reports of social behaviors from caregivers (i.e., interview or rating scale measures) and through direct observation of behavior during play with peers (see Chapter 2 for a more detailed review; Brown et al., 1996; Cohen & Spenciner, 1994). However, the current methods used to measure social development in early childhood are limited. First, caregiver reports are the primary source for information about social development for infants and toddlers, yet caregiver rating scales can be influenced by the caregivers' biases (Pellegrini, 1996). Rating scales rely on the caregivers' perceptions of the children's behavior, which can vary widely based on the respondents (Cohen & Spenciner, 1994). It is recommended that researchers and practitioners conduct a multi-method assessment (Elliott et al., 2008; Severson, Walker, Hope-Doolittle, Kratochwill, & Gresham, 2007), including direct observation and caregiver rating scales to help eliminate the subjective bias of caregiver report.
Second, for children less than two years old, there are few systematic observation measures available to observe the social behaviors of young children within their natural environments (Pellegrini, 1996). The systematic direct observation systems that exist observe preschool age children (i.e., three to five years old), not infants and toddlers (Pellegrini, 2013). In addition, they focus on social interactions between peers, not between children and their caregivers (Parten, 1932; Pellegrini, 2013; Pierce-Jordan & Lifter, 2005; Rubin, 2001; Seider, 2001). Those observation systems identified in the literature that measured social interactions between the caregiver and the child in the home environment used Likert based ratings to record behavior after the observation was completed (Crawley & Spiker, 1983; Landry, Smith, Miller-Loncar, & Swank, 1997). These systems, therefore, relied on the observers’ perception of the caregiver and child behaviors, rather than direct observation of the behaviors.

Third, these systematic direct observation systems measured social behaviors (see Chapter 2 for an overview of behaviors identified through systematic direct observation systems), but did identify how these social behaviors occur across development from simple to more complex behaviors (Shaffer, 2010). Currently, there is no consensus in the literature about the developmental sequence of social behaviors in early childhood (see Chapter 2 for a more detailed review of the
literature). The scales that exist to measure social behaviors do not provide detailed information as to what social behaviors look like in infants and toddlers or how social behaviors develop across ages. Instead, these scales observe a series of social behaviors, but have not evaluated how these behaviors are related to each other or how they vary as a function of age or development (Parten, 1932; Pierce-Jordan & Lifter, 2005; Rubin, 2001; Seider, 2001). Consequently, the purpose of this study was to begin to explore what social behaviors look like and how they vary as a function of age for infants and toddlers.

**Importance of Natural Setting**

This section discusses the importance of observing young children within a natural setting to examine the early development of children's social behaviors. For the past 60 years, descriptive research on child development has primarily studied children in laboratory settings (Pellegrini, 1996, 2013). Researchers have recognized that observing children within their natural environment provides a more accurate measure of behavior than observing children in a contrived laboratory setting (Bronfenbrenner, 1977; Pellegrini, 2013), but many research studies evaluating social behaviors are still conducted in a laboratory. For practitioners, the Department of Education stated in the IDEA Part C regulations (2011) that early intervention services should be provided within the natural environment, which may include the
"home, community, or other settings that are typical for an infant or toddler" (Section 303.26). The IDEA Part C regulations stress the importance of children receiving services in a natural environment and in an environment similar to that of their typically developing peers. Below is a description of why researchers and practitioners should work with children within the children's natural environment instead of the laboratory environment. A description of the caregiver's role in the natural environment is also discussed below.

**Generalization**

The first reason research should be conducted in a natural environment is because observations in laboratory settings are usually contrived, artificial settings and the behaviors observed may not necessarily generalize to more natural settings, such as the home environment (Bronfenbrenner, 1977). Laboratory-based experiments are concerned with internal validity and researchers can determine whether changing one specific independent variable, such as the toys, has an effect on the child's degree of social behavior (Pellegrini, 2013). However, it is likely that the specific experiences presented in the laboratory (i.e., child playing alone with caregiver and one toy in a quiet room without a television or furniture) may never be present in the natural environment; therefore, it is difficult to generalize that the child's behavior is representative of behavior across all settings and contexts.
Naturalistic observations are more concerned with external validity and describe behavior as it naturally occurs. To control for potential confounds in naturalistic observations, such as how different children in different environments (e.g., number of siblings, access to television, number of toys) would respond, researchers can design ecologically valid experiments where children are observed across different settings (i.e., home, childcare center, park). Comparing children's behavior across contexts allows for a more accurate assessment of their natural behavior within various contexts (Pellegrini, 2013).

**Construct Validity**

Another reason children should be observed in the natural environment is because children's behavior can be influenced by novel settings, so observing children in a laboratory environment may confound that data (Cooper, Heron, & Heward, 2006). For instance, based on a child's temperament, a child may be slow to warm up to this unfamiliar laboratory environment. The experiment may unintentionally be measuring a child's temperament or a child's comfort level with the novel environment. If the experiment was designed to measure social interactions, but the child is too uncomfortable to play with the caregiver, the experiment is not assessing what it was designed to measure. A more valid method to assess the child's social
interactions would be to observe the child in a natural environment (i.e., the home) in
order to minimize threats to construct validity.

**Caregiver's Role**

When conducting research studying social development of infants and
toddlers, the caregiver should be a central component of the physical environment
(Pellegrini, 2013). Social development relates to social interactions with others, and
the caregiver represents the primary source of social interactions during the first few
years of life (DiCarlo, Onwujuba, & Baumgartner, 2014). A child's primary caregiver
is likely to be ever present in a child's world even as the child's environment changes
(i.e., home, doctor's office, and playground). It is through interactions with the
caregiver that children learn about and experience their world (DiCarlo et al., 2014).
The caregiver-child relationship influences relationships between children and their
peers or other adults in their environment across their lifespan, and is especially
important in developing social behaviors in early childhood (Bronfenbrenner &
Morris, 2006). Therefore, when observing children within their natural contexts, the
caregiver should also be present to allow for a more accurate assessment of the
children's behaviors (Pellegrini, 1996). Little research has been conducted to evaluate
infants' and toddlers' social interactions in the home setting; therefore, this research
study further investigated this relationship.
The Relationship of Social Development to Communication and Cognitive Developmental Domains and Play Abilities

In order to understand social development, it is important to recognize that social development does not occur in isolation; social development is intertwined with other domains of development, specifically language and cognitive development. In addition, social development in early childhood frequently occurs within the context of play. Understanding the relationship among developmental domains illustrates the ways in which development in one domain influences development across other domains. Specifically, understanding development in language and cognitive development can help inform an understanding of social behaviors and how they emerge. Moreover, the interactions among domains can shed light on processes of how social development occurs across individuals and within various contexts.

Communication Development

According to a socio-interactionist approach, children begin to develop language through engagement in social interactions (Bloom & Lahey, 1978; O'Neil-Pirozzi, 2009). Communicative behaviors are behaviors exhibited during interactions with another person and include smiling, eye-gaze, and vocalizations (DiCarlo et al.,
Children learn how to communicate through these behaviors before they develop the ability to speak (Brandone, Golinkoff, & Salkind, 2006). Interactional synchrony describes the process through which mother-infant dyads share coordination in their communicative behaviors. Interactional synchrony involves a reciprocal interaction where a mother's actions are well-timed and appropriate in response to the infant's needs, and the infant is also able to move or share eye contact based on a mother's actions (DiCarlo et al., 2014).

It is through interactions with the caregiver that children learn how to appropriately communicate and use language in social situations (Brandone et al., 2006; Hymes, 1967). Specifically, children learn social conventions such as how to initiate, maintain, and conclude interactions with others. Hart and Risley (1995) illustrated the importance of early social interactions (i.e., talking to children) on language development. Through social interactions, caregivers play a critical role in shaping a child's communication development. For the purposes of the current study, it is important to identify the interrelatedness of social behaviors and communication behaviors.

**Cognitive Development**

Social development is also highly interrelated with cognitive development (Bugental & Grusec, 2006; Moriguchi, 2014). A child's cognitive and social abilities
vary with development. According to Piaget's theory, around 6- to 8-months-old, children begin to focus on events that are outside of their body as they begin to understand that objects and other people are separate from themselves (Snow & McGaha, 2003). At this point in development, children first begin to develop a sense of autonomy, which is a necessary component of developing the ability to engage in interactions with other people. As infants approach 12- to 18-months-old, they begin to understand that actions are a result of both their own behaviors as well the behaviors of others, indicating a relationship between cognitive and social abilities. By 24-months-old, children have developed symbolic representations, and they are able to imitate modeled information after a delay because they are able to remember experiences over time (Snow & McGaha, 2003).

Bandura's (1978) social cognitive theory emphasized that cognitive abilities determine not only what is observed in the environment, but also how those actions are perceived and interpreted. As children develop cognitively from focusing on perceptual elements of their environment to being able to cognitively represent and process ongoing events, they are also participating in more complex interactions with those in their environment. A child's cognitive abilities will determine whether or not what is observed is remembered across time or generalized to new situations. The ability to organize information and easily access this information in future situations
is also a component of cognition (Bandura, 1978). It is through cognitive processes that children internalize societal standards by observing others and learning how to behave (Bugental & Grusec, 2006).

Social cognitive theory emphasizes reciprocal determinism, which is a process through which a child can both influence and be influenced by the environment (Bandura, 1978). The caregiver is the child's primary source of social interactions in the first few years of life. Through reciprocal determinism and social interactions between the caregiver and the child, the caregiver will guide the child in developing increasingly more complex cognitive abilities such as the development of higher mental functions (i.e., symbolic representations) and the ability to internalize and learn through the behaviors observed during social interactions (Moriguchi, 2014). Vygotsky (1978) described cognitive development as consisting of a restructuring of understandings based on interactions in the environment. Through interactions with their caregivers, children's development is facilitated across both cognitive and social domains.

**Play Abilities**

Social behaviors have frequently been evaluated within a play context (Brown et al., 1996). Examining a child's behavior during play is one way to measure a child's social development because play is a naturally occurring, pervasive childhood
activity. Through play, children are able to engage with their environments and socialize with play partners as they learn about their world (Piaget, 1954; Vygotsky, 1978). One of the primary methods to measure social development in preschool-age children outside of the laboratory environment has been to observe children playing with their peers within a preschool setting (Brown et al., 1996). However, some researchers have argued that play with peers does not represent an appropriate method to measure social interactions in infants and toddlers because the caregiver is the primary source of social interactions in very early childhood (Lloyd, 2010; Pellegrini, 2013). To observe social behaviors of infants and toddlers, researchers should observe the caregiver-child interactions rather than peer interactions (DiCarlo et al., 2014).

When assessing child development, it has been recommended that assessment occur during daily activities and interactions (Washington Office of Superintendent of Public Instruction, 2008). The play setting provides a natural environment to observe social interactions between the child and the caregiver. Play provides the means through which children can engage with their caregivers and learn about the world around them (Vygotsky, 1978). Bronfenbrenner and Morris (2006) stated that development occurs through progressively more complex interactions over extended periods of time. Play provides a setting where caregivers can facilitate social learning
by participating in reciprocal interactions at the child's developmental level (DiCarlo et al., 2014), making play with their caregiver an optimal setting to observe a child's social behaviors.

**Importance of Social, Cognitive, and Communication Development, and Play Abilities**

It is important to understand the relationship among social, cognitive, and communication development and play abilities because providing interventions in one area of development may lead to improvements across additional developmental domains. Providing preventative social supports, such as social skills training, in preschool or elementary school classrooms may lead to a decrease in deficits in other developmental domains such as cognitive and emotional development (Cohen & Spenciner, 1994; Cook et al., 2008). Therefore, the present study sought to explore what social behaviors are displayed in an early childhood play setting and how these behaviors are related to language and cognitive development as well as play abilities, as identification of these behaviors could lead to play interventions that could affect social, cognitive, and communication development.

**Exploring Social Behavior in Early Childhood**

Because there was not already an established observation system available to observe social behavior in early childhood, the purpose of the present descriptive
study was to explore what social behaviors are displayed in infants (i.e., 12-month-old children) and toddlers (i.e., 24- and 36-month-old children) during natural interactions with their caregivers. First, social behaviors were identified through a literature search. Then, video recordings of children and their caregivers during a naturalistic play observation were observed and new behaviors were identified, all the behaviors were placed into categories, and operational definitions of the social behavior categories were developed through an iterative process. A description of the Project Play Database, the database from which the video recordings for the present study were collected, is discussed below followed by the research questions developed.

**Project Play Database**

Participants for the current study were selected from the Project Play database, which consisted of videotaped recordings of children with and without delays and disabilities at 8 months through 60 months collected over five years. The Project Play database included several measures such as the Developmental Play Assessment (DPA; Lifter, 2000), the Battelle Developmental Inventory-Second Edition-Screening Test (BDI-2-ST; Newborg, 2005), the Vineland Adaptive Behavior Scales, Second Edition (Vineland-II; Sparrow, Cicchetti, & Balla, 2005), and information about family background and everyday activities.
The DPA consisted of a 30-minute video recorded observation of a child and a caregiver playing with four different sets of toys. Approximately every 7 minutes the pair was presented with a new toy set. This assessment measured child initiated play behaviors as the caregiver was instructed to respond to the child's play rather than lead or direct the behavior. The observations were conducted in a naturalistic, familiar environment (i.e., the home or the childcare center). This naturalistic setting with the child and caregiver provided a setting where social behaviors could be observed in young children and their caregivers. Therefore, these video recordings were used to help explore instances of social behaviors that emerge in early childhood.

The BDI-2-ST was administered to evaluate development across the five early childhood developmental domains: adaptive, motor, communication, cognitive, and personal-social abilities. The screening test included observations, caregiver interview questions, and structured tasks. A cut-score was provided for each domain. Children whose score was below the cut-score may be at-risk for a developmental delay, and further assessment in that area of development was recommended.

The Vineland-II was administered as an interview with the caregiver to better understand a child's personal and social skills used in everyday living. The Vineland-II consists of four domains, Communication, Daily Living Skills, Socialization, and Motor Skills that are combined to create an overall Adaptive Behavior Composite.
score. This score can be used to identify children who may be at-risk for difficulties in everyday functioning.

Two additional rating scales were available in the Project Play database and were created for the Project Play research study: Child Family Background Form and Child Family Activities Form. These demographic forms provided information about the child's development (i.e., birth weight, history of early intervention services), family background (i.e., family income, number of caregivers and children living in the home), and everyday activities (i.e., types of toys in the home, number of hours spent watching television). These additional assessments provided information that could be compared with the social behaviors identified through the descriptive research.

**Research Questions**

The purpose of this descriptive study was to explore what social behaviors are displayed in early childhood, given that most methods for examining social behavior rely on elicited behaviors. Because of the importance of the child-caregiver relationship in developing social interactions, a secondary research question evaluated the relationships between the child social behaviors and caregiver social behaviors. Finally, the relationships of the identified social categories to measures of social, cognitive, communication, and play development available in the Project Play
database were evaluated. Below are the specific research questions that were explored. Hypotheses for each research question are presented at the end of Chapter 2.

**Research Question 1**

What observable social behaviors can be identified in 12-, 24-, and 36-month old children during a 14-minute sample of play occurring in a natural environment?

**Research Question 2**

Are there differences in the proportion of categories of social behaviors (as determined by analyses in Research Question 1) displayed among 12-, 24-, and 36-month old children?

**Research Question 3**

Is there a positive correlation between the child and the caregiver social behavior categories (as determined by analyses in Research Question 1)?

**Research Question 4**

Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and other related measures in the Project Play Database?
**Research Question 4a.** Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and the Personal-Social domain score on the BDI-2-ST?

**Research Question 4b.** Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and the Cognitive domain score on the BDI-2-ST?

**Research Question 4c.** Is there a positive correlation categories of social behaviors (as determined by Research Question 1) and the Communication domain score on the BDI-2-ST?

**Research Question 4d.** Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and the play score on the DPA?
Chapter Two

This chapter begins with a review of two perspectives that inform this study's understanding of social development. A review of the literature is then presented, describing how social behavior in early childhood is currently measured. Next, four specific observation systems that were identified during the literature review are examined closely; the items, strengths, and weaknesses of each system are presented. Next, the rationale for the development of a descriptive study to examine social behavior in early childhood is discussed. Finally, using evidence from the literature, hypotheses are presented for each of the research questions presented in Chapter 1.

Perspectives of Social Development

In order to better understand social development, it is important to evaluate the theories and models that describe how social behaviors develop. Bronfenbrenner's bioecological model (Bronfenbrenner & Morris, 2006) and Bandura’s social cognitive theory (Bandura, 1989) are the two primary perspectives used in this paper to guide the understanding of social development. These approaches help explain how the interaction between social and cognitive abilities influences the way in which children process, understand, and learn from their environments.
Bronfenbrenner’s Bioecological Model

Background. Bronfenbrenner’s model has evolved from an ecological model that emphasized the importance of the environment in shaping human development (1977) to a bioecological model that is future oriented and focuses more on processes and the importance of the person in shaping development (Bronfenbrenner & Morris, 2006). The bioecological model includes four specific components: Process, Person, Context, and Time. Process refers to the interactions, across time, between the individual and the environment. Bronfenbrenner and Morris (2006) described proximal processes as the processes of progressively more complex reciprocal interactions with people and objects in a child's environment, and the primary mechanisms through which development occurs. The effects proximal processes have on human development vary as a function of the Person, Context, and Time. Person characteristics include dispositions, resources (e.g., knowledge, experience, skill), and demand characteristics (i.e., whether or not the individual invites or discourages reactions from the environment). Contexts represent the immediate and more removed environmental contexts that influence development. Time refers to different time periods in which development occurs across generations and throughout different historical periods.
Bronfenbrenner and Morris (2006) continued to utilize Bronfenbrenner's (1977) systems level approach to describing how these four processes shape human development. Specifically, development does not occur in isolation, but is influenced by a nested arrangement of systems: the microsystem, the mesosystem, the exosystem, and the macrosystem (Bronfenbrenner, 1977). The microsystem represents the interactions between an individual and the immediate environmental context (e.g., home, school, work). The mesosystem is comprised of the interactions among several microsystems (e.g., interactions between home and school). The exosystem includes major institutions of society, such as neighborhoods, churches, agencies of government, and social networks. The final system in Bronfenbrenner's 1977 model is the macrosystem, which represents the culture or subculture including the social, educational, legal, and political systems. Bronfenbrenner and Morris (2006) include an additional system in their model, the chronosystem, which refers to changes that occur across time.

In summary, the bioecological approach emphasizes that an individual exists within broader subsystems (i.e., schools, families, communities, cultures) that interact with each other. The interactions among these subsystems, the individual characteristics of the person, and the frequency and stability of interactions across time influence how individuals interpret and respond to experiences in their
environment (Bronfenbrenner & Morris, 2006). Specifically, the bioecological model defines development as "stability and change in the biopsychological characteristics of human beings over the life course and across generations" (p. 796; Bronfenbrenner & Morris, 2006).

**Approach to Social Development.** The bioecological model can be applied to social development by exploring the interactive relationships among Process, Person, Context, and Time within the various subsystems. Bronfenbrenner and Morris (2006) described that development occurs through "processes of progressively more complex reciprocal interaction between an . . . organism and the person, objects, and symbols in its immediate external environment" (p. 797). Since the 1980s, Bronfenbrenner has posited that more than two people are involved in the ecology of development and there is a reciprocal relationship where children influence individuals who influence them (Bronfenbrenner, 1980). Based on this perspective, children are active participants in their development. They are both influenced by their immediate environment and influence their environment through Person characteristics (i.e., their dispositions, knowledge, and experience). Each child's knowledge and experience will impact how the child interacts with others in the environment, making the child an active participant in the process of development.
**Microsystem.** According to the bioecological model, at the microsystem level, children's experiences will vary based on their individual characteristics (Person characteristics), opportunities to engage in social interactions (microtime), and their immediate environments (Context; Bronfenbrenner & Morris, 2006). Person characteristics include factors such as motivation, skill, knowledge, ability, and other biologically-based processes and characteristics, such as race, age, and gender. Children exposed to similar social interactions in the home environment may develop different social skills based on their internal characteristics (e.g., extrovert versus introvert), suggesting the importance of Person characteristics for development.

Microtime refers to the extent to which proximal processes are continued across time or are discontinued. Bronfenbrenner and Morris (2006) posited that social interactions must occur on a regular basis, for a long enough period of time, in order to influence development. Specifically, they proposed that, for young children, the caregiver is the person with whom children will interact most regularly across extended periods of time. For any specific interaction, if the social interactions do not continue to occur, Bronfenbrenner and Morris (2006) proposed that development in that interaction could slow or potentially reverse direction.

Context refers to environmental characteristics that the child is born into, such as family characteristics. The number of siblings, divorce or single-caregiver homes,
maternal responsiveness, and socioeconomic status are microsystem contextual factors that may affect the social development of children (Bronfenbrenner & Morris, 2006; Greenberg, 1999). A child first develops in the context of the close relationship with the primary caregiver and the quality of this interaction influences the child's future interactions with the caregiver and with others in the environment (Shaffer, 2010).

As children grow, they are capable of progressively more complex interactions within their microsystem (i.e., their family, school, and peer group contexts; Bronfenbrenner, 1980). Specifically, children will begin to develop relationships with other individuals in their family system and peers and teachers in their school environment. The initial social interactions that children have with their primary caregivers provide a foundation for how these behaviors will emerge and develop with other individuals in new contexts.

**Summary.** For the purposes of the present study, the focus was on the child’s microsystem and, most specifically, the interactions between the child and the primary caregiver. This exploration included an evaluation of the characteristics of the primary caregiver. Therefore, two variables that are related to socioeconomic status – family income and caregiver education – were included in the present study.
Bandura’s Social Cognitive Theory

Social cognitive theory is central to understanding social development. According to this theory, social development occurs through a triadic relationship among behavior, cognition, and the environment (Bandura, 1989). Social cognitive theory incorporates and expands upon social learning theory. Social learning theory posits that individuals learn through observing others and then imitating their actions (Shaffer, 2010). Bandura emphasized that observational learning (a) is not unidirectional and (b) cannot occur unless cognitive processes are involved: cognition helps mediate learning (Bandura & Barab, 1971). Specifically, Bandura (1978) described reciprocal determinism, or the process through which a child can both influence and be influenced by the environment as the process through which development occurs.

Intermediary cognitive processes also play a critical role in social cognitive theory. Cognitive abilities will determine not only what is observed in the environment, but also how those actions are perceived, if they will have lasting effects, how they will be organized for future reference, and their valence and efficacy (Bandura, 1978). A child's cognitive abilities will determine whether or not the observation is remembered across time or generalized to new situations. The ability to organize information and easily access this information in future situations
are also components of cognition (Bandura, 1978). It is through mutual social interactions with others in the environment that children are afforded opportunities to process and remember societal standards by observing others and learning how to behave (Bugental & Grusec, 2006).

A key aspect of social cognitive theory is that children's behavior is not just determined by the environment (i.e., through observing others), but that children also influence their own environment. The process of reciprocal determinism highlights how children are active participants in shaping their own environments. Whether or not a child learns through observing others is influenced by cognitive processes including how expected outcomes (i.e., rewards and punishers), which can be internal (e.g., self-regulation) or external (e.g., praise), are perceived as well as the environment in which learning takes place (Bandura, 1989).

**Integrating Bandura’s Social Cognitive Theory with Bronfenbrenner's Model**

Social cognitive theory emphasizes reciprocal determinism, which is a process through which a child can both influence and be influenced by the environment (Bandura, 1978). The bioecological model posits that characteristics of the person, such as ability, experience, knowledge, skill, and demand characteristics will encourage or disrupt reactions from the environment (Bronfenbrenner & Morris, 2006). Therefore, cognitive processes in social cognitive theory, such as perceived
outcomes, and a child's knowledge, abilities, and skills, are represented as Person characteristics in the bioecological model. It is through cognitive processes, or Person characteristics perception that children influence their environment. Two children in the same environment may perceive the environment differently based on their personal characteristics, which in turn could lead to children exhibiting different behaviors in the same environmental context.

Social cognitive theory emphasizes the importance of the environment in the triadic relationship among cognition, behavior, and the environment. By applying the bioecological model, at the microsystem level, a child first develops in the context of the close relationship with the primary caregiver. Both social cognitive theory and the bioecological model emphasize the importance of continuous reciprocal interactions (Bandura, 1978) or interactions that occur frequently and over a period of time (Bronfenbrenner & Morris, 2006). Integrating this within the context of the relationship with the primary caregiver, a child who observes a caregiver display a behavior repeatedly (i.e., smiling, talking) and cognitively internalizes the importance of this behavior through Person characteristics (and cognitive ability) may begin to display this behavior more frequently, which will lead to remembering. Social cognitive theory emphasizes the importance of a reciprocal relationship between behavior and the environment. A child's behavior (i.e., smiling back at the caregiver)
will have an influence on the environment (i.e., the caregiver will smile again or laugh in response to the child); therefore, the multiple opportunities to engage in that behavior are directly influenced by the child's behavior.

According to the bioecological model, observing the behaviors of others does not necessarily lead to learning if the interaction is not reciprocal or if the child does not have the motivation, ability, or knowledge to learn (i.e., the Person characteristics; Bronfenbrenner & Morris, 2006). As such, the cognitive component of social cognitive theory is critical to learning. Children must acknowledge (i.e., social behavior) the importance of social interactions. They must also internalize (i.e., cognitive process) and engage (i.e., social behavior) in mutual reciprocal interactions with the caregiver in order to develop social abilities (Bandura, 1978). A child's ability to learn and develop social behaviors may be affected by multiple factors, specifically the interaction among social interactions within the microsystem (i.e., reciprocal determinism), Person characteristics including cognitive abilities, and the environmental context in which learning occurs (Bandura, 1991; Bronfenbrenner & Morris, 2006).

**Integrating Theory into the Definition of Social Behavior**

Based on the integration of the bioecological model and social cognitive theory, the process of *how* development occurs is dependent on the child's
microsystem, Person characteristics, the reciprocal interactions between children and their caregivers, and time in the process of learning (Bandura, 1991; Bronfenbrenner & Morris, 2006). It is still important to review what social behavior looks like as it develops. Bugental and Grusec (2006) described that social behaviors occur within the context of relatedness to others. The definition of social behavior that was developed in Chapter 1 for this study is "an interaction between or among people, which can range from simply acknowledging the presence of another to engaging in shared activities." According to social cognitive theory, and this definition, an early emerging social behavior is observation of others (Bandura & Barab, 1971).

The definition of social development developed in Chapter 1 is "the continuity and change in social behaviors that occur across time and among people." Therefore, it is important to understand what happens after a child observes another individual. Around 6- to 8-months-old, children first begin to develop a sense of autonomy, which is a necessary component of developing the ability to engage in interactions with other people. As infants approach 12- to 18-months-old, they begin to understand that actions are a result of both their own behaviors as well the behaviors of others. By 24-months-old, children are able to imitate modeled information after a delay because they are able to remember experiences over time (Snow & McGaha, 2003).
Through interactions with others, infants, children, and adolescents acquire the skills necessary to independently make decisions (Bugental & Grusec, 2006). Therefore, interactions with others help individuals develop independence and autonomy (i.e., Person characteristics according to the bioecological model; Bronfenbrenner & Morris, 2006). Autonomy is influenced by an individual's ability to remember (i.e., cognitive component of social cognitive theory; Bandura, 1991).

Caregivers try to teach children what is acceptable behavior by modeling appropriate behavior and then hope that their children's autonomous or self-directed behavior will represent this appropriate behavior (Bugental & Grusec, 2006). Of particular importance to social cognitive theory is reciprocal determinism, where the child will influence the caregiver's social behavior and the caregiver will influence the child's social behaviors (Bandura, 1989). Therefore, a secondary level of social behavior is participating in social interactions with another (the caregiver).

**Measuring Social Development**

According to social cognitive theory and Bronfenbrenner's bioecological model, social learning takes place within the context of a child's environment (Bandura, 1991; Bronfenbrenner & Morris, 2006). Interactions with caregivers represent the primary source of social interactions during the first few years of life.
(DiCarlo et al., 2014). Therefore, any examination of social behaviors in young children should occur within a child's natural environment with the caregiver present.

Studies of social development, and certainly evaluations and measurements of social development, often have been conducted in a laboratory setting where specific behaviors are elicited based on contrived experimental conditions (Pellegrini, 2013). In contrast, research that occurs in the natural setting allows the child to display a broader range of skills and provides a better estimate of the child's actual abilities (Cohen & Spenciner, 1994; Linder, 1993; Pellegrini, 1996, 2013; Pellegrini & Perlmutter, 1989).

Although an assessment in a child's natural setting with the caregiver present represents best practices for observing social behavior, it is important to understand how social behavior is actually measured in the literature. In order to determine how social development is measured, two literature searches, presented below, were conducted to determine how social development is evaluated. The purpose of the first search was to gain a better understanding of the most common assessments that are used to measure social behaviors in early childhood. The results of this search indicated that caregiver report was the primary method used. A description of specific measurement systems identified is presented, and the limitations of caregiver report are discussed. The second literature review evaluated the literature for assessments
that measured child behavior through direct observation. The specific types of measurement systems that were identified to observe social behaviors are discussed. Specifically, a description of four assessments that observed both child and caregiver behavior is presented. Finally, the limitations of the current assessment systems are discussed.

The Initial Literature Search: Assessment of Social Behavior

For the purposes of the current study, it is important to determine the way in which researchers have isolated and measured social behaviors, specifically in early childhood. Accordingly, the developmental, special education, school psychology, and early childhood literature were reviewed by searching the following databases (PsycInfo, PsycArticles, ProQuest Dissertations: Social Sciences, ERIC, and Psychology and Behavioral Sciences Collection). The keywords "social behavior, assessment, and early childhood" were used to identify how social behavior is assessed in young children. This search resulted in 1,961 articles. The abstracts of the articles were reviewed to identify articles that included an assessment of social behavior. Because there are many ways to measure development (i.e., cognitive, social, language), articles were excluded if they did not mention assessment of social behavior in the abstract. In addition, articles were excluded if they studied children older than 60-months-old because the purpose of this search was to identify
assessments for infants and toddlers. Finally, because the goal was to identify assessment measures of young children, articles were excluded if they did not measure child behaviors (i.e., measured social behaviors of caregivers or monkeys).

The identified articles were reviewed for specific measures of social behavior. Of the original 1,961 articles, 852 articles evaluated social behaviors. Based on these 852 articles, 30 measures were identified to assess social behaviors in early childhood (see Table 2). Of these 30 measures, 16 assessments were identified that measure social behavior through rating scales completed by a caregiver or a teacher. The remaining 14 instruments were developmental inventories that measure social development in addition to other areas of development (e.g., cognitive or language development.

Of the 30 measures, 16 measures identified in the literature search were rating scales, suggesting that currently, social development of young children is primarily assessed through caregiver or teacher report (Elliott et al., 2008; Severson et al., 2007). These rating scales are used to assess social behavior by having a child's caregiver or preschool teacher rate a series of behaviors on a Likert scale based on how frequently the child exhibits that behavior and include: the Ages and Stages Questionnaire: Social Emotional (ASQ: SE; Squires & Bricker, 2009; Squires, Bricker, & Twombly, 2002), the Infant Toddler Social and Emotional Assessment
(ITSEA; Carter & Briggs-Gowan, 2006), and the Devereux Early Childhood Assessment for Infants and Toddlers (DECA-IT; Mackrain, LeBuffe, & Powell, 2007). A complete list of the 16 scales identified through the literature search is presented in Table 2.

The remaining 14 of the 30 measures identified through the first literature search were developmental inventories, which assess development in early childhood across a range of domains including, but not limited to, social development. These developmental inventories provide individual domain scores in addition to a total score to provide an estimate of a child's overall developmental profile. Similar to rating scales, caregiver report is the primary method used to assess social behaviors on the social domains of developmental inventories such as the Battelle Developmental Inventory (BDI; Newborg, 2005) and the Bayley Scales of Infant and Toddler Development (Bayley, 1969, 2006). See Table 2 for a detailed list of the 14 developmental inventories that were identified based on the literature search.
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<th>Measures</th>
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<td>(Bruininks, Woodcock, Weatherman, &amp; Hill, 1996)</td>
</tr>
<tr>
<td>Social Skills Improvement System</td>
<td>SSIS</td>
<td>3:0-18:0</td>
<td>(Gresham &amp; Elliott, 2008)</td>
</tr>
<tr>
<td>Vineland Adaptive Behavior Scales, Second Edition</td>
<td>Vineland-II</td>
<td>0:0-90</td>
<td>(Sparrow et al., 2005)</td>
</tr>
</tbody>
</table>

*Developmental Inventories Completed by Practitioners*

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Scale</th>
<th>Age Range</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment, Evaluation, and Programming System, 2nd Ed.</td>
<td>AEPS</td>
<td>0:0-6:0</td>
<td>(Bricker, Petti-Frontczak, Johnson, &amp; Straka, 2002)</td>
</tr>
<tr>
<td>Battelle Developmental Inventory, 2nd Ed.</td>
<td>BDI-2</td>
<td>0:0-7:11</td>
<td>(Newborg, 2005)</td>
</tr>
<tr>
<td>Bracken Basic Concept Scale-Revised</td>
<td>BBCS-R</td>
<td>2:6-8:0</td>
<td>(Bracken, 1998)</td>
</tr>
<tr>
<td>Brigance Diagnostic Inventory of Early Development II</td>
<td>IED-III</td>
<td>0:0-7:0</td>
<td>(Glascoe, 2013)</td>
</tr>
</tbody>
</table>
**Limitations of caregiver and teacher report.** Caregiver or teacher report is the primary method used to assess social behaviors both on rating scales and on the social domains of developmental inventories. Caregiver or teacher report requires respondents to rate their perception of the child's behavior. Despite the frequency with which caregiver report is used to assess social development, there are many limitations to evaluating social behavior through this method. Each of these limitations is discussed more thoroughly below.

<table>
<thead>
<tr>
<th>Tool Name</th>
<th>Code</th>
<th>Age Range</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental Assessment of Young Children-Second Ed.</td>
<td>DAYC-2</td>
<td>0:0-5:11</td>
<td>(Voress &amp; Maddox, 2013)</td>
</tr>
<tr>
<td>FirstSTEp: Screening Test for Evaluating Preschoolers</td>
<td>FirstSTEp</td>
<td>2:9-6:2</td>
<td>(Miller, 1993)</td>
</tr>
<tr>
<td>Hawaii Early Learning Profile</td>
<td>HELP</td>
<td>0:0-3:0</td>
<td>(Parks, 2006)</td>
</tr>
<tr>
<td>Individual Growth and Development Indicators for Infants and Toddlers</td>
<td>IGDI</td>
<td>0:0-3:0</td>
<td>(Carta, Greenwood, Walker, &amp; Buzhardt, 2003)</td>
</tr>
<tr>
<td>Infant - Toddler Developmental Assessment [IDA]</td>
<td></td>
<td>0:0-3:0</td>
<td>(Provence, Erikson, Vater, &amp; Palmeri, 1995)</td>
</tr>
<tr>
<td>Merrill-Palmer-Revised Scales of Development</td>
<td>M-P-R</td>
<td>0:0-6:6</td>
<td>(Roid &amp; Sampers, 2004)</td>
</tr>
<tr>
<td>Ounce Scale</td>
<td></td>
<td>0:0-3:6</td>
<td>(Meisels, Marsden, &amp; Dombro, 2003)</td>
</tr>
<tr>
<td>Toddler and Infant Motor Evaluation</td>
<td>TIME</td>
<td>0:0-3:6</td>
<td>(Miller &amp; Roid, 1994)</td>
</tr>
<tr>
<td>Transdisciplinary Play Based Assessment, Second Edition</td>
<td>TPBA 2</td>
<td>0:0-6:0</td>
<td>(Linder, 1993, 2008)</td>
</tr>
</tbody>
</table>
**Subjectivity.** One significant limitation of caregiver or teacher report is the ratings are subjective rather than objective. Some questions ask: "compared to other children his/her age, does your child . . ." These types of questions may be difficult to answer, especially if the question refers to the caregiver's first child, as a caregiver may not know what is typical for other children that age (Cohen & Spenciner, 1994). In addition, there may be some questions that can be interpreted differently based on a caregiver's interpretation of the question, such as on the BDI-2-ST, "Follows adult directions with little or no resistance" (Newborg, 2005). Caregivers of infants may not ask their child to follow directions. Some caregivers may respond "yes", assuming that the child would follow directions the caregiver were to give them, whereas other caregivers may respond "no" as there is no opportunity for the child to demonstrate this skill in the environment (Andreassen & Fletcher, 2007). Another problem with caregiver report is the caregivers may embellish their answers, stating the behavior that they think the researcher is looking for, rather than reporting what they actually observe in the environment (Cooper et al., 2006).

For children who do attend childcare centers, teachers may have just as much bias in their responses as caregivers. For instance, a teacher may have a negative impression of a child who is overly active and requires frequent redirection. As a result of these hyperactive behaviors, the teacher may incorrectly report that the child
does not have any friends or that the child responds inappropriately to adult attention (McGoey, Eckert, & DuPaul, 2002). The inappropriate behavior may be the teacher's perception of the child's ability to sit still, rather than the teacher's perception of the child's social abilities. Therefore, the primary limitation when relying solely on caregiver or teacher reports is the likely bias based on the rater and the resulting difficulty in determining a child's true social ability (Andreassen & Fletcher, 2007; Cohen & Spenciner, 1994).

_Do not measure continuum of behaviors._ The biggest disadvantage of rating scales and norm-referenced inventories currently available is that the items do not represent social development as a construct. Some of these instruments identify "developmental milestones" such as smiling or recognizing oneself in the mirror; however, these individual behaviors do not represent a sequence of progressively more complex behaviors that develop through interactions with others in the environment. A more cohesive developmental sequence of social behaviors is needed to add to the literature and provide helpful information for children identified with delays and disabilities (Bronfenbrenner & Morris, 2006).

The Carolina Curriculum for Infants and Toddlers with Special Needs (CCITSN; Johnson-Martin et al., 2005; Johnson-Martin et al., 1991) and the Hawaii Early Learning Profile (HELP; Parks, 2006) are both criterion referenced instruments
that measure a range of developmental abilities. The goal of these measures is to
directly link intervention curriculum activities to the items in the assessment. Similar
developmental skills (e.g., social behaviors), however, are not necessarily grouped
together in a logical developmental sequence. For instance, a series of behaviors that
all emerge at approximately the same age are grouped together (measure a child's
ability to smile, look in the mirror, and respond to the child's own name). This creates
several groups of behaviors that all occur at approximately the same time in
development, but these grouped behaviors do not provide information about how each
behavior is related to behaviors that occur at younger or older ages (Cohen &
Spenciner, 1994). There is no information regarding the way that behaviors can build
upon one another or be used to represent a sequence of progressively more complex
behaviors across development. If items were grouped together based on a continuum
of related social behaviors, a child's current abilities could be assessed. This method
would allow for the provision of an intervention centered on the behavior that should
occur next based on the identified developmental sequence (Cohen & Spenciner,
1994).

*Problematic for children with developmental delays.* Current measurement
systems are problematic because, if a child is identified as at-risk for or as having a
developmental delay, further assessment is typically needed to identify appropriate
intervention targets (Elliott et al., 2008). The Social Skills Improvement System (Gresham & Elliott, 2008) was designed to provide a link between assessment and intervention; however, it is for children preschool age (3 years) and above, and does not provide assessment of infant and toddler social abilities. In addition, this system asks caregivers and teachers to rate pro-social behaviors that the child may or may not display. Intervention targets are selected based on the caregiver's report of what behavior is most concerning rather than on an understanding of the developmental sequence of behaviors (Gresham & Elliott, 2008). It is necessary to explore what social behaviors are actually exhibited by infants and toddlers during an observation in a natural setting. After identifying what behaviors are displayed, further studies can evaluate a sequence of social behaviors that occur throughout development. This sequence could be used for children identified with delays or disabilities to identify the children's current social behaviors and determine appropriate intervention targets based on their actual observed abilities.

The Second Literature Search: Direct Observation of Social Behaviors

When assessing young children, researchers recommend conducting a multimethod assessment (Elliott et al., 2008; Severson et al., 2007), including collecting direct observation of children’s behaviors in addition to caregiver ratings. Direct observation of behavior helps to reduce potential biases presented in caregiver
report (Andreassen & Fletcher, 2007). However, specific observation systems of social development were not identified through the initial literature search. Therefore, a second literature search was conducted to identify direct observation scales available in the developmental, special education, school psychology, and early childhood literature by searching the following databases (PsycInfo, PsycArticles, ProQuest Dissertations: Social Sciences, ERIC, and Psychology and Behavioral Sciences Collection) using the keywords "social behavior, observation, and early childhood" and "social behavior, observation and infant." Similar to the previous literature search, the abstracts of the articles were reviewed to determine papers that observed a child's social behavior. Papers were excluded if they measured caregiver behavior only or measured behavior of children older than five years old. Papers were also excluded if they did not measure social behavior, such as papers that only observed hyperactive behavior. Of the 128 articles identified in the search, 26 met the inclusion criteria. These 26 identified articles were examined. Articles referenced within these articles were also identified and those articles were reviewed to identify any additional observation measures. Four additional articles were identified. Because the goal was to identify observation systems that could be replicated for this study, only articles that used a systematic observation system (e.g., the authors used a form that observers completed to record data) were included in the analyses below. Ten
articles were excluded because they described observing social behavior, but did not describe systematically how behavior was observed and recorded during the observation.

Based on the literature search, 20 articles used systematic, direct observation to measure social behaviors. The results of the literature reviews are presented below. First, the three primary methods that were identified to observe social behaviors are discussed: Likert scales, frequency count, and interval recording. Next, the two methods of measuring caregiver-child interactions are discussed. Finally, the 16 articles, which measured peer-peer interactions, are presented. Four specific observation systems that were the most prominent in the literature review are described in depth, including the advantages and disadvantages of each system.

**Methods of observing behavior.** Three primary methods were identified in the literature to systematically observe social behaviors: Likert scales, frequency count, and interval recording. Likert scales have been used to assess different dimensions of social behavior, such as social interest and wariness (e.g., Baggett et al., 2010; Frosch, 1997; Penela, Henderson, Hane, Ghera, & Fox, 2012). In these studies, a child was observed for a pre-determined amount of time. At the end of the observation, an observer completed a Likert scale based on an estimation of how frequently social behaviors were observed. Some of the Likert scales observed single
behaviors, such as infant attention/arousal, warmth seeking, and behavioral regulation (Baggett et al., 2010). Other scales included dimensions of behavior (pro-social, aggressive, shy/withdrawn, and disruptive behaviors) that were created by combining the ratings of multiple items (Frosch, 1997). These latter observations were subjective because the observer was responsible for observing multiple behaviors and then classifying these behaviors into predetermined dimensions after the observation. This subjectivity could lead to bias because of the recency effect; if a child does not exhibit social interactions during the first 4-minutes of a 5-minutes observation, but engages in a complex game during the last minute, the child's behavior may be rated as highly engaged for the entire observation instead of engaged for only 20% of the observation. Likert scale ratings completed after the observation are more difficult to establish reliability between raters for measures of behavior (Briesch & Chafouleas, 2009).

A second method of observing social behavior was to tally behaviors using a frequency count, where every instance of a social behavior was recorded during a given observation (e.g., Barbu, 2003; Lau, Higgins, Gelfer, Hong, & Miller, 2005). Examples of behaviors included: approaches, contacts, withdrawals, facial expressions, gazes, imitations, gestures, and verbal utterances (Barbu, 2003). For this method, the researchers identified specific behaviors to observe and recorded each
instance of that behavior. The researchers did not describe how they identified the behaviors to observe; therefore, there was no way to know if these behaviors were representative of social behaviors from previous research. The strength of this approach is that every instance of behavior is recorded, so it provides an accurate assessment of the child's behavior. This approach works well for discrete behaviors; however, for behaviors that do not have a clear beginning and end it is difficult to record behavior using this approach.

The third method used to assess social behaviors was interval recording, where a given observation was divided into intervals and behavior was recorded if it occurred during the interval. Whole interval records behavior that occurs throughout the entire interval (Cooper et al., 2006). If the interval is 10-seconds long, the behavior must occur for the entire 10-seconds to be counted. Whole interval recording is recommended to observe behavior that occurs continuously for long durations of time (e.g., a tantrum), as it can underestimate the occurrence of discrete behaviors. Partial interval recording is when the behavior is recorded if it occurs anytime in a given interval (Cooper et al., 2006). This recording system is useful for discrete behaviors that do not occur too frequently as it can overestimate the actual occurrence of behavior. Finally, momentary time sampling records behavior if it occurs exactly at the end of each interval. For a 10-second interval, the behavior has
to occur at the end of the 10-seconds to be recorded. This system is useful for discrete behaviors that occur frequently, but not continuously. Similar to whole interval, if the behavior does not occur frequently, it can underestimate behavior (Cooper et al., 2006). The majority of the articles reviewed used interval recording to record behavior. For these types of recordings, a sample of social behavior was recorded to give an estimate of overall behavior (e.g., Henderson, Fox, & Rubin, 2001; McConnell & Odom, 1999; Stoneman & Brody, 1993). In these studies, social behaviors between a child and peers, such as responses to social initiation and continued social interactions, were recorded across play sessions (McConnell & Odom, 1999; Rubin, 2001). Many of the researchers did not describe how they identified the behaviors to observe; therefore, there was no way to know if these behaviors were representative of social behaviors from previous research.

**Caregiver-child interactions.** Because of the reciprocal influence of caregiver-child interactions (Bronfenbrenner & Morris, 2006) and the caregiver's role in providing learning opportunities for young children (DiCarlo et al., 2014), observing the caregiver behavior is critical to understanding the opportunities available in the environment for a child to develop (Thomas, 1998). Of the 20 articles identified as providing measures of direct observation of social behaviors during the
literature search, only two methods were identified which measured the behaviors of both children and their caregivers.

The first method was described in an article examining mother-child interactions with a sample of 2-year-old children identified with Down syndrome (Crawley & Spiker, 1983). Observers used a 5-point Likert scale to record behaviors. Specifically, they watched 10-minutes of a videotape twice and recorded their ratings after the second time they watched the tape. The observers coded six caregiver behaviors (i.e., directiveness, mood, sensitivity, stimulation value, mother appeal, and elaborativeness) and ten child behaviors (play maturity, social initiative, social responsivity, interest, object initiative, positive affect, negative affect, locomotion, child appeal and animation). Four mother behaviors were also rated dichotomously (i.e., pacing, developmental appropriateness, readability, and intrusiveness), and one measure "mutuality" was coded along a 5-point scale to determine the degree to which the child and the caregiver shared the same intentions (Crawley & Spiker, 1983). This measure was important because it addressed the reciprocal nature of caregiver-child interactions. However, it was subjectively rated along on a 5-point Likert scale after watching a videotape. A more accurate method would be to record the exact caregiver and child behaviors as they were observed to determine if they were in fact "mutual" or reciprocal in nature.
The second method measured caregiver behavior and child responsiveness to caregiver behavior after a 30- to 60-minute naturalistic observation (Baggett et al., 2010; Landry et al., 1997; Landry, Smith, & Swank, 2006). Caregivers' behavior was measured using both a frequency count during the observation (i.e., number of attention-directed and restrictive behaviors) and a 5-point rating scale after the observation (i.e., positive affect, warm responsiveness, flexibility, verbal content, and physical intrusiveness). Children's behavior was recorded as responsiveness to their mothers' attention-directing behaviors (i.e., gestures, affect, eye gaze, and vocalization/words) as well as through child-initiated behavior (Landry et al., 1997). Child behaviors were recorded using a 5-point weighted scale in which behaviors that were thought to emerge early in development were given 1-point (e.g., eye gaze), and more complex behaviors were given more points (e.g., compliance with a caregiver's instructions was given 3-points). Both caregiver and child behavior categories were developed based on previous research measuring social behaviors.

The purpose of this measure was to evaluate a child's responsiveness to a caregiver's social interactions. Therefore, these researchers recorded caregiver-child interactions unidirectionally (i.e., what was the caregiver's behavior and how did the child respond). Reciprocal relationships or behaviors between children and caregivers were not recorded. More research is necessary to evaluate the reciprocal nature of
caregiver-child interactions instead of just the unidirectional effects of the caregivers' interactions on child behavior.

**Peer-peer interactions.** Sixteen articles identified in the second literature search were observation systems that observed social interactions between children and their peers. However, play with peers is not an appropriate method to measure social interactions in infants and toddlers because the caregiver is the primary source of social interactions in very early childhood (Landry et al., 1997; Lloyd, 2010; Pellegrini, 2013). In the first few years of life, an infant's natural setting includes the primary caregiver; therefore, naturalistic observations of infant behavior should also include the primary caregiver (DiCarlo et al., 2014). The importance of descriptive research measuring social development outside of the classroom environment has been presented in the literature for over 30 years, yet the majority of research is still focused on behaviors observed in the classroom setting, not behaviors observed in the home environment (Bronfenbrenner, 1980; Pellegrini, 2013).

Research on direct observation of social behavior began in the 1930s with Parten's seminal study (Parten, 1932), yet few standardized assessment measures have been developed since then. A review of four observation systems that were identified as most prominent during the literature review will be discussed to address (1) how
they measure social behavior and (2) why they were not selected as the measure of social development for this research study.

*Parten's Scale (Parten, 1932).* In her classic study, Parten (1932) organized social participation into six categories: unoccupied behavior, onlooker, solitary independent play, parallel activity, associative play, and cooperative or organized supplementary play. Parten collected pilot data for several weeks in a preschool setting, in order to develop her scale of social participation. During unoccupied behavior, the child is not playing. The child may be walking or looking around the room, but he or she is not engaging in any play or social behaviors. Onlooker behavior is defined as watching other children play, including talking to other children, without joining their play activity. Solitary independent play is when the child plays alone with toys different from other children and makes no effort to get close or reference what other children are doing. Parallel play refers to when the child plays independently, but with similar toys to those around him or her. Associative play describes play behaviors when children play with other children in similar or identical activities and borrow or share materials. Cooperative or organized play is the highest level of play when there is a sense of belongingness and children work to attain a goal or make something together. Internal consistency for social participation
has been reported to be high (.76 to .90), no measures of validity were reported (Parten, 1932).

**Advantages.** This research is important because this was the first research study to stress the importance of measuring social behavior in young children. Previous research used social settings (i.e., play with peers) as a context to observe children's attitudes, personality traits, and toy preference (Parten, 1932). In addition, prior to this, many researchers conducted research in laboratory settings instead of observing children in their natural environment. Parten (1932) was the first researcher to organize a classification system for how to measure social behaviors of preschoolers in their natural environment, and 80 years later, this system is still being used. Researchers who are interested in measuring social behaviors through observational measures primarily utilize or modify these categories, emphasizing the long-term impact of this study.

**Disadvantages.** Understanding social interactions among peers is important; however, in order to understand the developmental continuum of social behaviors, it is important to first observe the interactions between children and their caregivers (Pellegrini, 2013). The earliest social interaction an infant experiences is with the caregiver. The relationship that develops through these experiences is critical to the social behaviors that are observed and learned during the first few years of life.
The primary disadvantage of Parten's research is that it occurred within nursery school classrooms. Many young children do not attend childcare centers, but instead stay home with a caregiver or nanny during the day. This observation scale was designed to measure social behaviors between children and their peers, but does not address social interactions between children and their caregivers. Another disadvantage of this system is that a child's social behaviors are intertwined with a child's play behavior. The three highest social categories (i.e., parallel, associative, and cooperative play) are primarily describing a child's social behavior in play, rather than isolating these two constructs. According to this scale, it is not possible to have high levels of social behaviors if the child is not engaged in cooperative play.

Another disadvantage with this scale is the psychometric properties have not been sufficiently reported. Some internal consistency estimates were reported, but additional measures such as inter-rater agreement or measures of validity are not reported in the literature. Because this article is referenced as a one of the most influential studies of social behavior, more psychometric data should be available.

**Play Observation Scale (Rubin, 2001).** The Play Observation Scale (POS; Rubin, 1986; Rubin, 2001) is one of the most frequently used systems to measure social development. It has almost perfect inter-rater reliability estimates with Kappas.
ranging from .80 to .95 (e.g., Henderson et al., 2001; Rubin, 2001). The POS measures areas of social development as defined by Parten as well as areas of cognitive development as defined by Piaget (1961) and Smilansky (1968).

Specifically, the POS classifies behavior as play behavior or non-play behavior. Social play categories on the POS include solitary play, parallel play, or group play. The solitary and parallel play categories measure similar behaviors as those identified by Parten, and the group play category combines the associative and cooperative play categories from Parten's measure. Solitary play is defined as playing apart from other children with different toys or paying no attention to other children in the play area. Parallel play is when a child plays independently, but with similar toys and in close proximity to other children. During parallel play, the child is attentive and aware of the other children. Group play is when a child plays with other children and there is a common goal for their activity. Non-play behaviors on the POS are organized into 10 categories and include Parten's definitions of unoccupied and onlooker behavior.

Advantages. This observation system is important because as reported in the literature search that was conducted; it was the most widely used measure. This system was used by three different researchers within this literature search to evaluate social and cognitive behaviors of different children, demonstrating its utility (Henderson et al., 2001; Root & Stifter, 2010; Rubin & Coplan, 1998). In addition, it
has high inter-rater reliability and well defined categories. This system is also unique because it separates social and cognitive play if someone is interested in identifying behaviors exhibited by these separate constructs.

Disadvantages. Although this scale emphasizes the importance of both social and cognitive development, it also has disadvantages. The primary disadvantages of this system are similar to those of Parten's scale. First, this system is designed to measure behaviors among preschool-aged peers. Therefore, it does not consider the importance of social behaviors in infants and toddlers. With younger children, the caregiver-child interaction is critical and should be included to determine early social behaviors (DiCarlo et al., 2014).

In addition, this observation system defines social behaviors as "social play." None of the behaviors classified as non-play behaviors are considered social behaviors. For instance, the category "onlooker behavior" describes when a child watches the activities of others but does not enter into the activity. One can argue that children learn through observing others and then eventually interact with those in their environment (Bandura, 1991); as such, this acknowledgement of another is a social behavior. The final disadvantage is that psychometric data on validity were not available in the literature.
System for Observation of Children's Social Interactions (Brown et al., 1996). The System for Observation of Children’s Social Interactions (SOCSI; Brown et al., 1996) also expands upon Parten's definition of social behaviors. Brown et al. (1996) reviewed the literature from three fields (Applied Behavior Analysis, Developmental Psychology, and Pragmatics) to identify behavioral strategies preschool-age children use during social interactions with peers. The SOCSI identifies 15 behavioral strategy categories from their literature review (e.g., calling, comments, gestures, questions, requests, role assignments) and 12 social goals categories (e.g., aggression, assistance, attention, comfort-support, information seeking). An observer watches social interactions and determines (1) the child's social goal when initiating a behavior, (2) the behavioral strategy the child uses to try to achieve that social goal, and (3) whether or not the child had a successful social interaction (the peer did not ignore him or her, but engaged in the initiated behavior).

Advantages. The primary advantage of the SOCSI is that it provides a link between the child’s abilities (behavioral strategies) and desired social interaction. The authors discussed that a child could use any of the behavioral strategies to achieve any of the social goals, which allows for a direct link to intervention planning. Based on this detailed observation conducted, an observer would be able to identify behaviors to target for intervention. For instance, if a child is having difficulty with
approaching peers, this child could work on approaching one peer; then after the child has mastered this goal, the child could work on it for another goal (e.g., approaching a different peer). Keeping the strategy the same while expanding the social goals for which the strategy is used would allow for the behavior to generalize to new settings, situations, and new social goals (Brown et al., 1996).

**Disadvantages.** The primary disadvantage of the SOCSI is the complexity of in terms of its feasibility. Extensive training is required to be able to accurately identify the necessary social goals and behavior strategies. With 15 behavior strategy categories and 12 social goal categories, this observation system is not as simple as other observation systems that were identified through the literature search. Another disadvantage is that it was designed to measure behaviors among peers. Although the behaviors listed could be extended to interactions between children and their caregivers, the observation system has not been used for this purpose. Because a child's early social interactions occur between the child and the caregiver (DiCarlo et al., 2014) rather than among peers, this measure does not identify social behaviors that develop in early childhood. In addition, there are no psychometric data available in the literature on the SOCSI.

**Social Behavior Scale (Pierce-Jordan & Lifter, 2005).** The Social Behavior Scale (SocBS; Pierce-Jordan & Lifter, 2005) was developed to isolate social
interactions from the complexity of the play activity by creating four mutually exclusive, exhaustive categories of social behavior (i.e., onlooker, solitary, uncoordinated social, and coordinated social). By separating play and social activities, one can record children's behavior for higher levels of social interactions, even if their play skills are not as developed. For instance, talking falls into the highest category of social interaction, so the child does not have to be participating in complex play to be interacting with others.

The SocBS also sought to develop a continuum of behavior from least to most complex across these categories. The least complex category on the SocBS is the Solitary category, which integrates the unoccupied and solitary categories from Parten's scale. The Solitary category describes behavior such as when the child engages in play alone without looking or interacting with others. The next category, Onlooking, is the same as the onlooker category from Parten's measure: gazing at another, watching, but not participating. Then two new categories were developed for the SocBS, Uncoordinated Social and Coordinated Social. These categories replace the parallel, associative, and cooperative categories from Parten's study. Uncoordinated Social is defined as activities where the child may be talking to or sharing objects with another child, but the child is not expecting the other to respond. For this category, it is important to note that the social behavior is not coordinated
with the child's verbal or nonverbal behavior. The child may ask another child to look at a tower of blocks, but then knock over the tower before the anyone looks at the tower. Coordinated Social activities include coordinating social behaviors such as talking, sharing, or physical contact while also observing another's reaction or attention to those social behaviors.

Advantages. The primary advantage of this system is that it separates social behaviors from play behaviors. A child is able to engage in Coordinated Social activities even if the child is not engaging in complex levels of play. In addition, this scale provides four, mutually exclusive, exhaustive categories of social behavior. This observation system would be much easier to learn and administer than other systems, such as the SOCSI's 15 behavioral categories and 12 goal categories. Finally, the categories on this scale represent a continuum of social behaviors from simple to most complex.

Disadvantages. The primary disadvantage of the SocBS is that it measures behaviors among peers in a preschool setting. Similar to the SOCSI, many of these behaviors could be observed between a caregiver and a child, but these interactions have not been validated with this system. As has been discussed previously, the caregiver-child interaction is critical to social development (DiCarlo et al., 2014) and should be further evaluated. To better understand how social behaviors develop,
Another disadvantage of this system is the Coordinated Social category, which captures too large of a range of social development. According to the Coordinated Social category, a child's observable social behaviors, such as talking or hugging another, fall in this category (Pierce-Jordan & Lifter, 2005). In addition, more complex social activities such as taking turns or working together to build something also fall into this category. It can be argued that one more level of social interaction should be developed to distinguish between what types of social response the child expects from another. For instance, when a child looks at another because the child is curious, but does not expect the other to respond (e.g., Acknowledges or Onlooker behavior); when a child is simply seeking the attention of another, but wants the other to acknowledge their behavior (e.g., Attention Seeking or showing behaviors); and when the child is mutually engaging in an activity with another (e.g., Engagement or Coordinated social activities). Parten’s (1932) highest category of social behavior, cooperative play, included a "sense of belongingness" where children worked together to attain a goal. An example of a child who is hugging the caregiver represents Coordinated Social on the SocBS, but it may be better represented in a category where the child is not necessarily working toward a common goal with the
caregiver; the child may just be concerned about their own behavior and not the behavior of the caregiver.

**Limitations of Current Measures**

A review of the current literature on observation systems measuring social behavior in early childhood identified five primary disadvantages. First, all of the observation systems measured social behaviors among peers, not between children and their caregivers. This limits the feasibility of these scales in the home environment. Second, these observations were conducted among preschool age children, not infants and toddlers, which limit their feasibility with younger children. Third, some of these observation measures entangle social development with play skills. For instance, Parten's scale and the POS require children to be engaged in complex play activities in order to receive credit for advanced social abilities (Parten, 1932; Rubin, 2001). When trying to identify how social behaviors develop in early childhood, it is difficult to isolate social behaviors from play behaviors.

Fourth, many of the classifications of social behavior do not represent how social behaviors develop from simple to the most complex behaviors. The SocBS did create a developmental sequence of social behaviors from simple to complex, but the Coordinated Social category covers a broad range of behaviors from talking to mutually engaging in a game. Behaviors within this category may need to be placed
in separate categories to represent differences in levels of social behaviors. There is little evidence in the literature supporting separate categories of social behaviors, so this must be explored further. Fifth, limited psychometric data were available for the reviewed scales. No measures of validity were reported making it difficult to determine if the scales measure social behavior or a different construct.

**Identification of What Social Behavior is Exhibited by Young Children**

After reviewing the early childhood literature, the current observation systems available in the field have several limitations. As a result of these limitations, there was a need to understand what social behavior is exhibited during child-caregiver interactions in early childhood. A description of the approach used to explore what social behaviors are displayed by infants and toddlers is presented below. Finally, the rationale for the observation system used is presented.

**Purpose of Current Study**

The purpose of the present study was to explore what social behavior (1) is exhibited by infants, toddlers, and preschoolers, (2) in the home environment with a caregiver. Based on the definitions from Chapter 1 of social behavior ("an interaction between or among people, which can range from simply acknowledging the presence of another to engaging in shared activities") and social development ("the continuity and change in social behaviors that occur across time and among people"), it was
necessary to develop a procedure to explore what social behaviors are exhibited by young children during a naturalistic play session with their caregiver.

**Recording behavior.** This descriptive study used both qualitative and quantitative methods to explore social behavior in early childhood. Qualitative methods focus on four specific characteristics for research design: credibility, fittingness, auditability, and confirmability (Sandelowski, 1986). Credibility emphasizes the importance of the close connection the researcher has with the data collection. The behaviors identified as social behaviors are credible if individuals other than the researcher can identify the behaviors (Sandelowski, 1986). Fittingness relates to the importance of collecting qualitative data in a natural setting with few controlling conditions. Auditability is the researcher's ability to clearly describe the decision process, so that other researchers could arrive at similar conclusions given the data. There are 12 specific steps Sandelowski (1986) indicated as important to ensure Auditability: 1) how interest in the study began, 2) the researcher's perspective on the variables, 3) the purpose of the study, 4) how subjects were included, 5) the bidirectional impact the researcher and the participants had on each other, 6) how the data were collected, 7) the length of data collection, 8) the setting, 9) how the data were analyzed, 10) how the data were weighted, 11) inclusion and exclusion criteria for the data categories, and 12) the techniques used to determine if the data were
credible. Finally, confirmability emphasizes the meaningfulness of the findings. Confirmability values subjectivity as the researcher interprets the data.

Observations were coded by the first author. Qualitative inquiry emphasizes the importance of direct and personal contact with the study (Patton & Westby, 1992). Therefore, the credibility, which can be compared to internal validity, was enhanced by having the first author develop, code, and interpret the data (Sandelowski, 1986). The purpose was to identify the social behaviors that young children display; therefore, video recorded play sessions of child and caregiver dyads were used to observe these behaviors. It was important for the first author to code the data, so that the social behaviors could be identified first-hand. Bronfenbrenner and Morris (2006) refer to this type of research as research in the discovery mode where the "aim is to devise new research designs that not only question existing results, but also yield new, more differentiated, more precise, replicable research findings" (p.795).

The purpose of this descriptive study was to identify social behaviors exhibited in early childhood in a natural setting. Because there was very little research on using systematic direct observation to record social behaviors in infants and toddlers, this study was exploring a new research direction to determine its feasibility. This study was a contingent mixed-method design where the qualitative results were
used to determine the next group of research questions that were analyzed quantitatively (Sandelowski, 2014; Sandelowski, Voils, & Barroso, 2006).

One disadvantage of the first author coding the data was that the observer was not blind to the study characteristics. Sandelowski (1986) cautioned that closeness to the study both enhances and threatens the study. It was therefore important to ensure that the data could be described and interpreted by more than just the first author. Frequent inter-rater reliability checks were used to make certain that experimenter expectancies were not biasing the data during the quantitative analyses.

**Coding scheme.** Although the specific observable social behaviors were explored, they were framed in terms of social cognitive theory; individuals cognitively appraise their environments and it is the interaction among these cognitive processes, behavior, and the environment that leads to development. Children observe the behaviors exhibited by others and then through cognitive processes may create an internal representation of that behavior (Bandura, 1978). An early emerging social behavior is awareness of others, illustrated through gaze and eye-contact (Shaffer, 2010). At approximately 12-months-old children, have some cognitive capacity to appraise the environment when they observe others, especially with the emerging recognition that they are separate from others (Bandura & Barab, 1971). Therefore, an initial level of social behavior that develops in 12-month-old
Infants would be observation of others in terms of creating a representation of others as separate from the self.

Integrating the bioecological model, whether or not a child learns the social behavior that is observed depends on the child’s interactions among cognitive processes (Person characteristics), the environmental context, and proximal processes (frequency of observation; Bronfenbrenner & Morris, 2006). Of particular importance to social cognitive theory is reciprocal determinism, where children are not only influenced by their environments, but are also influencing their environments by being active participants in their learning environments. Within the context of child-caregiver interactions, the child will be influencing the caregiver’s social behavior and the caregiver will be influencing the child’s social behaviors (Bandura, 1989). Therefore, a secondary level of social behavior is participating in social interactions with another (the caregiver). The emerging cognitive capacities of recognizing others as separate entities enables the child to engage in social interactions at a new level of understanding.

As little research has explored the process of identifying social behaviors that develop in early childhood, the current study sought to identify specific behaviors that are displayed by 12-, 24-, and 36-month-old children during a play setting in a natural environment with a caregiver present. Bronfenbrenner and Morris (2006) posit that to
measure reciprocal interactions, complementary measures between caregivers' and children's behaviors should be measured. Recording caregiver and child behavior along the same scale would allow for conducting correlations to determine if the caregiver and child engage in mutual interactions. In addition, behavior should be observed throughout an observation session, rather than coding behavior based on a weighted scale after the session. Recording throughout the session ensures that the data (1) represent behaviors that the caregivers and children were actually exhibiting and (2) reduce the subjective nature of evaluating these behaviors at the end of the observation period. The identification of specific social behaviors and the operational definitions of these behaviors were explored for Research Question 1.

Hypotheses

After a thorough review of the literature on measuring social development in early childhood, several research questions were developed, described below. Because no direct observation system was identified in the literature to observe social behaviors in infants and toddlers, the first research question was designed as a descriptive question to qualitatively explore what social behaviors look like and how they emerge in early childhood. Social behaviors, as defined for this study, are “an interaction between or among people, which can range from simply acknowledging the presence of another to engaging in shared activities.” The second research
question evaluated whether or not there were differences in social behavior across age as measured by the four categories of social behavior developed from the first research question. The third research question addressed the relationship between the caregiver and child social behaviors. The final research question explored the relationship between the four social behavior categories developed with cognitive, communication, personal-social, and play measures of development in the Project Play database.

Research Question 1

The first research question was: *what observable social behaviors can be identified in 12-, 24-, and 36-month old children during a 14-minute sample of play occurring in a natural environment?* Based on the review of the literature, a review of the current scales that measure social behaviors of young children, and social cognitive theory, it was hypothesized that four categories of social behavior were representative of qualitatively different categories of social development. The behaviors identified were primarily selected from Parten's study (Parten, 1932), Rubin's Play Observation Scale (POS; Rubin, 2001) and Pierce-Jordan's Social Behavior Scale (SocBS; Pierce-Jordan & Lifter, 2005). Although four categories of social behavior were identified based on the literature, the specific behaviors and the
operational definitions of each category were explored through observations of the video recordings.

**No Acknowledgement.** The first category was a No Acknowledgement category. In this category the child is not engaging in any of the social behaviors described below; there is no active acknowledgement of others. This category is similar to the unoccupied and solitary categories from previous scales (Parten, 1932; Pierce-Jordan & Lifter, 2005; Rubin, 2001). An example is when the child is focusing on playing with toys and is not acknowledging the presence of the caregiver during play.

**Acknowledgement.** The second category was Acknowledgement. This is the first level where a child is displaying social behaviors. The child acknowledges the presence of the caregiver by observing or approaching the caregiver. These behaviors are socially directed by the child toward another without necessarily implying a response from the caregiver. These would be similar to onlooking categories on previous scales (Parten, 1932; Pierce-Jordan & Lifter, 2005; Rubin, 2001). Examples include glancing at or watching an adult in the room, gazing at the caregiver, running toward the caregiver, smiling in response to the caregiver without orienting toward the caregiver, and giving the caregiver an object without waiting for the caregiver's response.
**Attention Seeking.** The next category was Attention Seeking. Here the child expects some response from the caregiver. For instance, the child performs an action (e.g., hugging, giving a toy) with the expectation that the caregiver will respond. However, the purpose of this action is not for mutual engagement. It is similar to the attention and comfort/support categories of the SOCSI (Brown et al., 1996). It is also similar to the uncoordinated social category of the SocBS; however, on the SocBS, the child does not expect a response from the peer (Pierce-Jordan & Lifter, 2005). In the Attention Seeking category, the child is expecting a response from the caregiver, but they are not fully engaging the caregiver. Examples include continuing to play alone while having a conversation with the caregiver, asking the caregiver for help, checking-in with the caregiver after completing a task to see if the caregiver responds, showing a toy to the caregiver without sharing the toy with the caregiver, kissing or hugging a caregiver with the expectation of reciprocity, physical aggression (hitting or kicking the caregiver, throwing toys, having a tantrum) with the expectation that the caregiver will respond.

**Engagement.** The final category was Engagement. At this level, the child's verbal and nonverbal behaviors are socially focused with the caregiver's behaviors. These behaviors must be initiated by the child. This category would include behaviors classified as cooperative play, group play, and coordinated social play on other scales.
(Parten, 1932; Pierce-Jordan & Lifter, 2005; Rubin, 2001). When a child displays Engagement behaviors, the child performs an action and then waits for the caregiver to respond and these reciprocal interactions continue. Examples include sharing, joint attention, suggesting a play theme, and singing, where the child is fully engaging with the caregiver.

**Research Question 2**

The second research question was: *are there differences in the proportion of categories of social behaviors (as determined by analyses in Research Question 1) displayed among 12-, 24-, and 36-month old children?* Because the literature reviewed did not identify how social behaviors develop, it was important to explore if there were differences among the three age groups and the social behaviors identified through the descriptive research. According to social cognitive theory (Bandura, 1991), a child's social interactions begin with observation. Acknowledging the importance of others in the environment is an early emerging social behavior. Acknowledgement represented the first level of social behavior measured for this study. The next level of social behavior measured was Attention Seeking behaviors. As children begin to interact with others in their worlds, they should engage in social behaviors with the goal of generating a response from their caregivers. These children are trying to learn how to engage in reciprocal interactions, but they are first only able
to seek out attention from the caregiver without learning how to fully participate in interactions. The final level of social behavior classified as Engagement represents when the child has integrated social and cognitive abilities and is learning through higher level reciprocal interactions with the caregiver.

Therefore, it was hypothesized that all children would display social behaviors, but the quality of the social behaviors would vary based on the child's age. One goal was to explore social behaviors that could be observed in infants and toddlers and determine how social behaviors are displayed in children of different ages.

**Research Question 3**

The third research question was: *is there a positive correlation between the child and the caregiver social behavior categories (as determined by analyses in Research Question 1)?* A primary benefit of the DPA video recordings was that they included the child playing with a caregiver. The primary purpose was to identify qualitatively different social behaviors; however, because of the importance of the reciprocal nature of caregiver interactions, an estimate of the caregivers' behavior was also recorded once per minute. The caregiver's behavior was assessed using the same four categories as were used to assess child behavior (No Acknowledgement, Acknowledgement, Attention Seeking, Engagement; see Appendix A for examples).
Social cognitive theory states that children learn through interactions with people in their environment. Because young children were assessed in the context of their interactions with caregivers, it was important to measure both the children's and the caregivers' behaviors (Thomas, 1998). As social cognitive theory emphasizes the reciprocal influence of behavior on the environment, a child's behavior can influence the caregiver's behavior just as the caregiver's behavior can influence child behavior (Bandura, 1978). Therefore, it was hypothesized that there would be a relationship between child and caregiver behavior within the same categories of social behavior (Bronfenbrenner & Morris, 2006). It is through interactions with the caregiver that the child learns progressively more complex social interactions, as such, it was hypothesized that there would be a positive correlation between child and caregiver behaviors across the four levels of social behavior measured. Specifically, it was hypothesized that child Acknowledgement behaviors and caregiver Acknowledgement behaviors would be positively correlated. Similarly, it was hypothesized that child Attention Seeking and caregiver Attention Seeking behaviors would be positively correlated. Finally, it was hypothesized that child and caregiver Engagement behaviors would be positively correlated.
Research Question 4

The final research question was: *is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and other related measures in the Project Play Database?* This research question was evaluated through four specific research questions.

**Research Question 4a.** *Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and the Personal-Social domain score on the BDI-2-ST?*

**Research Question 4b.** *Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and the Cognitive domain score on the BDI-2-ST?*

**Research Question 4c.** *Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and the Communication domain score on the BDI-2-ST?*

**Research Question 4d.** *Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and the play score on the DPA?*

**Hypothesis 4a.** The Personal-Social domain on the BDI-2-ST was developed to measure social interactions with adults and peers and to measure the development...
of self-concept and social role (Newborg, 2005). The purpose of the four social categories developed was to represent early emerging social behaviors in infants, toddlers, and preschoolers. Therefore, it was hypothesized that the four categories of social behavior developed and the Personal-Social domain would be positively correlated as they are measuring similar constructs.

**Hypothesis 4b.** According to social cognitive theory, social and cognitive development are related, yet separate constructs (Bandura, 1991). The context in which social interactions occurs and a child's personal cognitive abilities influence how individuals interpret and learn from their social interactions. Therefore, it was hypothesized that there would be a positive correlation between cognitive behaviors as measured by the Cognitive domain on the BDI-2-ST and social behaviors as measured by the four social categories developed. Although a positive correlation was hypothesized, it was hypothesized that this relationship would not be as strong as the relationship between the Personal-Social domain and the categories of social behaviors explored because the Cognitive domain measures a different developmental construct.

**Hypothesis 4c.** Through social interactions, language develops (Bloom & Lahey, 1978). As a child develops communicative behaviors, the child is developing progressively more complex relationships with those in the environment (DiCarlo et
Therefore, social development and language development are highly interrelated (Bloom & Lahey, 1978) and it is difficult to separate social development from language development. Because social and language abilities are highly interrelated, it was hypothesized that, like cognitive abilities, there would be a positive correlation between language as measured by the Communication domain on the BDI-2-ST and social behaviors as measured by the four social categories developed. Although a positive correlation was hypothesized, it was hypothesized that this relationship would not be as strong as the relationship between the Personal-Social domain and the categories of social behaviors explored in this study because the Communication domain measures a different developmental construct.

**Hypothesis 4d.** Play provides a setting where caregivers can facilitate social learning by participating in reciprocal interactions at the child's developmental level (DiCarlo et al., 2014). Current social observation systems (e.g., POS, SOCSI) measure social behavior as a component of play, suggesting that there is a strong relationship between play and social behavior that is difficult to disentangle (Brown et al., 1996; Rubin, 2001). Because of the importance of play in social development, it was hypothesized that there would be a positive correlation between play abilities as measured by the DPA and social behaviors as measured by the four social categories developed. Although a positive correlation was hypothesized, it was
hypothesized that this relationship would not be as strong as the relationship between
the Personal-Social domain and the categories of social behaviors explored in this
study because the play scores measure a different developmental construct.
Chapter Three

Method

Observations for the current study were selected from the Project Play database. This chapter begins with a description of the Project Play Database including how participants were recruited and a list of the measures collected. Then a description of how participants were selected and the demographics of the participants included in the study are presented. The measures used are described followed by a description of the research design. The qualitative methodology used to develop the categories of social behavior identified, and the quantitative procedures that describe the observational coding system used to measure behavior are discussed. The methods for inter-rater reliability are also presented. Finally, the planned analyses for each of the research questions is described.

Project Play Database

The Project Play database consists of videotaped recordings of children with and without delays and disabilities at 8 months through 60 months collected over five years. Project Play is a research study funded by the Institute for Education Sciences (IES) to determine a developmental sequence of play activities in children ages 8 months through 60 months and to evaluate the psychometric properties of the Developmental Play Assessment (DPA; Lifter, 2000). Data for Project Play were
collected throughout a state in the Northeastern United States. Participants were recruited through early intervention centers, childcare centers, schools, events, mailings, and recruiting events at local children’s museums. Children were assessed within four weeks of their target birth dates (two weeks before or two weeks after) or their target half-birthday dates.

The goal of the Project Play research study was to collect data on 500 children for a cross-sectional study across 10 age groups: 8-, 12-, 18-, 24-, 30-, 36-, 42-, 48-, 54-, and 60-months-old. The goal was to recruit equal numbers of boys and girls at each age; half of the children would be typically developing and half would be identified as developing with delays; and the children’s would match the racial, ethnic, and socio-economic diversity of the state in which the data were collected. In addition, the Project Play database was designed so that a subset of the children (n = 217 participants) was assessed every 6-months (except for the 8-month sample was reassessed at 12 months) for 3 years or until they were 60-months-old.

The Project Play database included several measures to evaluate domains of child development including the DPA, the Battelle Developmental Inventory-Second Edition-Screening Test (BDI-2-ST; Newborg, 2005), and the Vineland Adaptive Behavior Scales-Second Edition (Vineland-II; Sparrow et al., 2005). The DPA consists of a 30-minute play session with a child and a caregiver playing with four
different sets of toys. This assessment provided a naturalistic observation to examine social behaviors of children and their caregivers. The toy sets were identified through a review of the literature on toy characteristics and how toys can be used in natural play assessments (see Measures below for a more thorough description). In addition, information about family background and everyday activities was collected. All inventories were administered during each child's initial assessment. For children included in the longitudinal sample, the DPA and demographic information were collected at each assessment; the BDI-2-ST and the Vineland-II were administered only during the child's initial assessment. All assessments were collected during one or two visits with a familiar caregiver and the target child in a natural environment (i.e., home or childcare center).

Participants

**Determination of number of participants.** To evaluate how social behavior develops (research question 1) and to develop operational definitions of categories of social behavior, preliminary data were collected with 15 children who were typically developing across three age groups (i.e., 12-, 24-, or 36-months; 5-children per age group). To evaluate the relationship among the categories of social behavior and age (research question 2), G-Power calculations (Faul, Erdfelder, Buchner, & Lang, 2009), were conducted to determine the number of participants. It was recommended
that the total sample size be at least 69 participants in order to obtain a moderate effect size of 0.4, at an alpha of 0.05 and power level of 0.95 for a repeated measure analysis of variance with four social behaviors measured across three age groups. Assuming a small effect size of .2, 264 participants would be necessary. Only 83 participants were available in the Project Play database for initial assessments of 12-, 24-, and 36-month old children. Because there were not 264 participants available in the Project Play database, the present study was regarded as a pilot study to explore the interaction between levels of social acknowledgement and age. Future studies, with more participants, should further evaluate this research question quantitatively.

**Selection of participants.** Participants for the current study were randomly selected using a random number generator in Microsoft Office Excel 2007 from the sample of initial assessments of typically developing 12- (N = 30), 24- (N=27), and 36- (N=26) month old children in the Project Play database. Only typically developing children were included because the goal was to better understand how social behaviors develop. Children identified with delays and disabilities may display a different pattern of social behaviors and should be included in future studies. All children identified through the random number generator had complete data available within the Project Play database (i.e., DPA observation and BDI-2-ST scores).
Seventy-five participants were identified, 25 from each of the three age
groups. The demographic characteristics of the participants are presented in Table 3.

Table 3

Participant Demographics

<table>
<thead>
<tr>
<th></th>
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<th>24 months</th>
<th>36 months</th>
<th>Total</th>
</tr>
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<td>9</td>
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<td>1</td>
<td>4</td>
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<td>$25,000-$49,999</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
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<td>$75,000-$99,999</td>
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<td>12</td>
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Due to limitations in the data available, the demographics (e.g., gender) across ages were limited. There were only 26 (17 girls and 9 boys) typically developing children in the Project Play database who were 36-months old. Therefore, this sample was unable to have an equal number of boys and girls, as we were limited by the extant data available. The sample included a total of 42 girls and 33 boys. At 12-months old there were 14 girls and 11 boys; at 24-months there were 12 girls and 13 boys; and at 36-months there were 16 girls and 9 boys.

The majority of the children were White/Non-Hispanic (N = 57). Other races/ethnicities represented in the sample include Asian (N = 11), African American (N = 9), Hispanic (N = 5) and Native American (N = 1). Nine children were identified as an "Other" Race or Ethnicity by their caregivers. Specifically, there was one child identified as Romanian-American, one as Middle Eastern, one as Hispanic-White-Indian, two as Jewish, one as Asian-American, one as Indian, one as White-Indian, and one family did not report what they meant as "Other." Seventeen of the children were identified as falling into one or more of the racial/ethnic categories. This sample is representative of a diverse population. Despite this, the majority of the sample is White/Non-Hispanic and there are too few Asian, African American, Hispanic, and Native American participants to make broad generalizations about the applicability of these results to those populations.
Of the 75 children, English was the primary language spoken in the home of 66 children; English and Spanish were the primary languages spoken in the home of eight children; and Telugu was the primary language spoken in the home of one child.

For 74 of the children, the mother was the primary caregiver; for one child the grandmother was the primary caregiver. The majority of primary caregivers had a graduate or professional degree (N = 48); 18 had a college degree; two had completed some college; five had completed high school; and one did not have a high school degree. Fifty families owned the house or apartment in which they lived; 22 rented a house or apartment; and one family lived in subsidized housing. Almost two-thirds of the caregivers in this sample had graduate degrees and owned their own homes, suggesting this sample may not be representative of families whose caregivers have not completed post-secondary school.

Eight of the children lived in homes with only one adult, 64 lived with two adults, and three children lived in homes with three adults. Thirty-one children were only children, 26 had one sibling, 14 had two siblings, two children had three siblings, one child had four siblings, and one child had five siblings. Only nine of the 44 children with siblings had younger siblings; whereas, 35 of the children had older siblings. Eighteen of the children attended a childcare center for some part of each week.
Overall the sample represented children from diverse races/ethnicities and homes. However, the results may not be representative of all populations because over two-thirds of the sample was identified as White-Non-Hispanic, almost 90% of the children lived in homes with at least two caregivers, over two thirds of the children's caregivers owned their own homes, and almost two-thirds of the children's primary caregivers had graduate degrees.

Measures

**Developmental Play Assessment observations.** The DPA (Lifter, 2000) is an assessment that was designed to assess play development as a reflection of what young children know about the world around them. The DPA was designed to generate an individualized play profile in order to help guide instructional planning. Inter-rater reliability for trained observers is .96 for the overall total score and ranges from .80 to .97 across the qualitative categories.

The DPA video recordings in the Project Play database consisted of a 30-minute observation of a child and caregiver playing with four different sets of toys in a natural environment (home or childcare center). Approximately every 7-minutes the toy sets were changed to allow for play with a variety of objects. Children were presented with four different sets of toys throughout the 30-minute observation. The role of the child was to play without constraints.
The toy sets were identified through a review of the literature on toy characteristics and how toys can be used in natural play assessments. One set consisted of a bear puppet, a wooden Farm Puzzle with jumbo knobs, a plastic container with beads and a string, a glitter wand, and a plastic dump truck with two figures in the cab of the truck. Another set included a baby doll, a set of nesting cups, a comb and mirror, a spoon, a folded blanket, and some Tinker Toys in a plastic container. A third toy set had a coffee pot, two cups, two saucers, and two spoons, a container of plastic nuts and bolts, a set of plastic sorting barrels, boy and girl doll figures, and a train with three train cars that are not connected. The last toy set included a cloth caregiver and baby figures; a wooden cat, plastic dog and cat figures; a plastic container of small wooden blocks, and a wooden tool puzzle. Each toy set was constructed to include open-ended toys or toys that could be used in multiple ways (nest cups, stack cups, use cups to feed figure). In addition each set included at least one animated figure and the proportion of the toys to each other were considered, so that they could be used in combinations.

The role of the caregiver was to respond to, but not direct, the child's play behaviors. Specifically, caregivers were instructed to sit with their children during the observations. They were asked to talk with their children about the toys (e.g., comment on what the child is doing, "Look how you are stacking those blocks"), help
their children if they asked for help (e.g., child does not have the motor skills to attach two train cars together and asks for help), and respond to their children if they were asked something (e.g., child asks, "Do you want to have a tea party" and hands a cup to the caregiver).

Each play session was video recorded and then coded for the frequency and variety of different play activities. The description of the coding system is beyond the scope of the present study. On average, typically developing children exhibit over 100 individual play behaviors during a 30-minute observation (Lifter, 2000). Play activities ranged from simple manipulation of one object (e.g., mouthing a toy or taking apart the nesting cups) to manipulation of multiple objects (e.g., stacking blocks or putting the spoon in a cup) to linking activities together (e.g., feeding the doll with the spoon, combing the dolls hair, and covering the doll with a blanket). Individual play activities were then classified into qualitative categories that represent a developmental sequence of play based on analysis of the literature (Lifter, 2000). For each category, a child's play was coded as Absent (i.e., less than two play activities and less than two different exemplars of play), Emerging (i.e., more than four play activities with at least two different exemplars), or Mastered (i.e., child exhibits at least 10 activities across at least 4 different exemplars).
The data available for the present study consisted of scored play samples for 30 of the 75 participants (10 children per age group). The 30 children in this subsection of this study were observed engaging in 159 individual play activities on average ($SD = 56$). DPA data used included frequency counts for the four ways in which play activities occurred: DPA-I, DPA-S, DPA-B, DPA-Q. DPA-I play activities represented the frequency count of play activities that occurred independently across the 30-minute play assessment. DPA-S behaviors included play activities that were embedded into a sequence of activities (i.e., child combs the doll's hair, then puts the doll to bed). These activities were linked in time and appeared to be connected to a theme (Lifter, 2000). On average, the children in this study engaged in 20 DPA-S activities ($SD = 22$). DPA-B activities included activities where a child used one object to represent another in the context of the play activity. For example, the child may have pretended that a bowl was a "swimming pool" for the figures. These behaviors included using the toys in a way other than their intended purpose and occurred on average very rarely in the current sample ($M = 2; SD = 2$). The final category, DPA-Q, represented play behaviors when the child used a substitution during a sequence. For example, the child pretended that there was milk in a cup (substitution), fed the baby the milk, combed the baby's hair, and put the baby to bed, placing a blanket over the baby. As DPA-Q combines DPA-B and DPA-S activities,
these activities represented the most advanced levels of play behaviors. On average 4 DPA-Q activities ($SD = 8$) were observed with the current sample. In sum, the DPA-I, DPA-S, DPA-B, DPA-Q values were used for the analyses of correspondence with the social measures and other measures of development.

**BDI-2-ST.** The Battelle Developmental Inventory, Second Edition (BDI-2; Newborg, 2005) is a norm-referenced assessment for children ages 0- through 7-years-old. The BDI-2-ST includes 100 test items from the full BDI-2 (20 items for each of the five domains). Reliability coefficients for the BDI-2-ST Total Score are .92 (12-17 month-old children), .93 (24-29 month-old children), and .94 (36-41 month-old children) for internal-consistency. Additional psychometric information has not been reported for the screening measure or the domains measured by the screening measure.

The BDI-2-ST was administered to evaluate development across the five early childhood developmental domains: adaptive, motor, communication, cognitive, and personal-social abilities. The screening test includes observations, caregiver interview questions, and structured tasks. Because the literature review identified relationships between social development and cognitive and communication development, the Personal-Social, Cognitive, and Communication domains were selected as the three measures to be included in the analyses. These domains were developed by
identifying milestones that occur across development and have been used on previous measurement instruments (Newborg, 2005). As such, the development of the items on these domains does not necessarily represent a developmental continuum of behavior, but these domains do represent the best approximation of child social, cognitive, and communication ability available in the Project Play sample. A cut-score is provided for each domain. Children whose score was below the cut-score set at 1.5 standard deviations below the mean may be at-risk for a developmental delay. The BDI-2-ST data for the present study are presented in Table 4.

Table 4

| BDI-2-ST Cut Scores and Mean Scores of Participants for Each Developmental Domain |
|-------------------------------|----------------|----------------|----------------|
| BDI-2-ST domains              | 12 months      | 24 months      | 36 months      |
| **Cut Scores**                |                |                |                |
| Personal-Social               | 8              | 16             | 21             |
| Cognitive                     | 9              | 16             | 20             |
| Communication                 | 10             | 16             | 22             |
| Total Score                   | 51             | 86             | 111            |
### Mean Scores of Participants

<table>
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<th>Domain</th>
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<th>24 months</th>
<th></th>
<th>36 months</th>
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<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Personal-Social</td>
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<td>22.12</td>
<td>4.38</td>
<td>29.00</td>
<td>4.12</td>
</tr>
<tr>
<td>Cognitive</td>
<td>14.20</td>
<td>1.43</td>
<td>17.92</td>
<td>2.34</td>
<td>24.40</td>
<td>3.12</td>
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<tr>
<td>Communication</td>
<td>12.16</td>
<td>3.40</td>
<td>20.80</td>
<td>2.27</td>
<td>25.52</td>
<td>3.33</td>
</tr>
<tr>
<td>Total Score</td>
<td>65.84</td>
<td>8.36</td>
<td>103.48</td>
<td>9.38</td>
<td>129.08</td>
<td>9.82</td>
</tr>
</tbody>
</table>

For the present study the cut-scores were 51 (12-17 month-old children), 86 (24-35 month-old children), and 111 (36-41 month-old children) for the Total score; 8 (12-17 month-old children), 16 (24-35 month-old children), and 21 (36-41 month-old children) for the Personal-Social domain; 9 (12-17 month-old children), 16 (24-35 month-old children), and 20 (36-41 month-old children) for the Cognitive domain; and 10 (12-17 month-old children), 16 (24-35 month-old children), and 22 (36-41 month-old children) for the Communication domain. For the current sample of 75 participants, the Means of the Total Scores were 65.84 (SD = 8.36; 12-month-old children), 103.48 (SD = 9.38; 24-month-old children), and 129.08 (SD = 9.82; 36-month-old children). The means of the Personal-Social domain were 16.36 (SD = 3.33; 12-month-old children), 22.12 (SD = 4.38; 24-month-old children), and 29.00 (SD = 4.12; 36-month-old children). The means of the Cognitive domain were 14.20 (SD = 1.43; 12-month-old children), 17.92 (SD = 2.34; 24-month-old children), and
24.40 (SD = 3.12; 36-month-old children). The means of the Communication domain were 12.16 (SD = 3.40; 12-month-old children), 20.80 (SD = 2.27; 24-month-old children), and 25.52 (SD = 3.33; 36-month-old children). These data support the prior findings that BDI-2 scores increase with age (Newborg, 2005). In addition, these findings support the status of the children in the sample as typically developing children.

**Measures of social behaviors.** Extant video recordings of the Developmental Play Assessment (DPA; Lifter, 2000) were used to measure social behavior. Because the DPA video recordings were collected in the families' homes and a familiar caregiver was always present as a play partner for the child, this assessment provides an environment where social behaviors between the child and the caregiver could be observed and recorded. In order to examine social behaviors in the infants and toddlers, new categories of social behavior were developed.

Four categories were created based on descriptive studies of children's social behaviors, a review of current observation measures used in the literature, social cognitive theory, and Bronfenbrenner's bioecological model (see Chapter 2 for detailed literature review). These categories were based on the definitions of social behavior and social development derived for this study: social behavior is "an interaction between or among people, which can range from simply acknowledging
the presence of another to engaging in shared activities;" and social development is "the continuity and change in social behaviors that occur across time and among people." They were primarily selected from Parten's classic study (Parten, 1932) on social play, Rubin's Play Observation Scale (POS; Rubin, 2001) and Pierce-Jordan's Social Behavior Scale (SocBS; Pierce-Jordan & Lifter, 2005). The four categories of social behavior identified were: No Acknowledgement, Acknowledgement, Attention Seeking, and Engagement. These categories were developed as a starting point to examine the social behaviors of young children (i.e., infants, toddlers, and preschoolers) in their natural environment during play with a familiar adult. The description of how the operational definitions of these categories evolved throughout the study is discussed in the Procedures section below.

**Design**

This research design was a contingent mixed-methods observational, descriptive study constructed in a cross-sectional design across three age periods: 12 months; 24 months; and 36 months. It consisted of both qualitative and quantitative components where the results of the qualitative analyses were used to develop quantitative research questions to further explore what social behavior looks like in early childhood and how it is related to other domains of development (Sandelowski, 2014; Sandelowski et al., 2006). The qualitative components centered on an
exploration of what social behaviors were exhibited by 12-, 24-, and 36-month old children during a play session with their caregiver. The quantitative components focused on analyses of the identified social behavior categories. Specifically, (a) the interaction among age and the categories of social development, (b) the relationship between child and caregiver behaviors, and (c) the relationship between the categories of social behavior identified and measures of social, communication, cognitive, and play abilities available in the Project Play Database were explored. A detailed description of the planned analyses is presented below.

**Qualitative Procedures: Identifying Categories of Social Behavior**

**Research Question 1:** What observable social behaviors can be identified in 12-, 24-, and 36-month old children during a 14-minute sample of play occurring in a natural environment? According to qualitative methodology, the researcher should have direct personal contact with the data collection (Patton & Westby, 1992). The specific behaviors and operational definitions of the categories were developed, refined, and revised by the primary coder. To explore what social behaviors were observable in early childhood, qualitative inquiry was evaluated through auditability, credibility, fittingness, and confirmability (Sandelowski, 1986). Auditability is defined as the researcher's ability to clearly describe the decision process, so that other researchers could arrive at similar conclusions given the data (Sandelowski,
1986). Credibility emphasizes the importance of the close connection the researcher has with the data collection. The behaviors identified as social behaviors in this study were evaluated for credibility by having individuals other than the researcher identify the behaviors (Sandelowski, 1986). Fittingness relates to the importance of collecting qualitative data in a natural setting with few controlling conditions. Finally, confirmability was evaluated by exploring the meaningfulness of the findings through additional research questions. Each of these methods is described below.

**Auditability.** Auditability is the researcher's ability to clearly describe the decision process, so that other researchers could arrive at similar conclusions given the data. There are 12 specific steps Sandelowski (1986) indicates are important to ensure Auditability: 1) how the interest in the study began, 2) the researcher's perspective on the variables, 3) the purpose of the study, 4) how subjects were included, 5) the bidirectional impact the researcher and the participants had on each other, 6) how the data were collected, 7) the length of data collection, 8) the setting, 9) how the data were analyzed, 10) how the data were weighted, 11) inclusion and exclusion criteria for the data categories, and 12) the techniques used to determine if the data were credible.

**Interest in the study.** I became interested in the question of how social behavior develops during data collection of the DPA video recordings. As I collected
data and observed children interacting with their caregivers, I anecdotally observed that there appeared to be differences in the quality of social interactions between infants and toddlers. As I explored the literature to determine how social behavior emerges in early childhood, I discovered that the literature provided little empirical research on social development in infants and toddlers.

**Perspective.** My theoretical perspective focuses on social cognitive theory and Bronfenbrenner's ecological model (see Chapter 2 for a more thorough description of this perspective). Social cognitive theory emphasizes reciprocal determinism, which is a process through which a child can both influence and be influenced by the environment (Bandura, 1978). For instance, person characteristics in the bioecological model (Bronfenbrenner & Morris, 2006), such as perceived outcomes, and a child's knowledge, abilities, and skills will have an influence on the environment. Person characteristics, such as cognitive processes, are how children influence their environment. Social cognitive theory emphasizes the importance of the environment in the triadic relationship among cognition, behavior, and the environment. By applying the bioecological model, at the microsystem level, one can invoke the context of the close relationship with the primary caregiver. Children must both acknowledge (i.e., social behavior) their caregiver and also make sense (interpret) what is going on (i.e., cognitive process) and engage (i.e., social behavior)
in mutual reciprocal interactions with the caregiver in order to learn (Bandura, 1978). A child's ability to learn and develop social behaviors may be affected by multiple factors, specifically the interaction among social interactions within the microsystem (i.e., reciprocal determinism), Person characteristics including cognitive abilities, and the environmental context in which learning occurs (Bandura, 1991; Bronfenbrenner & Morris, 2006).

**Purpose.** The purpose was to explore what social behaviors were displayed in early childhood. Because the literature provided little empirical research on social development in infants and toddlers, the goal was to contribute to the literature by identifying observable behaviors in this age group. A secondary purpose was to explore the social categories developed with other measures available in the Project Play database, which, based on the literature review, are related to language, cognition, and play.

**Subjects.** Because the literature provided little information on social development in infants and toddlers, this study aimed to include participants as young as possible. A subset of children, five children from each age group (i.e., 12-, 24-, or 36-months), were included in the qualitative analyses. Only typically developing children were included because the goal of this project was to better understand how social behaviors develop. Children identified with delays and disabilities may display
a different pattern of social behaviors and should be included in future studies. All children identified through the random number generator had complete data available within the Project Play database (i.e., DPA observation and BDI-2-ST scores).

**Bidirectional influence.** I collected data for the Project Play database for three years. During these observations I was able to interact with families and gather their perspective of the play research we were conducting. Some families inquired whether social play was recorded. The DPA assessment does not specifically measure social aspects of play, but I recognized that the assessment was capable of capturing social interactions during play. Therefore, the participants were instrumental in illustrating the need to measure social behavior.

**Data collection.** The procedures of data collection for this descriptive study were developed based on the review of the literature, a review of the current scales that measure social behaviors of young children, social cognitive theory, and the author's knowledge of behaviors that are exhibited during the DPA. The behaviors identified were primarily selected from Parten's classic study (Parten, 1932) on social play, Rubin's Play Observation Scale (POS; Rubin, 2001) and Pierce-Jordan's Social Behavior Scale (SocBS; Pierce-Jordan & Lifter, 2005). The behaviors used in these studies were evaluated for their ability to be operationally defined and easily coded from the 30-minute DPA observation.
The following categories were initially identified as important social behaviors for preschool age children:

*Awareness.* Child gazes at another person or at person's actions; Child is an observer, not a participant (Pierce-Jordan & Lifter, 2005). Child steps, walks, or runs toward. Child follows, sits, squats, lies, bends, turns, or orients toward (glances, looks at, watches; Barbu, 2003)

*Sharing/Giving/Talking To.* Child shows, offers, talks (even if not looking at parent). These behaviors must be child initiated, not just responding to parent, but with the purpose of interacting with parent. Child's verbal and nonverbal behaviors are socially focused (talking, sharing) including eye contact (Pierce-Jordan & Lifter, 2005), but social behavior is not coordinated with verbal/nonverbal behavior (do not share in attention or wait for other to reply).

*Attention Seeking.* Includes positive and negative behaviors. **Positive:** Places self in proximity (sits, stands or lies against), holds on, hugs, places arm around, places hand on, nuzzles, tickles, kisses, plays. **Negative:** hits, kicks, pulls hair, pinches, shakes, shoves, pushes, threatens (Barbu, 2003).

Child does a play activity without engaging the other in the play, but checks-in with play partner. For instance knocks over blocks and then looks to parent to see reaction or completes nesting cups (instances where child will likely do something
and be proud of the play and look to parent to see parent's reaction. Parent is not
engaged in play participation, just responding to child).

Engaging/Participation. Child's verbal and nonverbal behaviors are socially
focused, including talking, sharing objects (giving for other to play with), making eye
contact or physical contact and coordinating that behavior with verbal/nonverbal
behavior of the other. The child coordinates his or her attention and timing of
language or actions with the focus of attention and timing of language or action of
others (Pierce-Jordan, 2005). This includes turn-taking, joint attention, and parallel
play.

Ignoring. Parent is trying to engage child, but child does not respond to parent
prompt.

No Social Behavior. Child is not engaging in any of the social behaviors
described above. Instead child may be focused on playing with toys, intent on play,
and not acknowledging another during this play.

After identifying these behaviors, I watched three video recordings (one from
each of the three age ranges, 12-, 24-, and 36-months old). The DPA video recordings
consisted of caregivers and children playing in a natural environment. As I watched
the recordings, I took notes on the behaviors I observed. I identified specific
examples of the categories and refined my category descriptions. I also developed a
hierarchical nature to the coding scheme, placing the behaviors in the order that I thought represented the least to most complex social behaviors. Then I consulted another researcher who was a postdoctoral research fellow working on the Project Play research project. The purpose of this consultation was to see if the behaviors could be observed by another individual. Two video recordings within each age group (six video recordings total) were watched concurrently by the two of us. Every 10-seconds we discussed the behavior we observed and which category we would record it into. The code we agreed upon was recorded and modifications to operational definitions were corrected, if necessary. After this, the final operational definitions were developed. The coding sheet and definitions are included in Appendix A; operational definitions and examples of each are presented below.

1. No Acknowledgement: child is not engaging in any of the social behaviors described below. There is no active acknowledgement of others.

Child examples include:

- Child is focused on playing with toys. Child is intent on play and does not acknowledge the caregiver during play.
- The caregiver is holding the child, but the child did not initiate the interaction.
Caregiver examples:

- Caregiver is not looking or engaging with the child during play.
  - The caregiver is talking/texting on cell phone.
  - The caregiver is looking away from child

2. Acknowledgement: child acknowledges the presence of another, such as observes or approaches the caregiver. These behaviors are socially directed by the child toward another without necessarily expecting a response from the other.

Child examples include:

- Child bends, turns, or orients (looks at) towards the caregiver as the caregiver manipulates the toys.
- The child glances at the caregiver, for less than 2 seconds and does not share eye contact.
- Child approaches, walks, or runs toward the caregiver.
- Child sits, squats, leans against the caregiver without expectation of response from the caregiver (i.e., child sits on caregiver, but plays independently).
- Child smiles in reaction to caregiver without orienting towards caregiver (e.g., child may continue to play with toys but smiles at something caregiver says or does).
- Child makes babbling noises or talks while playing, as a means of acknowledging they know the caregiver is watching (caregiver may be responding), but no response is expected.

- Child shows, gives, shares, or offers toys to the caregiver without expecting a response (i.e., the child does not wait for caregiver to reply).

**Caregiver examples:**

- Caregiver is watching/looking at child, but is not actively participating in the child's play.

- Caregiver is wiping the child’s nose/mouth.

- Caregiver repeats what child says, but does not add additional comments about what the child is doing.

3. **Attention Seeking:** child expects some response from the caregiver. Child performs an action with expectation that another will respond, but the child is not fully engaging with the caregiver.

**Child examples include both positive and negative behaviors:**

- Child makes babbling noises or talks, with the expectation that the caregiver will respond. Child may continue to play on his/her own,
while having a conversation with caregiver or eliciting noises with the expectation that the parent will respond to the vocalizations.

- Child may elicit help from the caregiver or make a request of the caregiver (e.g., "do this" or "help me"), without turn taking or mutual engagement in the activity. The caregiver serves as a vehicle not play partner.

- Child maintains eye contact for 2 seconds or more.

- Child does a play activity without engaging the caregiver in the play, but checks-in with play partner (e.g., the child stacks all of the cups and is proud, so the child looks to the caregiver to see the reaction. Caregiver is not engaged in play participation, but responds to the child). This behavior may result in a change in affect, such as smiling or laughing.

- Child shares or gives something to the caregiver to elicit a response (e.g., attention) from parent, but not to engage in mutual play participation. For instance the child may give the caregiver a toy and then take it back or may point to an object.

- Child places self in proximity (sits, stands or lies against), hugs, places arm around, places hand on, nuzzles, tickles, or kisses with the
expectation that the caregiver will reciprocate or comfort the child

(NOTE: if this occurs twice in a row it is considered Engagement).

- Child hits, kicks, pulls hair, pinches, shakes, shoves, pushes, threatens, or has a tantrum with the expectation of the caregiver verbal or physical response.

**Caregiver examples:**

- Caregiver is seeking attention by engaging in an activity different from the activity the child is engaged in.
- Caregiver tries to get child to play with a specific toy.
- Caregiver says: "look at me," or "come here," or "do this."

4. **Engagement:** full engagement with another. Child's verbal and nonverbal behaviors are socially focused. These behaviors must be initiated by the child.

**Child examples include:**

- Child talks, sings, shares objects (gives toy to caregiver to play with), makes eye contact or physical contact and coordinates that behavior with verbal/nonverbal behavior of the caregiver; that is, the child coordinates his or her attention and timing of language or actions with the focus of attention and timing of language or action of the caregiver.
o Child asks for help, and after being shown how to do something, imitates this behavior (Shared attention).

o Child initiates same play activity as caregiver (caregiver puts puzzle piece in, child puts another piece in –or takes a piece out, and then waits for caregiver's response to put in another piece).

o Child mutually plays a game (peek-a-boo) with caregiver.

o Child engages in more than 2 attempts of attention seeking behavior (showing or giving caregiver a toy) and child turns it into a game. This must involve a back-and-forth behavior, where both the caregiver and the child are engaging in social interactions.

o Child asks caregiver to play and hands the caregiver a toy or suggests a play theme.

*Caregiver examples:*

o Caregiver is commenting on what the child is doing.

o Caregiver is holding a toy related to what the child is doing.

o Caregiver is playing a game with the child.

*Length of data collection.* Data collection for the DPA was collected across 5-years.
Setting. The data for the DPA were collected in a naturalistic environment (i.e., home or school) with a familiar caregiver as the play partner.

Data analysis. The data from the qualitative observations were used to modify the operational definitions of the categories. It was also necessary to observe caregiver behavior in addition to child behavior to begin to explore the reciprocal nature of child-caregiver interactions. This relationship was explored through research question 3.

Weighting data. Data for the qualitative study were not weighted.

Credibility. Credibility emphasizes the importance of the close connection the researcher has with the data collection. The credibility, or internal validity, was enhanced by having the researcher develop, code, and interpret the data (Sandelowski, 1986); therefore, the first author was the primary coder of the social behavior categories. The behaviors identified as social behaviors were credible if other individuals could recognize them (Sandelowski, 1986). After I examined three video recordings (one from each age group of 12-, 24-, and 36-month-old children), I consulted a postdoctoral research fellow to see if the behaviors could be observed by another individual. Two video recordings within each age group (six video recordings total) were coded by the postdoctoral research fellow as the operational definitions of the categories were explored. For these samples, we watched the videotapes
concurrently and discussed the behavior to be recorded every 10-seconds. The code we agreed upon was recorded and modifications to operational definitions were corrected, if necessary.

**Fittingness.** Fittingness relates to the importance of collecting qualitative data in a natural setting with few controlling conditions (Sandelowski, 1986). It is most closely associated with external validity. Fittingness relates to generalizability of the data to new situations. Specifically, it is important for studies to be designed to represent the specified group of interest. To address fittingness, several variables were considered. First, these data were collected in a naturalistic environment with familiar caregivers, which should make the results more applicable to naturalistic observations of child behavior. A sample of 5-children from each of three age groups (i.e., 12-, 24-, or 36-months; 15-children total) were selected to help illuminate social behaviors that can be observed in infants and toddlers. To control for any order effect of the toys in the DPA data, the five samples selected in each age group included the toys presented in a different order. Each of the four toy sets was presented first at least once in each age group. This helped control for any differences among toy sets, such as if one set encouraged more social interactions than the other toy sets. Although this small sample of data would not contain the exhaustive social behaviors exhibited by 12-, 24-, and 36-month old children, it provided a meaningful
description of what types and categories of social behaviors are displayed by young children in a natural play environment with a familiar caregiver.

**Confirmability.** Finally, confirmability emphasizes the meaningfulness of the findings. Confirmability values subjectivity as the data is interpreted. I believe that the behaviors observed in this qualitative analysis represent observable social behaviors in early childhood. To further evaluate these behaviors across ages, I conducted a more extensive research study with 60 additional participants (75 participants total). Further evaluation of the meaningfulness of the social behavior categories was conducted by exploring the relationship between child and caregiver social behaviors. In addition, I was interested in exploring the relationship between the behaviors identified and the measures of social, communication, cognitive, and play abilities in the Project Play database. These additional analyses are explored below.

**Quantitative Procedures**

**Observation length.** In order to evaluate the social behavior categories identified through the qualitative methodology, it was necessary to determine a way to measure these observable behaviors to evaluate them quantitatively. Based on the literature review, current observation lengths to measure social behaviors in early childhood vary from 5-minutes (Schrepferman, Eby, Snyder, & Stropes, 2006) to up
to 60-minutes (Baggett et al., 2010; Landry et al., 1997). Rubin recommended observing in 5-minute intervals across several days, with at least 15-minutes of total observation time for the POS (2001). For the SocBS, Pierce-Jordan and Lifter (2005) observed in 5-minute intervals across four days of observation for a total of 20-minutes of assessment. Parten observed children for 1-minute each day (1932) across several weeks of observation. For observations between caregivers and children of infants and toddlers, Crawley and Spiker (1982) coded 10-minutes of a videotape because they reported 20-minutes was too long to reliably observe behavior of children ages 13- to 28-months-old.

Because extant video recordings from the DPA were only available from one 30-minute DPA observation for each participant at each age, children were only able to be observed once. When designing this study to observe social behavior during the DPA, one goal was to allow the children to play with at least two different toy sets as the toys were not normed for social behaviors. A 14-minute observation length was selected for this research. In the DPA, children were presented with a different set of toys every 7-minutes; therefore, a 14-minute observation allowed the child-caregiver dyads to have the opportunity to play with two different toy sets within the DPA video recordings.
In addition to determining the length of the overall observation, it was also necessary to determine how to record behavior. The POS (Rubin, 2001) used a 10-second observation interval, where the observer recorded the behavior that occurred most often during the 10-seconds; the SocBS (Pierce-Jordan & Lifter, 2005) used event recording to record each instance and duration of behavior; and Parten's scale consisted of observing for 1-minute and then recording behavior at the end of the observation. Similar to the overall observation length, there was little consensus in the literature to determine how frequently to record behavior. The POS (Rubin, 2001) was the most commonly used assessment in the literature, and it employed a 10-second interval recording system. Therefore, a 10-second partial interval procedure was selected to record the children's social behaviors across the 14-minute observation for this research study.

For a partial interval procedure, behavior is recorded if it occurs at any time during the specified interval. As such, the child's behavior was observed for 10-seconds and at the end of 10-seconds the observer recorded the child's behavior into one of the four categories of social behavior. The observer recorded the highest category of behavior that was observed, regardless of how long the behavior occurred using the following hierarchy: No Acknowledgement (lowest), Acknowledgement, Attention Seeking, Engagement (highest). The highest behavior was selected, to make
the observation system feasible for the observer. Other systems, such as recording the behavior that occurred for the greatest duration of time or the behavior that occurred most frequently would require the observer to monitor much more than just the qualitative level of social behavior. Measuring duration, the observer would have to monitor how long each behavior occurred. Measuring the behavior that occurred most frequently could also be difficult as social behavior does not necessarily have a discrete beginning and end, so it would be difficult to determine which behavior occurred most frequently. As such, it was decided to record the behavior that occurred qualitatively at the highest level to make the recording system feasible for the observer.

Only one category was coded for each interval in order to make the observation system feasible as well. If the observer was required to record behavior in all categories, the observer may have to spend two to three seconds recording the data, and would not be observing the child for the full 10-seconds. By only recording one behavior, the observer needed to briefly (less than one second) look away from the video recording at the end of every 10-seconds, allowing for a more accurate assessment of observed behavior.

**Coding the caregivers' behaviors.** Every sixth 10-second interval (once per minute), the caregiver's behavior was observed to provide an estimate of the
caregiver's social behavior. No research was available in the early childhood literature to recommend how frequently caregiver behavior should be recorded. The Behavioral Observation of Students in Schools (BOSS; Shapiro, 2011) is one of the most widely used systematic direct observation measures to record student behavior in elementary and secondary school settings. This system recommends using a 15-second observation interval to record student behavior for 15 minutes. Every fifth interval (once per minute) the behavior of a comparison peer is observed. An estimate of the comparison peer’s behavior is then compared to the child's behavior to determine the behavioral standards in the classroom. Assuming a reciprocal relationship between caregiver and child social behaviors, based on the BOSS system, observing the caregiver once per minute should provide enough of an estimate of the caregiver's behavior to compare with the child's behavior. Therefore, the same 10-second partial interval procedures were used to record caregiver behavior.

Because the third research question was explicitly concerned with the correlation between child and caregiver behavior, the same categories and the same hierarchy of behavior were used to record caregiver behavior: No Acknowledgement (lowest), Acknowledgement, Attention Seeking, Engagement (highest). By recording the behaviors into the same categories, this study was better be able to compare the
relationship between caregiver and child social behavior (see Appendix A for operational definitions of caregiver behavior).

In summary, observations were recorded every 10-seconds for 14-minutes. Child behavior was recorded into only one of the four categories of social behavior at the end of each 10-second interval. Once per minute child behavior was not observed, and caregiver behavior was observed and recorded. Therefore, there were a total of 70 intervals for which child behavior was observed and 14 intervals for which caregiver behavior was observed.

**Interobserver agreement.** One disadvantage of the first author coding the data was that the observer was not blind to the study characteristics. Sandelowski (1986) cautions that closeness to the study both enhances and threatens the study. It was therefore important to ensure that the data could be described and interpreted by more than just the first author. Interobserver agreement was conducted every five videos, resulting in 15 of the 75 video recordings being coded by a second observer. A second observer coded a participant that had already been coded. The second coder was a first year graduate student in the school psychology doctoral program who was trained in the coding system using three video recordings (i.e., one video sample from each age group).
Inter-Rater Reliability

Interobserver Agreement (IOA; Landis & Koch, 1977) using Kappa (Cohen, 1960) and Intra-class correlations (ICC; Cohen, 1960) were used to measure inter-rater reliability. Inter-rater reliability is determined by measuring agreement. Specifically, it measures whether two raters who independently code the data are able to be interchangeable (i.e., are coding the same behaviors consistently). Reliability can range from -1, representing no agreement between the raters, and +1, representing complete agreement between raters. Twenty percent of the samples within each age range were randomly selected and coded by a second observer. An agreement of .80 has been used in the literature as representing a reliable estimate that the two raters coded the observed behavior into the same categories (Krippendorff, 2004). Lower estimates (i.e., above .60) are acceptable if only tentative conclusions about the reliability are assumed. For the purposes of this study, the goal for inter-rater reliability was set at a level at or above .60. Because reliability, measured using Kappa, for the first 5 video recordings was below .60, the two raters discussed all areas of disagreement for the first 10 video recordings until they reached 100% agreement for all behaviors for which they disagreed. This helped control for experimenter expectancies and ensured that the coding system could be implemented by a second coder who was less familiar with the study characteristics. A total of 15
(of the 75) video recordings were coded by the second observer. This was a pilot study, so it was important to make sure that the observation categories could be identified by two observers in order to make any reliable conclusions about the data.

As disagreements were discussed for the first 10 videos, it was discovered that disagreements usually occurred between the Attention Seeking and Engagement categories or between the No Acknowledgement and Acknowledgement categories. This suggests that the categories are scaled and inter-rater reliability should be weighted to control for disagreements that occur (i.e., a difference between No Acknowledgement and Engagement is weighted more than a disagreement between Attention Seeking and Engagement). If the categories are equally spaced, weighted kappa is recommended; however, we did not know the relationship among our social behaviors (Fleiss & Cohen, 1973). Therefore, ICC was selected to provide an additional measure of interrater reliability that controls for the mean difference between raters as a component of variability (Fleiss & Cohen, 1973).

**IOA.** Interobserver agreement was calculated using the Kappa coefficient, where

\[
K = \frac{p_o - p_e}{1 - p_e}
\]

The Kappa coefficient \(K\), represents the proportion of intervals in which there is agreement \(p_o\) after chance agreement \(p_e\) is excluded. The relative strength
of agreement for the Kappa statistic was determined using Landis and Koch's (1977) labels (< 0 = poor; 0.0 - .2 = slight; .21-.40 = fair; .41-.60 = moderate; 0.61-0.80 = substantial; 0.81-1.00 = almost perfect). The relative strength of overall IOA for current study was .70 (range .48 - 1.0), which using Landis and Koch's (1977) labels suggests moderate (0.41-0.60) to almost perfect agreement (0.81-1.00). Agreement was slightly higher for intervals that included only child observations (K = .68, range .34 - 1.0) than intervals that included only caregiver observations (K = .63, range .13 - 1.0).

**ICC.** Intra-class correlations for the two raters were also calculated. ICC measures the consistency of the two raters for grouped data. For the current data set, raters coded behavior into one of four social behavior categories every interval. The relationship (e.g., linear, quadratic, curvilinear) among the categories was unknown when the raters coded the data. ICC allows for meaningful correlation of measurements when there is no known way to order the measurements within a group. The reliability program within SPSS (IBM Corp., 2010) was used to calculate the alpha statistic where

\[
\alpha = \frac{MS - MS_R}{MS + (df \times MS_R)}
\]

MS represents the mean square of the measures, MS_R represents the mean square of the residual, and df represents the degrees of freedom of the coders. The
alpha statistic for the two raters was 0.86 (range 0.75-1.00) suggesting consistency in measuring the four social behaviors for the two raters. Similar to Kappa, ICC was slightly higher for intervals that included only child observations (\( \alpha = .86 \), range .66 - 1.0) than intervals that included only caregiver observations (\( \alpha = .77 \), range .40 - 1.0).

**Research Questions and Planned Analyses**

**Research Question 1:** *What observable social behaviors can be identified in 12-, 24-, and 36-month old children during a 14-minute sample of play occurring in a natural environment?* Observations were recorded every 10-seconds for 14-minutes as the operational definitions of the social categories were developed. There were a total of 70 intervals for which child behavior was observed and 14 intervals for which caregiver behavior was observed. Within each behavior category, the number of intervals in which that behavior was observed during the video recordings was summed to determine the total number of behaviors observed for each category. The means and standard deviations for the 5 children observed within each of the three age groups were evaluated for trends across ages for both children and their caregivers.

**Research Question 2:** *Are there differences in the proportion of categories of social behaviors (as determined by analyses in Research Question 1) displayed*
among 12-, 24-, and 36-month old children? Observations were recorded every 10-
seconds for 14-minutes. Therefore, there were a total of 70 intervals for which child
behavior was observed. Within each behavior category, the number of intervals in
which that behavior was observed during the video recordings was summed to
determine the total number of behaviors observed for each category. Using the
Statistical Package for the Social Sciences version 19 (SPSS; IBM Corp., 2010), four
new variables were created for each child representing the total number of intervals
observed for each of the four behavior categories. To convert these numbers to
proportions, these four new total variables were then divided by 70 (the total number
of intervals for which child behavior was observed). The result represents a
proportion of how frequently behavior occurred in each category. By converting the
data to proportions, comparisons could more easily be made across categories. The
converted proportional data for each behavior category were used as the variables
measuring social behavior in all data analyses.

Repeated measures analysis of variance (ANOVA) was conducted in SPSS
(IBM Corp., 2010) to determine if there was a change in social behaviors across 12-,
24-, and 36-month children. As the four behavior categories were observed for all
children, the converted proportional data for each behavior category were used as the
four continuous dependent variables in this analysis. The four social behavior
categories represented the within-subjects independent variables, and the three age groups were used as the between-subjects independent variable. This research question allowed for the exploration of both main effects and interaction effects. Of particular interest to this study were whether there was an interaction between social behavior category and age. Specifically, the ANOVA determined whether changes observed across the four social behavior categories were different for 12-, 24-, and 36-month-old children. Main effects were measured with the ANOVA. The main effect of social behavior category was evaluated through exploration of whether there were changes in the proportion of social behaviors observed across the four social behavior categories. The main effect of age was measured by determining if there were differences in the proportion of social behaviors observed for 12-, 24-, and 36-month-old children.

**Research Question 3:** Is there a positive correlation between the child and the caregiver social behavior categories (as determined by analyses in Research Question 1)? Caregiver social behavior was observed once per minute. Similar to child behavior, caregiver behavior was summed for each of the four categories. As the observation occurred over a total of 14 minutes, the sum of caregiver social behavior was divided by 14 (the number of observed intervals) to represent a proportion of how frequently behavior occurred in each category. Pearson product-
moment correlations between the proportion of child and caregiver social behaviors were calculated using SPSS (IBM Corp., 2010) to determine if there was a positive correlation between caregiver social behavior and child social behavior for the overall sample and within each age group. Pearson product-moment correlations were selected because both the caregiver and the child social behavior category variables were continuous variables. In addition, it was assumed that there would be a linear relationship among these variables, such that higher levels of child social behavior scores would be related to higher levels of caregiver social behavior. Because of this, the Pearson correlation was the appropriate statistic for these analyses.

Research Question 4: Is there a positive correlation between categories of social behaviors (as determined by Research Question 1) and other related measures in the Project Play Database? Pearson product-moment correlations between the proportion of child social behavior, the four categories of play behavior DPA, and the BDI-2-ST Personal-Social, Cognitive, and Communication domains were conducted in SPSS (IBM Corp., 2010). Pearson product-moment correlations were represented in a matrix. A correlation matrix (Campbell & Fiske, 1959) allows for correlations among unrelated constructs collected by various methods to be conducted. Therefore, analyses were conducted among all of the variables available (a) the four social behavior categories: No Acknowledgement, Acknowledgement, Attention Seeking,
and Engagement; (b) the total score, age equivalent, and the five BDI-2-ST domain scores: Adaptive, Personal-Social, Communication, Motor, and Cognitive; and (c) the four DPA scores: DPA-I, DPA-S, DPA-B, and DPA-Q. Correlations were used to determine if any of the social categories, developmental scores, or play scores were correlated for the overall sample and within each age group. Correlations represented in this matrix could be used to provide evidence of convergent and discriminant validity.
Chapter Four

Results

The first research question qualitatively explored what social behaviors were displayed in early childhood. Research questions 2 through 4 were addressed statistically using SPSS version 19 (IBM Corp., 2010) and the results are presented below. The second research question evaluated the differences among ages as measured by the four categories of social behavior using a repeated measures analysis of variance. An overview of the assumptions that were tested is presented, followed by the results of the analysis. The third research question compared the four categories of child social behavior to the four categories of caregiver behavior. Correlations for each age group and for the sample as a whole were computed. Finally, the fourth research question explored the relationship between the four social categories of children's behavior, the BDI-2-ST developmental inventory domain scores, and the DPA play observation scores to determine if the social behaviors identified are related to the cognitive, communication, personal-social, and play measures available in the Project Play Database. Correlations are presented for the overall sample as well as for each age group to evaluate these relationships. Using a multi-trait, multi-method matrix, correlations will also be described as evidence of construct (convergent and discriminant) validity (Campbell & Fiske, 1959).
Research Question 1: Exploration of Social Behaviors

The first research question was: what observable social behaviors can be identified in 12-, 24-, and 36-month old children during a 14-minute sample of play occurring in a natural environment? To explore what social behaviors are observed in 12-, 24-, and 36-month old children, the means and standard deviations for the 5 children observed within each of the three age groups were evaluated for trends across ages for both children and their caregivers. Observations were recorded every 10-seconds for 14-minutes as the operational definitions of the social categories were developed. There were a total of 70 intervals for which child behavior was observed and 14 intervals for which caregiver behavior was observed. Within each behavior category, the number of intervals in which that behavior was observed during the video recordings was summed to determine the total number of behaviors observed for each category. Table 5 displays the means of the four categories of behavior across ages for both children and their caregivers.
Table 5

*Number of Intervals Social Behaviors were Observed for the Children and their Caregivers according to Age*

<table>
<thead>
<tr>
<th>Social Behavior Categories</th>
<th>12 months M</th>
<th>12 months SD</th>
<th>24 months M</th>
<th>24 months SD</th>
<th>36 months M</th>
<th>36 months SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child Behaviors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Acknowledgement</td>
<td>14.60</td>
<td>4.04</td>
<td>9.20</td>
<td>7.98</td>
<td>13.40</td>
<td>10.19</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>36.00</td>
<td>4.36</td>
<td>16.00</td>
<td>8.57</td>
<td>14.80</td>
<td>6.61</td>
</tr>
<tr>
<td>Attention Seeking</td>
<td>17.20</td>
<td>5.54</td>
<td>39.00</td>
<td>15.51</td>
<td>21.60</td>
<td>6.07</td>
</tr>
<tr>
<td>Engagement</td>
<td>2.20</td>
<td>1.92</td>
<td>5.20</td>
<td>5.63</td>
<td>19.80</td>
<td>9.76</td>
</tr>
<tr>
<td><strong>Caregiver Behaviors</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Acknowledgement</td>
<td>0.40</td>
<td>0.55</td>
<td>0.00</td>
<td>0.00</td>
<td>0.40</td>
<td>0.55</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>5.60</td>
<td>3.85</td>
<td>2.60</td>
<td>2.30</td>
<td>2.80</td>
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<td>Attention Seeking</td>
<td>2.40</td>
<td>2.07</td>
<td>0.60</td>
<td>0.89</td>
<td>1.40</td>
<td>1.14</td>
</tr>
<tr>
<td>Engagement</td>
<td>4.40</td>
<td>2.41</td>
<td>10.60</td>
<td>2.30</td>
<td>7.20</td>
<td>1.48</td>
</tr>
</tbody>
</table>

More Acknowledgement behaviors occurred at 12-months ($M = 36.00$, $SD = 4.36$) than at 24-months ($M = 16.00$, $SD = 8.57$) or 36-months ($M = 14.00$, $SD = 6.61$); more Attention Seeking behaviors occurred at 24-months ($M = 39.00$, $SD = 15.51$) than at 12-months ($M = 17.20$, $SD = 5.54$) or 36-months ($M = 21.60$, $SD = 6.07$).
and more Engagement behaviors occurred at 36-months ($M = 19.80$, $SD = 9.76$) than at 12-months ($M = 2.20$, $SD = 1.92$) or 24-months ($M = 5.20$, $SD = 5.63$).

In summary, the 12-month old children displayed the highest frequency of Acknowledgement behaviors, the 24-month old children displayed the highest frequency of Attention Seeking behaviors, and the 36-month old children displayed the highest frequency of Engagement behaviors. This suggests that with typically developing children, these social behaviors may represent a different categories of social play behaviors across development. These qualitative data provided support to further evaluate the relationship among age and social behaviors with a larger sample size.

For caregivers (see Table 5), few behaviors were observed across ages for the No Acknowledgement and Attention Seeking categories. Caregivers of 12-month-old children were observed primarily in Acknowledgement and Engagement behavior categories ($M = 5.60$, $SD = 3.85$; $M = 4.40$, $SD = 2.41$ respectively) and Engagement behaviors were the primary behaviors observed for caregivers of the 24-month ($M = 10.60$, $SD = 2.30$) and 36-month ($M = 7.20$, $SD = 1.48$) children. This suggests that caregivers of all age groups displayed Engagement behaviors. There were few caregiver behaviors observed overall, so more data should be collected to evaluate caregiver behavior in the other categories.
Research Question 2: Differences among Age and Categories of Social Behavior

The second research question was: Are there differences in the proportion of categories of social behaviors (as determined by analyses in Research Question 1) displayed among 12-, 24-, and 36-month old children? To evaluate this question the number of 10-second intervals in which each of the behaviors occurred over the 14-minute observation was summed for each of the four categories. These numbers were then divided by 70 (the total number of intervals for which child behavior was observed), to represent a proportion of how frequently behavior occurred. Repeated measures analysis of variance (ANOVA) was used to determine if there were differences in the proportions of the four social behaviors measured in 12-, 24-, and 36-month old children.

Assumptions. Before computing the ANOVA, the assumptions for a mixed-model repeated measure ANOVA were tested. Each assumption is discussed below.

Normality. To test the assumption of normality of sampling distributions of the proportions of the total score within each cell, the Shapiro-Wilk test, Skewness, Kurtosis, and Q-Q plots were computed for each of the four social categories using all 75 participants (see Table 6). Significance values for Skewness and Kurtosis were calculated by dividing the Skewness (or Kurtosis) by the standard error. Significance greater than plus or minus two was used to determine whether Skewness and Kurtosis
violated the assumption of normality. The Shapiro-Wilk test was used to determine whether each category violated the assumption of normality. The proportion of Acknowledgement was the only variable that did not violate the Shapiro-Wilk test and was considered normally distributed ($p = .143$). The proportions of the other three variables (No Acknowledgement, Attention Seeking, and Engagement) were positively skewed and their Shapiro-Wilk $p$-values were less than .001 suggesting non-normality as there was a shift in the center of the distribution toward lower proportions. ANOVA is relatively robust to violations of this assumption if there are at least 20 degrees of freedom for error and no outliers (Tabachnick & Fidell, 2007). This model had 72 degrees of freedom for error, but both univariate and multivariate outliers were present for the proportions of the No Acknowledgement, Attention Seeking, and Engagement variables. Tabachnick and Fidell (2007) recommend that transformation of variables to improve normality because statistical inference becomes less robust as distributions depart from normality. If positively skewed distributions differ only moderately from normality, the square root transformation is tried; if the distribution differs substantially, the logarithm transformation is tried; and if the distribution is severely skewed, the inverse transformation is tried (Tabachnick & Fidell, 2007). Tabachnick and Fidell (2007) recommend trying transformations to find the transformation that produces (1)
skewness and kurtosis values closest to zero, (2) the best graph with visual inspection, or (3) the fewest outliers.

Because the purpose of this study was exploratory to determine how social behaviors develop, the proportions of the three variables (No Acknowledgement, Acknowledgement, and Engagement) were transformed using a square root transformation. After this transformation, the proportion of the No Acknowledgement and the proportion of the Attention Seeking variables no longer violated this assumption and were normally distributed ($p = .78$ and $.64$ respectively). After conducting a log transformation and inverse transformation, the square root transformation was also the most appropriate transformation for the proportion of Engagement variable based on visual inspection of the data, the Shapiro-Wilk test ($p = .002$) and measures of Skewness (0.562) and Kurtosis (-.484).
Table 6

*Normality Statistics for Child Social Behavior Categories*

<table>
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<tr>
<th></th>
<th>No Ack</th>
<th>Ack</th>
<th>Att Seek</th>
<th>Engage</th>
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<td><strong>Initial</strong></td>
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<td>Skewness</td>
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<td>.28</td>
<td>.28</td>
<td>.28</td>
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<tr>
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<td>.675</td>
<td>3.21*</td>
<td>5.70*</td>
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<tr>
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<td>Std. Error</td>
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<td>.55</td>
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<td>.55</td>
<td>.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td>-.54</td>
<td>-.91</td>
<td>-.51</td>
<td>-.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shapiro-Wilk Significance</td>
<td>.78</td>
<td>.14</td>
<td>.64</td>
<td>.002*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* * Indicates a violation of the assumption tested for Normality. Significance was calculated by dividing Skewness (or Kurtosis) by the Standard Error. Significance greater than ±2 violates the assumption of Normality. Ack = Acknowledgement; Att Seek = Attention Seeking.
Outliers. After the square root transformation of the proportion of No Acknowledgement, Attention Seeking, and Engagement variables, visual inspection of box plots showed no univariate outliers. No univariate outliers were identified for the non-transformed proportion of Acknowledgement variable. The Mahalanobis distance, which measures the distance between a point and the centroid of the other cases, was calculated to evaluate multivariate outliers. The maximum Mahalanobis distance (18.33) was less than the .001 chi-squared level of 18.47 which is the critical Chi-square value for four dependent variables, suggesting no multivariate outliers were present.

Independence of observation. The assumption of independence of observations assumes that each of the observations was independent of every other observation. This study was designed to measure individual children within a one-month window of their birthdays. Data were collected within the family home during individual home visits. As such, the assumption of observational independence was met.

Linearity. The assumption of linearity assumes there is a straight-line relationship between two variables (Tabachnick & Fidell, 2007). After plotting each pair of social behavior variables for each age group, for each pair of variables for the overall sample an assumption of linear relationship seemed reasonable.
**Homogeneity of variance.** Homogeneity of variance assumes that the variability in scores for one continuous variable (social behavior category) is the same at all values of another continuous variable (a different social behavior category). Levene's test of equality of error variances was found to be not significant for the transformed proportion of No Acknowledgement ($F(2, 72) = 2.82, p = .066$) and the transformed proportion of Attention Seeking ($F(2, 72) = 1.48, p = .234$) variables, suggesting homogeneity of variance. The proportion of Acknowledgement ($F(2, 72) = 3.79, p = .027$) and the transformed proportion of Engagement variables were significant ($F(2, 72) = 3.62, p = 0.32$), suggesting violation of the assumption of homogeneity of variance. This test is relatively robust to violations when there is the same number of participants within each group. In addition, a more stringent significance level ($p = .01$) was used to evaluate the results of the ANOVA, to control for the violation of this assumption.

Box's Test of Equality of Covariance (Box's M) was significant ($F(20, 189608) = 91.60, p < .001$). Because there was an equal number of participants within each group, it was unnecessary to evaluate Box's M because this violation will not impact the interpretability of the results.

**Absence of multicollinearity.** To ensure that the four social behaviors were measuring different constructs, multicollinearity was measured. The potential for
multicollinearity was assessed by evaluating the Pearson correlations between the
dfour measures of social behavior, too highly correlated variables suggest
multicollinearity (Tabachnick & Fidell, 2007). Acknowledgement was negatively
related to the square root of the proportion of Attention Seeking \( (r = -.58, p < .001) \)
and the square root of the proportion of Engagement \( (r = -.68, p < .001) \) behaviors
and positively correlated with the square root of the proportion of No
Acknowledgement \( (r = .33, p = .004) \) behaviors. The square root of the proportion of
Attention Seeking variable and the square root of the proportion of Engagement
variable were both negatively associated with the square root of the proportion of No
Acknowledgement variable \( (r = -.47, p < .001; \text{ and } r = -.46, p < .001 \text{ respectively} \)
and were not correlated with each other \( (r = .057, p = .63) \). These correlations suggest
the absence of multicollinearity as no Pearson correlation was greater than 0.70
(Tabachnick & Fidell, 2007).

**Sphericity.** The sphericity assumption assumes that all pairs of within-subjects
variables have equal correlations (Tabachnick & Fidell, 2007). Sphericity was
measured using Mauchly's test of sphericity. This assumption was violated because
the test was significant \( (\text{Mauchly's } W = .75, \text{ Approximate Chi-Square} = 20.66, p = .001) \); therefore, the Greenhouse-Geisser measure \( (\epsilon = .830) \), which does not
assume sphericity was used to evaluate the within-subjects effects of the data (Tabachnick & Fidell, 2007).

ANOVA. Repeated measures analysis of variance (ANOVA) was conducted to determine if there were differences in the proportions social behaviors in 12-, 24-, and 36-month children (see Table 7, Figure 1, and Figure 2). As the four behavior categories were observed for all children, the converted proportional data for each behavior category were used as the four continuous dependent variables in this analysis. The four social behavior categories represented the within-subjects independent variables, and the three age groups were used as the between-subjects independent variable. This analysis allowed for the exploration of both main effects and interaction effects. Of particular interest to this study were whether there was an interaction between social behavior category and age. Specifically, the ANOVA determined whether differences observed across the four social behavior categories were different for 12-, 24-, and 36-month-old children. The Greenhouse-Geisser measure of the interaction between social categories and age was significant ($F (4.98, 179.24) = 21.76, p < .001, \text{partial eta squared} = .377$). Using Cohen's (1988) guidelines for effect size, (.01 = small, .09 = medium, .25 = large), partial eta squared = .377 indicates a large effect (Tabachnick & Fidell, 2007). This test deviates significantly from the parallelism hypothesis, which measures whether different
groups have parallel profiles. Parallelism tests the interaction and the significance suggests that there was an interaction between age and social category (Tabachnick & Fidell, 2007). Therefore, the data should first be interpreted by examining this interaction.

Table 7

ANOVA Statistics for Child Social Behavior Categories and Age

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
<th>Partial Eta Sq</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>3.57</td>
<td>6</td>
<td>.594</td>
<td>21.76</td>
<td>.000</td>
<td>.38</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>3.57</td>
<td>4.98</td>
<td>.716</td>
<td>21.76</td>
<td>.000</td>
<td>.38</td>
</tr>
<tr>
<td>Huynh Feldt</td>
<td>3.57</td>
<td>5.31</td>
<td>.671</td>
<td>21.76</td>
<td>.000</td>
<td>.38</td>
</tr>
<tr>
<td><strong>Social Category</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>2.82</td>
<td>3</td>
<td>.94</td>
<td>34.40</td>
<td>.000</td>
<td>.32</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>2.82</td>
<td>2.49</td>
<td>1.13</td>
<td>34.40</td>
<td>.000</td>
<td>.32</td>
</tr>
<tr>
<td>Huynh Feldt</td>
<td>2.82</td>
<td>2.66</td>
<td>1.06</td>
<td>34.40</td>
<td>.000</td>
<td>.32</td>
</tr>
<tr>
<td><strong>Error</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>5.90</td>
<td>216</td>
<td>.027</td>
<td></td>
<td></td>
<td>.027</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>5.90</td>
<td>179.24</td>
<td>.033</td>
<td></td>
<td></td>
<td>.033</td>
</tr>
<tr>
<td>Huynh Feldt</td>
<td>5.90</td>
<td>191.32</td>
<td>.031</td>
<td></td>
<td></td>
<td>.031</td>
</tr>
</tbody>
</table>
### Between Subjects Effects

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.019</td>
<td>2</td>
<td>.009</td>
<td>3.50</td>
</tr>
<tr>
<td>Error</td>
<td>.190</td>
<td>72</td>
<td>.003</td>
<td></td>
</tr>
</tbody>
</table>

**Interaction.** Specifically, the proportion of Acknowledgement behaviors showed a decreasing trend across age, occurring the most frequently in 12-month-old children and the least frequently in 36-month-olds children. On the other hand, the square root of the proportion of Engagement behaviors showed an increasing trend with age, occurring least frequently in 12-month-old children and most frequently in 36-month-old children. The transformed proportion of Attention Seeking behaviors tended to occur more frequently than other types of behaviors, and occurred more frequently in 24-month-old children than 12- and 36-month-old children. The transformed proportion of Attention Seeking behaviors supported a quadratic trend, increasing then decreasing with age. Figure 2 illustrates that similar levels of the square root of the proportion of No Acknowledgement behaviors occurred across ages. This result suggests that there may be a developmental pattern for the proportion of Acknowledgement behaviors (decreasing trend) and the square root of the proportion of Engagement behaviors (increasing trend), but the square root of the proportion of No Acknowledgement and the square root of the proportion of
Attention Seeking behaviors do not show a linear developmental trend with age (see Figure 1).

*Figure 1.* Proportion of intervals child social behavior was observed, on average, for the four categories of social behavior across the three age groups.
Figure 2. Proportion of intervals child social behavior was observed, on average, for the three age groups across the four categories of social behavior.
Table 8

Proportion of Intervals Social Behavior was Observed for Children across Ages

<table>
<thead>
<tr>
<th>Social Behavior Categories</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>No Acknowledgement</td>
<td>.19</td>
<td>.084</td>
<td>.14</td>
<td>.13</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>.52</td>
<td>.10</td>
<td>.32</td>
<td>.18</td>
</tr>
<tr>
<td>Attention Seeking</td>
<td>.27</td>
<td>.12</td>
<td>.43</td>
<td>.21</td>
</tr>
<tr>
<td>Engagement</td>
<td>.023</td>
<td>.025</td>
<td>.099</td>
<td>.099</td>
</tr>
</tbody>
</table>

Initial Child Behaviors

Child Behaviors After Transformation

| Sq Root No Ack | .42 | .11 | .34 | .15 | .32 | .17 | .36 | .15 |
| Acknowledgement | .51 | .10 | .32 | .18 | .23 | .13 | .36 | .18 |
| Sq Root Attention Seek | .51 | .11 | .63 | .18 | .55 | .13 | .56 | .15 |
| Sq Root Engagement     | .12 | .09 | .27 | .16 | .54 | .18 | .31 | .23 |

Note. Percentages of Child Behaviors After Transformation do not add up to 1 because three of the variables were transformed using a square root transformation. Sq Root = Square Root; Ack = Acknowledgement.

Four social categories. Because there was an interaction, the main effects are described in terms of the interaction among social behaviors and age. There was a main effect of social category based on the Greenhouse-Geisser adjustment in SPSS.
(\(F (2, 49, 179.24) = 34.40, p < .001\), partial eta squared = .323). This statistic tests the flatness hypothesis and indicates that the four social categories were variable, not flat. This result was especially evident in the trends shown in Figures 2 and 3. The proportion of Acknowledgement behaviors decreased with age and the square root of the proportion of Engagement behaviors increased with age, suggesting an inverse relationship between these two categories. The square root of the proportion of No Acknowledgement and the square root of the proportion of Attention Seeking behaviors did not vary as much with age, suggesting that the variability in social categories was most pronounced for the proportion of Acknowledgement and the square root of the proportion of Engagement behaviors.

**Age.** There was a main effect of age (\(F (2, 72) = 3.50, p = .035\), partial eta squared = .089) suggesting moderate differences among social behaviors of 12-, 24-, and 36-month-old children. Overall, children of all ages were observed displaying social behaviors. Because there was an interaction among social categories and age, the data are best interpreted by evaluating social behavior at each age (see Figures 2 and 3). Similar levels of the square root of the proportion of No Acknowledgement, the proportion of Acknowledgement, and the square root of the proportion of Attention Seeking behaviors were observed for 12-months olds, whereas the square root of proportion of Engagement behaviors occurred less frequently for 12-month-
old children. For 24-month-old children, similar levels of the square root of the proportion of No Acknowledgement, the proportion of Acknowledgement, and the square root of the proportion of Engagement behaviors were observed, and there were more square root of the proportion of Attention Seeking behaviors observed. For 36-month-old children, low levels of the transformed square root of proportion of No Acknowledgement and the proportion of Acknowledgement behaviors were observed. Contrarily, high levels of the square root of the proportion of Attention Seeking and the square root of the proportion of Engagement behaviors were observed. In summary, these results suggest an inverse relationship between 12-month-old and 36-month-old children as 12-month-old children displayed high levels of proportion of Acknowledgement behaviors and low levels of the square root of the proportion of Engagement behaviors and 36-month-old children displayed low levels of proportion of Acknowledgement behaviors and high levels of the square root of the proportion of Engagement behaviors. For 24-month-old children, proportion of Acknowledgement and the square root of the proportion of Engagement behaviors occurred at similarly low levels and the square root of the proportion of Attention Seeking behaviors occurred significantly more frequently, suggesting a quadratic trend for this age group. The square root of the proportion of No Acknowledgement behaviors occurred at a relatively stable rate across ages (see Figure 1).
Research Question 3: Relationship between Child and Caregiver Social Behavior

The third research question was: *is there a positive correlation between the child and the caregiver social behavior categories (as determined by analyses in Research Question 1)*? To analyze this question, caregiver behavior was observed once per minute using the same four categories used to observe child behavior (No Acknowledgement, Acknowledgement, Attention Seeking, and Engagement). The number of intervals in which each of the caregiver behaviors occurred was summed for each of the four categories. These numbers were then divided by 14 (the total number of observations for which caregiver behavior was observed), to represent a proportion of how frequently caregiver behavior occurred (see Table 9 and Figure 3). The child behaviors were also converted to a proportion, allowing direct comparison between the child and caregiver behaviors.

Table 9

*Proportion of Intervals Social Behavior was Observed in Caregivers across Ages*

<table>
<thead>
<tr>
<th>Social Behavior Categories</th>
<th>12 months M</th>
<th>12 months SD</th>
<th>24 months M</th>
<th>24 months SD</th>
<th>36 months M</th>
<th>36 months SD</th>
<th>Total M</th>
<th>Total SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Initial Caregiver Behaviors</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Acknowledgement</td>
<td>.031</td>
<td>.077</td>
<td>.063</td>
<td>.12</td>
<td>.043</td>
<td>.065</td>
<td>.046</td>
<td>.090</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>.36</td>
<td>.24</td>
<td>.29</td>
<td>.21</td>
<td>.22</td>
<td>.19</td>
<td>.2</td>
<td>.22</td>
</tr>
<tr>
<td>Attention Seeking</td>
<td>.13</td>
<td>.14</td>
<td>.054</td>
<td>.069</td>
<td>.060</td>
<td>.070</td>
<td>.083</td>
<td>.11</td>
</tr>
<tr>
<td>Engagement</td>
<td>.45</td>
<td>.24</td>
<td>.56</td>
<td>.27</td>
<td>.63</td>
<td>.22</td>
<td>.55</td>
<td>.25</td>
</tr>
</tbody>
</table>
Figure 3. Proportion of intervals caregiver behavior was observed, on average, for the four categories of social behavior across the three age groups.

Assumptions. To test the assumption of normality of sampling distributions of the proportions of the total score within each cell, the Shapiro-Wilk test, Skewness, Kurtosis, and Q-Q plots were computed for each of the four social categories of caregiver behavior using all 75 participants (see Table 10). Significance values for Skewness and Kurtosis were calculated by dividing the Skewness (or Kurtosis) by the standard error. Significance greater than plus or minus two was used to determine whether Skewness and Kurtosis violated the assumption of normality. The Shapiro-Wilk test was used to determine whether each category violated the assumption of
normality. Tabachnick and Fidell (2007) recommend trying transformations to find the transformation that produces (1) skewness and kurtosis values closest to zero, (2) the best graph with visual inspection, or (3) the fewest outliers. If positively skewed distributions differ only moderately from normality, the square root transformation is tried; if the distribution differs substantially, the logarithm transformation is tried; and if the distribution is severely skewed, the inverse transformation is tried (Tabachnick & Fidell, 2007). If the data are negatively skewed, then the data are reflected and then transformed (Tabachnick & Fidell, 2007).

The proportions of all three of the variables (No Acknowledgement, Acknowledgement, and Attention Seeking) violated the Shapiro-Wilk test (p-values were less than .001) and were positively skewed (see Table 10), suggesting non-normality as there was a shift in the center of the distribution toward lower proportions. The proportion of the Engagement variable was negatively skewed, suggesting non-normality with a shift in the center of the distribution toward higher proportions. ANOVA is relatively robust to violations of this assumption if there are at least 20 degrees of freedom for error and no outliers (Tabachnick & Fidell, 2007). This model had 72 degrees of freedom for error, but both univariate and multivariate outliers were present for the proportion of No Acknowledgement and the proportion of Attention Seeking variables. The square root, logarithmic, and inverse
transformations were tried on the proportion of all four variables. Based on Skewness, Kurtosis, the Shapiro Wilk test, and visual inspection of the histogram, the proportion of three variables (No Acknowledgement, Acknowledgement, and Attention Seeking) were transformed using a square root transformation because this represented the most normal distribution. The Engagement variable was not transformed because the untransformed variable appeared to have the most normal distribution based on visual inspection, skewness, kurtosis, and the Shapiro-Wilk test compared to the reflection of the square root, logarithmic, and inverse transformations.

Table 10

*Normality Statistics for Caregiver Social Behavior Categories*

<table>
<thead>
<tr>
<th></th>
<th>No Ack</th>
<th>Ack</th>
<th>Att Seek</th>
<th>Engage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>2.55</td>
<td>.71</td>
<td>2.42</td>
<td>- .44</td>
</tr>
<tr>
<td>Std. Error</td>
<td>.23</td>
<td>.28</td>
<td>.28</td>
<td>.28</td>
</tr>
<tr>
<td>Significance</td>
<td>11.09*</td>
<td>2.54*</td>
<td>8.64*</td>
<td>-1.57</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>6.74</td>
<td>-.10</td>
<td>9.54</td>
<td>-.59</td>
</tr>
<tr>
<td>Std. Error</td>
<td>.55</td>
<td>.55</td>
<td>.55</td>
<td>.55</td>
</tr>
<tr>
<td>Significance</td>
<td>12.25*</td>
<td>-.18</td>
<td>17.35*</td>
<td>1.07</td>
</tr>
<tr>
<td>Shapiro-Wilk Significance</td>
<td>.000*</td>
<td>.001*</td>
<td>.000*</td>
<td>.009*</td>
</tr>
</tbody>
</table>
Then linear relationships were tested for each pair of variables for the overall sample. The transformed square root of the proportion of No Acknowledgement and square root of the proportion of Attention Seeking behaviors occurred at very low rates for caregivers. Because there were so few data points, linear relationships were difficult to discern and any correlation with these variables should be interpreted cautiously. After plotting each pair of remaining social behavior variables for caregiver (square root of the proportion of Acknowledgement and the proportion of Engagement) and child behaviors (square root of the proportion of No

<table>
<thead>
<tr>
<th></th>
<th>Square Root No Ack</th>
<th>Square Root Ack</th>
<th>Square Root Att Seek</th>
<th>Engage</th>
</tr>
</thead>
<tbody>
<tr>
<td>After Transformation</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>1.34</td>
<td>-.43</td>
<td>.37</td>
<td>-.44</td>
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<tr>
<td>Std. Error</td>
<td>.28</td>
<td>.28</td>
<td>.28</td>
<td>.28</td>
</tr>
<tr>
<td>Significance</td>
<td>4.79*</td>
<td>-1.54</td>
<td>1.32</td>
<td>-1.57</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>.68</td>
<td>-.24</td>
<td>-.69</td>
<td>-.59</td>
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<tr>
<td>Std. Error</td>
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<td>.55</td>
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<tr>
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<td>27.2*</td>
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<tr>
<td>Shapiro-Wilk Significance</td>
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<td>.005*</td>
<td>.000*</td>
<td>.009*</td>
</tr>
</tbody>
</table>

* Indicates a violation of the assumption tested for Normality.
Significance was calculated by dividing Skewness (or Kurtosis) by the Standard Error. Significance greater than ±2 violates the assumption of Normality.

Ack = Acknowledgement; Att Seek = Attention Seeking.
Acknowledgement, the proportion of Acknowledgement, square root of the proportion of Attention Seeking, and square root of the proportion of Engagement), for each pair of variables, for the overall sample and within each age group, an assumption of linear relationship seemed reasonable.

**Correlations.** Correlations between child and caregiver social behaviors were calculated to determine if there was a relationship between caregiver social behavior and child social behavior within each age group and for the overall sample. Results are provided in Table 11. Cohen's (1992) guidelines were used to determine the strength of the relationship ($r = .10-.29 = \text{small}; r = .30-.49 = \text{medium}; r = .50-1.0 = \text{large}$).
Table 11

Correlations between the proportion of Child and Caregiver Social Behaviors

### 12-month-old children

<table>
<thead>
<tr>
<th>Child Behaviors</th>
<th>Caregiver Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sq Rt No Ack</td>
<td>Sq Rt Ack Att Seek</td>
</tr>
<tr>
<td>Ack</td>
<td>Sq Rt Eng No Ack</td>
</tr>
<tr>
<td></td>
<td>Sq Rt Ack Eng Eng</td>
</tr>
</tbody>
</table>

**Child Behaviors**

- Sq Rt No Ack: -.089, -.51**, -.090, .36, -.027, -.060, -.30
- Ack: -.76**, -.11, -.22, -.13, .20, .124
- Sq Rt Att Seek: -.045, -.12, .16, -.18, .092
- Sq Rt Engage: -.052, -.051, .11, .12

**Caregiver Behaviors**

- Sq Rt No Ack: -.27, -.10, -.26
- Sq Rt Ack: -.26, -.63**
- Sq Rt Att Seek: -.21

### 24-month-old children

<table>
<thead>
<tr>
<th>Child Behaviors</th>
<th>Caregiver Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sq Rt No Ack</td>
<td>Sq Rt Ack Att Seek</td>
</tr>
<tr>
<td>Ack</td>
<td>Sq Rt Eng No Ack</td>
</tr>
<tr>
<td></td>
<td>Sq Rt Ack Eng Eng</td>
</tr>
</tbody>
</table>

**Child Behaviors**

- Sq Rt No Ack: .099, -.62**, -.22, .42*, .12, .15, -.58**
- Ack: -.71**, -.44*, -.035, .23, .066, -.12
- Sq Rt Att Seek: .22, -.31, -.16, .074, .41*
- Sq Rt Engage: -.35, -.31, .047, .46*

**Caregiver Behaviors**

- Sq Rt No Ack: .23, -.10, -.75**
- Sq Rt Ack: -.18, -.65**
- Sq Rt Att Seek: .059
- Engage

Engage
### 36-month-old children

**Child Behaviors**

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**Caregiver Behaviors**

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### Overall Sample

**Child Behaviors**

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**Caregiver Behaviors**

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*Note.* *Correlation is significant at the .05 level

**Correlation is significant at the .01 level

Ack = Acknowledgement; Att Seek = Attention Seeking; Eng = Engagement; Sq Rt = Square Root.
**Overall Sample.** In order to determine if there was a relationship between child and caregiver behavior, it was important to determine the relationship between the proportion of caregiver and child behaviors for the same social categories. In the overall sample (see Table 11), there was a large positive correlation between the proportion of Engagement behaviors for caregivers and the square root of the proportion of Engagement behaviors for children ($r = .50, n = 75, p < .001$). There was a medium positive correlation between the square root of the proportion of No Acknowledgement behaviors for caregivers and children ($r = .33, n = 75, p = .009$). There was a small positive correlation between the square root of the proportion of Acknowledgement behaviors for caregivers and the proportion of Acknowledgement behaviors for children ($r = .24, n = 75, p = .010$). There was no significant correlation between the square root of the proportion of Attention Seeking behaviors for caregivers and children ($r = -.080, n = 75, p = .49$). These results suggest that high rates of square root of the proportion of Engagement, the square root of the proportion of No Acknowledgement and the proportion of Acknowledgement behaviors for children were related to higher rates of these behaviors in caregivers.

**Samples by Age.** For the 12-month-old children there were no significant relationships between child and caregiver behaviors (see Table 11). In the 24-month old sample, there was a medium positive relationship between the proportion of
Engagement behaviors of caregivers and the square root of the proportion of
Engagement behaviors of children \( (r = .46, n = 25, p = .019) \). Similarly, in 36-month-
old children there was a strong positive relationship between the proportion of
Engagement behaviors of caregivers and the square root of the proportion of
Engagement behaviors of children \( (r = .67, n = 25, p < .001) \). These data suggest that
the reciprocal nature of social interactions between caregivers and children was most
evident in the relationship between the proportion of Engagement behaviors for the
sample as a whole and for the 24- and 36-month age groups (see Table 11).

**Research Question 4: Relationship with Other Variables in Database**

The fourth research question was: *is there a positive correlation between
categories of social behaviors (as determined by Research Question 1) and other
related measures in the Project Play Database?* The four social categories were
correlated with BDI-2-ST and DPA scores using a correlation matrix (see Table 12).
A multi-trait, multi-method matrix (Campbell & Fiske, 1959) was used to provide
evidence of convergent and discriminant validity. BDI-2-ST raw scores were
converted to proportions, so that a comparison with the proportion of the four social
behavior categories could be more directly interpreted. To calculate the proportion,
the domain raw scores (Adaptive, Personal-Social, Communication, Motor, and
Cognitive) were divided by 40; the total score was divided by 200, as these numbers
represented the highest possible scores a child could attain. Because the child's social behavior category scores were also converted to a proportion, direct comparison between the four social behaviors and BDI-2-ST scores was possible.
Table 12

*Correlations among the proportion of Child Social Behavior, BDI-2-ST, and DPA Scores*

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Note: ** indicates significance at the .01 level, * indicates significance at the .05 level.
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</tr>
<tr>
<td>Sq Rt Att Seek</td>
<td>.16</td>
<td>.17</td>
</tr>
<tr>
<td>Sq Rt Engagement</td>
<td>.73**</td>
<td>.67**</td>
</tr>
<tr>
<td><strong>BDI-2-ST</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptive</td>
<td>.79**</td>
<td>.90**</td>
</tr>
<tr>
<td>Personal-Social</td>
<td>.78**</td>
<td>.71**</td>
</tr>
<tr>
<td>Comm</td>
<td>.86**</td>
<td>.79**</td>
</tr>
<tr>
<td>Motor</td>
<td>.73**</td>
<td>.88**</td>
</tr>
<tr>
<td>Cognitive</td>
<td>.89**</td>
<td>.89**</td>
</tr>
<tr>
<td>Age Equiv</td>
<td>.99**</td>
<td>-.62**</td>
</tr>
<tr>
<td>Total Score</td>
<td>-.62**</td>
<td>.60**</td>
</tr>
</tbody>
</table>

### DPA Scores

- DPA-I: -.95**
- DPA-S: .40*
- DPA-B: .51**
- DPA-Q: .49**

*Note. *Correlation is significant at the .05 level

**Correlation is significant at the .01 level

Ack = Acknowledgement; Att Seek = Attention Seeking; Sq Rt = Square Root; Comm = Communication; Age Equiv = Age Equivalent.
**BDI-2-ST.** To test the assumption of normality of sampling distributions of the proportions of the total score within each cell, the Shapiro-Wilk test, Skewness, Kurtosis, and Q-Q plots were computed for each of the BDI-2-ST variables using all 75 participants (see Table 13). Significance values for Skewness and Kurtosis were calculated by dividing the Skewness (or Kurtosis) by the standard error. Significance greater than plus or minus two was used to determine whether Skewness and Kurtosis violated the assumption of normality. The Shapiro-Wilk test was used to determine whether each category violated the assumption of normality. Tabachnick and Fidell (2007) recommend trying transformations to find the transformation that produces (1) skewness and kurtosis values closest to zero, (2) the best graph with visual inspection, or (3) the fewest outliers. If positively skewed distributions differ only moderately from normality, the square root transformation is tried; if the distribution differs substantially, the logarithm transformation is tried; and if the distribution is severely skewed, the inverse transformation is tried (Tabachnick & Fidell, 2007). If the data are negatively skewed, then the data are reflected and then transformed.

After initial screening of the BDI-2-ST variables, the non-transformed variables represented the most normal distribution compared to square root, logarithm, inverse, reflected square root, reflected logarithm, and reflected inverse transformations. Therefore, the BDI-2-ST data were not transformed.
Then linear relationships were tested for each pair of variables for the overall sample. For each pair of variables for the overall sample and within each age group, an assumption of linear relationship seemed reasonable; therefore, none of the variables were transformed.

Table 13

*Normality Statistics for BDI-2-ST Categories*

<table>
<thead>
<tr>
<th></th>
<th>Adaptive</th>
<th>Personal-Social</th>
<th>Comm</th>
<th>Motor</th>
<th>Cog</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skewness</td>
<td>-.12</td>
<td>.074</td>
<td>-.36</td>
<td>-.66</td>
<td>.50</td>
<td>-.17</td>
</tr>
<tr>
<td>Std. Error</td>
<td>.28</td>
<td>.28</td>
<td>.28</td>
<td>.28</td>
<td>.28</td>
<td>.28</td>
</tr>
<tr>
<td>Significance</td>
<td>-.43</td>
<td>.26</td>
<td>-1.29</td>
<td>-2.36*</td>
<td>1.79</td>
<td>-.61</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-1.22</td>
<td>-.73</td>
<td>-.058</td>
<td>-.79</td>
<td>-.77</td>
<td>-1.21</td>
</tr>
<tr>
<td>Std. Error</td>
<td>.55</td>
<td>.55</td>
<td>.55</td>
<td>.55</td>
<td>.55</td>
<td>.55</td>
</tr>
<tr>
<td>Significance</td>
<td>-2.22*</td>
<td>-1.33</td>
<td>-.11</td>
<td>-1.44</td>
<td>-1.40</td>
<td>-2.20*</td>
</tr>
<tr>
<td>Shapiro-Wilk</td>
<td>.002*</td>
<td>.12</td>
<td>.14</td>
<td>.000</td>
<td>.002*</td>
<td>.001*</td>
</tr>
</tbody>
</table>

*Note.* * Indicates a violation of the assumption tested for Normality. Significance was calculated by dividing Skewness (or Kurtosis) by the Standard Error. Significance greater than ±2 violates the assumption of Normality. Comm = Communication.
**Engagement.** Based on the correlations of the overall sample (see Table 12), there was a strong, positive correlation between the square root of the proportion of Engagement child behaviors and the child's score on all five domains of the BDI-2-ST (Adaptive: $r = .73$, $n = 75$, $p < .001$; Personal-Social: $r = .67$, $n = 75$, $p < .001$; Communication: $r = .75$, $n = 75$, $p < .001$; Motor: $r = .68$, $n = 75$, $p < .001$; and Cognitive: $r = .64$, $n = 75$, $p < .001$) as well as the BDI-2-ST total score ($r = .76$, $n = 75$, $p < .001$). Because of the strong, positive correlations, this suggests convergent validity between the Engagement social behavior category and the domains on the BDI-2-ST. Convergent validity means that the Engagement variable is highly interrelated to the developmental constructs on the BDI-2-ST (Campbell & Fiske, 1959).

Looking at the relationship between the proportion of social behaviors and the proportion of BDI-2-ST scores within each age group (see Table 12), the only significant correlations were positive correlations in 36-month-old children between the square root of the proportion of Engagement and the proportion of Communication ($r = .55$, $n = 25$, $p = .005$), the square root of the proportion of Engagement and the proportion of Motor ($r = .40$, $n = 25$, $p = .047$), and the square root of the proportion of Engagement and the proportion of the total score ($r = .44$, $n = 25$, $p < .030$). This suggests that although there was an overall relationship between
the square root of the proportion of Engagement and the proportion of BDI-2-ST scores, as it is purportedly represented by these variables, most of these relationships were not present or were not significant within the individual age groups.

In addition, the proportion of the BDI-2-ST Personal-Social and Cognitive domain scores was not found to be significantly correlated with the proportion of any of the four social categories across the three age groups (see Table 12).

**Acknowledgement.** For the overall sample (see Table 12), there was a large negative correlation between the proportion of Acknowledgement behaviors and the proportion of scores on the BDI-2-ST (Adaptive: $r = -.65, n = 75, p < .001$; Personal-Social: $r = -.54, n = 75, p < .001$; Communication: $r = -.65, n = 75, p < .001$; Motor: $r = -.61, n = 75, p < .001$; Cognitive: $r = -.52, n = 75, p < .001$; and Total Score $r = -.65, n = 75, p < .001$). The proportion of scores from the correlations with the overall sample suggests that higher proportions of scores on the BDI-2-ST were related to lower proportions of Acknowledgement behavior. Within each age group, there were no significant relationships between the proportion of Acknowledgement behaviors and the proportion of BDI-2-ST scores. Because of the negative correlations, this suggests discriminant validity between the Acknowledgement social behavior category and the domains on the BDI-2-ST. Discriminant validity means that the Acknowledgement variable is measuring a different theoretical construct than the
developmental constructs on the BDI-2-ST and is not highly correlated with the developmental domains (Campbell & Fiske, 1959).

No Acknowledgement. For the overall sample, there was a small to medium negative correlation between the square root of the proportion of No Acknowledgement behaviors and the proportion of BDI-2-ST scores (Adaptive: \( r = -0.29, n = 75, p = 0.011 \); Personal-Social: \( r = -0.34, n = 75, p = 0.003 \); Communication: \( r = -0.39, n = 75, p = 0.001 \); Motor: \( r = -0.23, n = 75, p = 0.048 \); Cognitive: \( r = -0.25, n = 75, p = 0.032 \); Total Score: \( r = -0.33, n = 75, p = 0.004 \)). The proportion of scores from the correlations with the overall sample suggests that higher proportions of BDI-2-ST scores were related lower square root of the proportion of No Acknowledgement behaviors. Within each age group, there were no significant relationships between the square root of the proportion of No Acknowledgement behaviors and the proportion of BDI-2-ST scores (see Table 12).

Attention Seeking. No correlations were identified between scores on the proportion of BDI-2-ST and the square root of the proportion of Attention Seeking behaviors for the overall sample or within each age group (see Table 12).

DPA. Child social behaviors were compared to four DPA scores (DPA-I, DPA-S, DPA-B, DPA-Q). DPA-I play activities represent the frequency count of each individual, independent play activities that the child exhibited across the 30-
minute play assessment. DPA-S behaviors included play activities where the child embedded the activity into a sequence of activities (i.e., child combs the doll's hair, then puts the doll to bed). These activities are linked in time and appear to be connected to a theme (Lifter, 2000). DPA-B activities include activities where a child uses one object to represent another within an activity. These behaviors include using the toys in a way other than their intended purpose. DPA-Q represents play behaviors when the child uses a substitution in one or another activity within a sequence. As DPA-Q combines DPA-B and DPA-S activities, these activities represent the most advanced levels of play behaviors. A subset of DPA scores was available for analysis (10 children in each age group); therefore, correlations with social behavior categories and play data were available only for 30 of the 75 children.

DPA scores were also converted to proportions. The total number of behaviors was calculated for each child by summing the DPA-I, DPA-S, DPA-B, and DPA-Q scores. For each child, proportions were calculated by dividing the child's DPA-I, DPA-S, DPA-B, and DPA-Q score by the child's overall summed total score. Because the child's social behavior category scores were also converted to a proportion, direct comparison between the four social behaviors and DPA scores was possible.

To test the assumption of normality of sampling distributions of the proportions of the total score within each cell, the Shapiro-Wilk test, Skewness,
Kurtosis, and Q-Q plots were computed for each of the four social categories of caregiver behavior using all 30 participants (see Table 14). Significance values for Skewness and Kurtosis were calculated by dividing the Skewness (or Kurtosis) by the standard error. Significance greater than plus or minus two was used to determine whether Skewness and Kurtosis violated the assumption of normality. The Shapiro-Wilk test was used to determine whether each category violated the assumption of normality. Tabachnick and Fidell (2007) recommend trying transformations to find the transformation that produces (1) skewness and kurtosis values closest to zero, (2) the best graph with visual inspection, or (3) the fewest outliers. If positively skewed distributions differ only moderately from normality, the square root transformation is tried; if the distribution differs substantially, the logarithm transformation is tried; and if the distribution is severely skewed, the inverse transformation is tried (Tabachnick & Fidell, 2007). If the data are negatively skewed, then the data are reflected and then transformed.

After initial screening of the DPA data, the proportion of DPA-B and the proportion of DPA-Q variables were positively skewed, but transforming the variables with square root, logarithmic, or inverse transformations did not normalize the data. The non-transformed distribution for all four variables represented the most normal distribution compared to square root, logarithm, inverse, reflected square root,
reflected logarithm, and reflected inverse transformations. Therefore, none of the data were transformed and correlations identified with these variables should be interpreted cautiously. Specifically, there was a large number of children for whom (DPA-S, DPA-B, and DPA-Q) behaviors were not observed during their session. In addition, there was very little variability within these categories. Correlations were calculated for each age group as well as for the overall sample.

Then linear relationships were tested for each pair of variables for the overall sample. For each pair of variables for the overall sample and within each age group an assumption of linear relationship seemed reasonable; therefore, none of the variables were transformed.
Table 14

*Normality Statistics for DPA Categories*

<table>
<thead>
<tr>
<th></th>
<th>DPA-I</th>
<th>DPA-S</th>
<th>DPA-B</th>
<th>DPA-Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skewness</td>
<td>-.68</td>
<td>.65</td>
<td>1.81</td>
<td>1.90</td>
</tr>
<tr>
<td>Std. Error</td>
<td>.42</td>
<td>.42</td>
<td>.42</td>
<td>.42</td>
</tr>
<tr>
<td>Significance</td>
<td>-1.62</td>
<td>1.55</td>
<td>4.31*</td>
<td>4.52*</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-.98</td>
<td>-.89</td>
<td>2.95</td>
<td>2.33</td>
</tr>
<tr>
<td>Std. Error</td>
<td>.82</td>
<td>.82</td>
<td>.82</td>
<td>.82</td>
</tr>
<tr>
<td>Significance</td>
<td>-1.20</td>
<td>-1.09</td>
<td>3.60*</td>
<td>2.84*</td>
</tr>
<tr>
<td>Shapiro-Wilk Significance</td>
<td>.000*</td>
<td>.001*</td>
<td>.000*</td>
<td>.000*</td>
</tr>
</tbody>
</table>

*Note.* * Indicates a violation of the assumption tested for Normality
Significance was calculated by dividing Skewness (or Kurtosis) by the Standard Error. Significance greater than ±2 violates the assumption of Normality.

*Within each age group.* There were no significant correlations between the proportion of any of the social behavior categories and the proportion of any of the DPA categories within each age group (see Table 12). For the 12-month-old children, there were not enough DPA-Q activities to calculate correlations for that variable. There were only 10 children with play observations coded for each age group, so
more participants are necessary to further evaluate differences between social behaviors and play behaviors across the three age groups.

**Engagement.** For the overall sample (see Table 12), there was a strong negative correlation between the square root of the proportion of Engagement scores and the proportion of the number of individual, independent DPA activities recorded during the 30-minute play session (DPA-I variable; \( r = -.51, n = 30, p = .004 \)). This suggests that higher proportions of the square root of Engagement were related to lower proportions of DPA-I activities. In addition, there was a positive correlation between the square root of the proportion of Engagement behaviors and the proportion of play behaviors with sequences and substitutions (DPA-S: \( r = .46, n = 30, p = .010 \); DPA-B: \( r = .52, n = 30, p = .003 \); and DPA-Q: \( r = .37, n = 30, p = .004 \)), suggesting higher proportions of more advanced levels of play behaviors were related to higher proportions of the square root of Engagement behaviors. This suggests convergent validity between the Engagement variable and higher play activities and discriminant validity between the Engagement variable and the least complex play activities (Campbell & Fiske, 1959).

**Acknowledgement.** There was a medium positive correlation between the proportion of Acknowledgement behaviors and the proportion of DPA-I activities (\( r = .45, n = 30, p = .010 \)) for the overall sample (see Table 12). This suggests that
higher proportions of individual play activities were related to higher proportions of Acknowledgement behaviors. There were significant negative correlations between the proportion of Acknowledgement behaviors and the proportion of play activities with sequences and substitutions (DPA-S: \( r = -0.36, n = 30, p = 0.049 \); DPA-B: \( r = -0.36, n = 30, p = 0.050 \); and DPA-Q: \( r = -0.49, n = 30, p = 0.005 \)), suggesting that higher proportions of more advanced levels of play behaviors were related to lower proportions of Acknowledgement behaviors. This suggests convergent validity between the Acknowledgement variable and individual play activities and discriminant validity between the Acknowledgement variable and the more complex play activities (Campbell & Fiske, 1959).

**Attention Seeking.** No correlations were observed between the square root of the proportion of Attention Seeking behaviors and the proportion of play behaviors (see Table 12).

**No Acknowledgement.** There was a negative correlation between the proportion of No Acknowledgement behaviors and the proportion of DPA activities that measured substitutions (DPA-B: \( r = -0.37, n = 30, p = 0.040 \)), suggesting that higher levels of play activities were related to lower levels of the proportion of No Acknowledgment behaviors (see Table 12). Overall, this categories was not related to the proportion of any of the individual play activities (DPA-I) or the proportion of the
highest level of play behavior (DPA-Q), suggesting these behaviors may not be good measures to identify the relationship between social abilities and play skills.
Chapter Five

Discussion

The results support the hypotheses created for this study and also generate new research questions that need to be evaluated. Categories that represent social behavior in early childhood were identified in the play observations for children at 12-, 24-, and 36-months old. Results indicated an interaction among the proportion of the four social behavior categories and the three age groups, suggesting that the proportion of social behaviors varied as a function of age. Specifically, Acknowledgement behaviors were highest in the youngest age group (12-month-old children) and lowest in the oldest age group (36-month-old children), whereas, Engagement behaviors were highest in the oldest age group and lowest in the youngest age group. Results also suggest positive correlations between Engagement behaviors and the BDI-2-ST developmental domains and the DPA scores.

An overview of the usefulness of the categories to measure social behavior is presented below. Then an examination of the results is discussed for the secondary research questions, followed by a discussion of the importance for the field of school psychology. Finally, limitations and future research directions are discussed.
Usefulness of Social Categories of Behavior

The primary purpose of this study was to identify what social behaviors are exhibited by infants and toddlers during a play session with a familiar caregiver in a natural context. Because an observation system to measure social behavior of infants and their caregivers in a natural environment was not identified in the literature, the categories of social behavior used were developed through a literature review, Bronfenbrenner's bioecological model (Bronfenbrenner & Morris, 2006), social cognitive theory (Bandura, 1978, 1989), and an iterative process of identifying behaviors from DPA video recordings. It was proposed that understanding how social interactions occur in the natural context would be useful in the future for devising a measurement system to assess social behavior across development.

Based on the second research question, it was hypothesized that all children would display social behaviors, but the quality of the social behaviors would vary as a function of age. Results indicated an interaction among the proportion of the four social behavior categories and the three age groups. An overview of the results for each category of social behavior is presented below. Then a brief discussion of the importance of the qualitative results is presented.
No Acknowledgement

No Acknowledgement behaviors occurred on average less than 20% of observed intervals across all three age groups. Although the observations were taken with a caregiver present, the proportion of No Acknowledgement behaviors primarily represented the time children spent playing with toys independently, without interacting with their caregivers.

Acknowledgement

It was hypothesized that the quality of social behavior would vary as a function of age. Although not statistically significant, Figure 2 and Table 7 illustrated that the youngest children (12-month-old children) were observed displaying the highest proportion of Acknowledgement behaviors. In contrast, the oldest children (36-month-old children) were observed displaying the lowest proportion of Acknowledgement behaviors.

The literature reviewed did not clarify what behaviors constituted social behavior for 12-month-old children. "Acknowledgement" was developed as the initial level of social behavior to be evaluated because it included behaviors that had been observed with older children (Parten, 1932; Pierce-Jordan & Lifter, 2005; Rubin, 2001) and this behavior was confirmed as a behavior that was exhibited by 12-month-old children during observation of the video recordings. Acknowledgement behaviors
occurred on average over half of the observed intervals for 12-month-old children, suggesting that this social behavior predominates in this age group. These behaviors represented an explicit acknowledgement of the presence of the caregiver. It was assumed that the children were always aware of the caregiver’s presence.

Acknowledgement may represent an important social developmental milestone for infants that is related to cognitive, language, and play development. At 12-months-old, children have begun to develop a sense of autonomy, which is a necessary component of developing the ability to engage in interactions with other people. Children are cognitively beginning to understand that events and people in their environment are separate from themselves. In addition, their communication abilities begin to develop as they begin to use single words to express meanings at this time in their development (Snow & McGaha, 2003). Acknowledgement may represent the social behavior that emerges in coordination with a child's cognitive and communication development, suggesting it may be an important marker of early social interactions.

**Attention Seeking**

The next level of social behavior created was Attention Seeking behaviors. Children across all three age groups engaged in Attention Seeking behaviors on average more than a quarter of the observed intervals. Although the transformed
Attention Seeking variable occurred (Figures 2 and 3) at the highest frequency across all age groups, the untransformed data (Table 7) indicated that this behavior was the most frequently observed behavior for 24- and 36-month old children, but not 12-month old children.

According to social cognitive theory (Bandura, 1978, 1989) and Bronfenbrenner's ecological model (Bronfenbrenner & Morris, 2006), reciprocal interactions with the environment (i.e., a primary caregiver) and children's personal characteristics (i.e., disposition and cognitive ability) across time will determine whether or not children internalize and learn new social behaviors. Bandura's (1978) reciprocal determinism emphasizes that children are active participants in shaping their own environments. A caregiver represents a child's primary source of social interaction in early childhood as well as the child's primary source of reinforcement (i.e., gain caregiver attention). Behaviors that elicit a response from their caregiver, but do not represent shared engagement, represent the "Attention Seeking" behaviors described. For instance, children may learn that when they throw balls in the house, their caregiver yells, "No." The children may continue to throw balls to continue to receive this verbal attention from their caregivers, or they may cease these behaviors. In either event, such behaviors require a response from the caregiver. The results demonstrate that Attention Seeking behaviors occurred across all three age groups,
suggesting children display these behaviors as young as 12-months old and continue to display these behaviors at 24- and 36-months old. Attention Seeking behaviors are important socially, as they represent behaviors that infants and toddlers express to get their needs met.

**Engagement**

The final category of social behavior, classified as Engagement, represented the highest category of social development evaluated because it was identified through the literature search and video recordings as the most advanced social behavior exhibited in the age range studied. It was hypothesized that the quality of social behavior would vary as a function of age, with 36-month-old children participating in the most Engagement behaviors compared to the other two age groups. Although not statistically significant, Figure 2 and Table 7 illustrate that the oldest children (36-month-old children) were observed displaying the highest proportion of Engagement behaviors (31% of observed intervals) and the youngest children (12-month-old children) were observed displaying the lowest proportion of Engagement behaviors (2% of observed intervals).

In an episode of Engagement, the child wants the caregiver to participate in a shared activity, rather than just wanting to gain the caregiver's attention (Attention Seeking) or wanting to observe that the caregiver is still present (Acknowledgement).
At the level of Engagement, the child's verbal and nonverbal behaviors are socially focused with the caregiver's behaviors (Pierce-Jordan & Lifter, 2005). According to the definition defined by this study, Engagement behaviors require mutual engagement between the child and caregiver, so both the child and caregiver behaviors are instrumental to the observation of this behavior.

Within the context of child-caregiver interactions, reciprocal determinism postulates that the child influences the caregiver's social behavior and the caregiver also influences the child’s social behaviors (Bandura, 1978). Young children (i.e., 12- and 24-month-old children), likely do not have as well developed cognitive processes, which effects their ability to interact with and influence their environment to the same degree as older children (i.e., 36-month-old children). According to reciprocal determinism, children are not only influenced by their environments, but are also influencing their environments by being active participants in their learning environments (Bandura, 1978). At the level of Engagement, the interactions are the most reciprocal, requiring the most developmental processes (i.e., engaging in coordinated and socially focused behaviors).

Engagement may represent an important social developmental milestone for toddlers, which is related to cognitive, language, and play development. By 36-months-old, children have begun to display symbolic or pretend play (Shaffer, 2010).
Cognitively, they have begun to develop symbolic representations for objects and people in their environment (Shaffer, 2010). Finally, they are experiencing an explosion in their communication abilities. Around 36-months-old, children use more than 2-words to begin to create complex sentences and questions. They are also able to understand the pragmatics of language and communication and are better able to interact with others in their environment (Shaffer, 2010). The results of this study suggest that Engagement may be the social behavior that requires more cognitive processes and communication skills, and therefore, emerges around 36-months-old in a child's development.

**Consistency of Results with Other Research Studies**

These results are promising for contributing to the literature on social development. Currently, few studies have observed the social behaviors of infants in a natural context. The results indicated that Acknowledgement and Attention Seeking behaviors could be identified in children as young as 12-months old during a play observation with the primary caregiver present. Engagement behaviors were primarily observed in 36-month old infants, suggesting that this behavior may emerge later in social development.

In Parten's (1932) seminal article on observing social behaviors in preschoolers in a natural context, she described "unoccupied, solitary, and onlooker
activity" as negative indicators of social activity. These types of behaviors include both the No Acknowledgement (i.e., unoccupied and solitary) and Acknowledgement (i.e., onlooker) categories of behavior as defined by the present study. According to the present results, however, Acknowledgement behaviors represented the largest proportion of observed behavior for 12-month-old children. Therefore, although this behavior may be a negative indicator of social activity for preschool-age children during interactions with their peers (as was measured by Parten's study), Acknowledgement behaviors may be a developmentally appropriate activity for younger children (12-month-old children) interacting with their caregivers. The results from the present study suggest that different social behaviors may be important indicators of social activity for infants during play with their caregivers.

Similar to the SocBS (Pierce-Jordan & Lifter, 2005), one goal of the present study was to determine how social behaviors develop from least complex to most complex. Because Pierce-Jordan and Lifter observed social behavior of older preschoolers (3 years 9 months to 6 years of age) during play with peers, the results from the 36-month old sample from this study were compared to the typically developing children in their sample. Children in Pierce-Jordan and Lifter's (2005) study were observed in the Solitary (similar to No Acknowledgement) category for
63% of the observation, whereas children in the current study displayed No Acknowledgement behaviors during only 13% of the observed intervals.

There are several factors that could account for this difference. First, children may display more social behaviors with their caregivers than their peers because the caregiver represents the child's initial and most familiar source of social interaction (Pellegrini, 1996). Studies could not be identified in the literature that evaluated the frequency of Acknowledgement (or similar) behaviors between infants and their caregivers. Therefore, the nature of this interaction should be further evaluated.

Second, Pierce-Jordan and Lifter recorded behavior using event recording, recording behavior each second to include every instance of social behavior. The current study used a partial interval recording system. Partial interval recordings are useful for discrete behaviors that do not occur too frequently, but can overestimate the actual occurrence of behavior because they record any instance of behavior that occurs within each interval. Therefore, the current study may have overestimated the amount of social behavior and underestimated No Acknowledgement behaviors by using a partial interval system to record behavior.

Validity of Qualitative Results

Because the literature provided little empirical research on social behaviors that are present in infants and toddlers, the goal was to enhance the literature by
measuring observable behaviors in this age group. The four categories of social behavior were identified through the review of the literature, a review of the current scales that measure social behaviors of preschool children, social cognitive theory, and the observations of DPA video recordings (i.e., process of auditability; Sandelowski, 1986). These behaviors, which were collected in a natural environment, were able to be observed by other individuals (i.e., fittingness; Sandelowski, 1986). Initial inter-rater reliability was moderate, so additional training was conducted until substantial to almost perfect reliability was attained. This suggests that with additional familiarity with the video recordings and the operational definitions, other individuals were able to identify the behaviors identified through the descriptive process (i.e., credibility; Sandelowski, 1986).

In addition, these data were evaluated for their meaningfulness and an interaction among the four social behavior categories and the three age groups suggests that the proportion of social behaviors varied as a function of age (i.e., confirmability; Sandelowski, 1986). Further evaluation of the meaningfulness of the social behavior categories was conducted by exploring the relationship between child and caregiver behaviors. Finally, confirmability was explored through exploring the relationship between the behaviors identified and the measures of social,
communication, cognitive, and play development in the Project Play database. These additional analyses are explored below.

**Relationship between Child and Caregiver Behaviors**

The purpose of the third research question was to evaluate if there was a relationship between the child and the caregiver behaviors for each of the four social behavior categories. The caregivers were observed using the same four social categories (No Acknowledgement, Acknowledgement, Attention Seeking, and Engagement). By observing the caregiver behavior along the same categories, this study could better determine if there was a relationship between child and caregiver behavior.

At the microsystem level of the bioecological model (Bronfenbrenner & Morris, 2006), the relationship with the primary caregiver is a central element of a child's social context. Integrating social cognitive theory (Bandura, 1978) with the bioecological model, learning occurs through continuous reciprocal interactions, among behavior, cognition, and the environment across time. Because a child's early social interactions influence and are influenced by the caregivers' social behavior, it was hypothesized that there would be a correlation between child and caregiver social behaviors across the four categories of social behavior measured.
In the overall sample, there was a large positive correlation for the proportion of Engagement \( (r = .50, n = 75, p < .001) \), a medium positive correlation for the proportion of No Acknowledgement \( (r = .33, n = 75, p = .009) \), and a small positive correlation for the proportion of Acknowledgement \( (r = .24, n = 75, p = .010) \) behaviors between caregivers and their children. These results suggest that higher proportions of caregiver social behaviors were related to higher proportions of child behaviors across three of the four social categories for the overall sample.

When looking at caregiver behaviors across the 12-, 24-, and 36-month old age groups, caregivers within each age group participated in Engagement activities approximately 50% of the observed intervals and Acknowledgement activities approximately 25% of the observed intervals. Caregiver No Acknowledgement and Attention Seeking behaviors occurred less than 15% of observed intervals within each age group. Overall, the proportion of caregiver social behavior was relatively stable across age groups, whereas child social behavior varied as a function of age, suggesting that within each age group there were no direct relationships between the proportion of children's social behavior and the proportion of their caregivers' social behavior.

When the relationships between the proportion of caregiver and the proportion of child behaviors were explored within each age group, the only significant
relationships between child and caregiver behaviors were the proportion of 
Engagement behaviors at 24- and 36-months (see Figure 3 and Table 11). Based on 
social cognitive theory, higher correlations between caregiver and child Engagement 
would be expected for older children compared to younger children. As children 
develop, they have greater cognitive capabilities and are exposed to more 
environments and individuals. Children learn that their behaviors will elicit responses 
from others in their environment and begin to participate in reciprocal interactions or 
Engagement activities as they develop, which is one explanation for why children 
displayed more Engagement behaviors at 24- and 36-months old. As a result, they 
have more opportunities to engage in progressively more complex reciprocal social 
interactions on a regular basis, which allows for more complex social development to 
occur (Bandura, 1978).

According to social cognitive theory and the results, at 12-months old, 
caregivers appear to be modeling Engagement activities, and through practice, 
children begin to engage in progressively more Engagement activities. Learning to 
engage in activities with caregivers requires Person characteristics (Bronfenbrenner & 
Morris, 2006), such as cognitive abilities (e.g., knowledge, experience, skill, symbolic 
representations) and demand characteristics (i.e., whether or not the individual invites 
or discourages reactions from the environment).
**Consistency with Other Research Studies**

Only one scale that measured similar child and caregiver behaviors during a naturalistic observation was identified in the review of the literature. Crawley and Spiker (1983) observed 24-month-old children with Down syndrome playing with their caregivers for 20-minutes. The observer completed Likert scale ratings of both caregiver and child behaviors. Caregiver behaviors included directiveness, mood, sensitivity, and elaborativeness, whereas child behaviors included play maturity, social initiative, social responsivity, interest, positive affect, and animation. The researchers found that caregivers who were more sensitive and elaborative had children who were more socially responsive to their caregivers requests and who had more play maturity. The researchers also found a relationship between caregiver stimulation and child social initiative, suggesting that children initiated more social actions when caregivers were more engaged and provided stimulation during play (Crawley & Spiker, 1983).

The behaviors identified by Crawley and Spiker (1983) as caregiver stimulation included behaviors that provided optimal cognitive stimulation for the child, such as labeling an object when the child was engaged with it. These behaviors were similar to behaviors identified as Engagement behaviors in the present study. Similarly, their child behaviors of social initiative (e.g., talking to, offering objects to
play with) were similar to the child Engagement behaviors as measured by the present study. Comparing Crawley and Spiker's (1983) results to the 24-month old age group of the present study, both studies indicated a positive correlation between caregiver and child Engagement behaviors.

Relationship of Social Categories with Other Variables in Database

Relationship with BDI-2-ST Personal-Social Domain

It was hypothesized that the four social behavior categories would be correlated with the scores on the Personal-Social domain of the BDI-2-ST because the Personal-Social domain was developed to measure a child's social interactions with adults and peers (Newborg, 2005). For the overall sample, the square root of No Acknowledgement and Acknowledgement behaviors were negatively correlated with the Personal-Social scores on the BDI-2-ST. The square root of Engagement behaviors was positively correlated with the Personal-Social domain scores. On the other hand, the square root of Attention Seeking behaviors was not correlated with the Personal-Social scores.

These results suggest that for the sample as a whole, the behaviors measured on the Personal-Social domain are most closely related to the behaviors displayed in the Engagement category (see Table 11). Specifically, this suggests convergent validity between the Engagement category and the Personal-Social domain and
discriminant validity between the Acknowledgement category and the Personal-Social domain (Campbell & Fiske, 1959). To further evaluate this relationship, the correlation between the square root of Engagement and the scores on the Personal-Social domain was further evaluated at each age group.

None of the correlations between the four categories of social behavior and the scores on the Personal-Social domain within each age group reached significance. Nevertheless, the correlations between the scores on the Personal-Social domain and the square root of Engagement behaviors were higher for 12-month-old children \( (r = .26, p = .20) \) and 24-month-old children \( (r = .27, p = .20) \) than 36-month-old children \( (r = .063, p = .76) \). Because Engagement behaviors occurred less than 10% of observed intervals for 12- and 24-month-old children, it was expected that the strongest correlation would be observed for 36-month-old children who participated in Engagement behaviors during 30% of the observed intervals. The results suggest the relationship between the square root of Engagement behaviors and the score on Personal-Social domain represents the opposite trend across ages as what was expected.

Examining the individual items on the Personal-Social domain, many of the items are consistent with behaviors that were defined as Acknowledgment behaviors. Specifically, some of the items are "shows awareness of other people," "smiles or
vocalizes in response to adult attention," "responds positively when familiar adults or adults in authority initiate social contact," and "allows others to participate in his or her activities" (Newborg, 2005). There is one item ("initiates social contact with peers in play") that measures a child's ability to initiate social interactions, but none of the items measure child initiated social interactions with adults.

Therefore, the Personal-Social domain is not measuring similar behaviors as those behaviors represented by the Engagement category, but is instead measuring similar behaviors as those behaviors represented by the Acknowledgement category. The BDI-2 was developed by analyzing items from existing measurement instruments and selecting the items that most comprehensively assessed developmental milestones. Experts in the field then determined the appropriateness of each item at assessing early childhood milestones and a subset of items from the full test were selected for the screening test (BDI-2-ST; Newborg, 2005). This method of identifying items to measure social behaviors did not identify what behaviors children actually exhibit when they are observed interacting with their caregivers. Therefore, the items represented on the BDI-2-ST may not be capturing social development fully. The qualitative nature of the present study allowed for an exploration of what social behaviors are displayed by infants and toddlers and these results may be more
representative of the quality of children's social behaviors at 36-months-old than the items identified on the BDI-2-ST Personal-Social domain.

For the overall sample, there was also a negative correlation between Acknowledgement behaviors and the Personal-Social domain scores, suggesting higher scores on the Personal-Social domain were related to fewer Acknowledgement behaviors. This relationship was also explored across each age group. When the relationship between Acknowledgement behaviors and the Personal-Social domain scores was evaluated, there was a positive correlation for 12-month-old children, no correlation for 24-month-old children, and a negative correlation for 36-month-old children. Although these correlations were not significant, this trend suggests a relationship between Acknowledgement behaviors and scores on the Personal-Social domain. Specifically, in the 12-month-old children, higher scores on the Personal-Social domain were correlated with higher Acknowledgement behaviors. This suggests that the Personal-Social domain may be capturing social behaviors that occur in 12-month-old children, such as Acknowledgement behaviors, but is not capturing more complex social engagement activities. Because several of the items on the Personal-Social domain measure similar behaviors as those behaviors represented by the Acknowledgement category (discussed above), this relationship would be expected. Results within each age group suggest convergent validity between the
Acknowledgement category and the Personal-Social domain for the 12-month-old children (Campbell & Fiske, 1959).

**Relationship with BDI-2-ST Communication Domain**

Because social development and language development are highly interrelated (Bloom & Lahey, 1978), it was hypothesized that there would be a relationship between language and social behaviors. Correlations were computed between the four social behaviors and the BDI-2-ST Communication domain score for the overall sample as well as for each age group.

For the overall sample, significant correlations were identified between the social behavior categories and the Communication domain score on the BDI-2-ST. Specifically, higher scores on the Communication domain were related to higher proportions of Engagement behavior, lower proportions of No Acknowledgement behavior, and lower proportions of Acknowledgement behaviors. This suggests convergent validity between the Engagement category and the Communication domain and discriminant validity between the Acknowledgement category and the Communication domain (Campbell & Fiske, 1959).

When evaluating the correlations at each age group, two significant relationships between the four social behavior categories and the BDI-2-ST Communication domain score were identified. For the 36-month old age group,
higher scores on the Communication domain were related to higher proportions of Engagement behaviors and lower proportions of No Acknowledgement behaviors. This suggests convergent validity between the Engagement category and the Communication domain for the 36-month-old children (Campbell & Fiske, 1959).

No other relationships were identified within specific age groups; however, there were trends across ages. Acknowledgement behavior was positively correlated for 12-month-old children, but negatively correlated for 24-and 36-month-old children. For 12-month-old children, higher Acknowledgement scores were related to higher Communication domain scores, suggesting that Acknowledgement behaviors may represent a critical observable behaviors in early childhood development.

The square root of Engagement behavior was positively correlated for all ages, with the strength of the relationship highest for the oldest age group (36-month-old children) suggesting a relationship between Communication scores and Engagement behaviors for the oldest age group. Examining the individual items on the Communication domain, some of the items are consistent with behaviors that would be defined as Engagement behaviors: "uses 2-word utterances to express meaningful relationships," "responds to who and what questions," "uses words to relate information about other people, their actions, or their experiences," and "converses on topics for more than 5 turn-taking exchanges" (Newborg, 2005). Many
of the items listed above on the BDI-2-ST Communication domain would fall under the Engagement category (e.g., child coordinates language, engages in back and forth interaction with caregiver) if they were observed during an observation. Because the Communication domain and Engagement category measure similar behaviors, a positive relationship would be expected for the oldest age group, where the majority of Engagement behaviors were observed.

**Relationship with BDI-2-ST Cognitive Domain**

It was hypothesized that there would be a relationship between cognitive and social behaviors (Bandura, 1991). Correlations were computed between the four social behaviors and the BDI-2-ST Cognitive domain score for the overall sample as well as for each age group.

For the overall sample, significant correlations were identified between the social behavior categories and the Cognitive domain score on the BDI-2-ST. The results suggest that higher Cognitive domain scores were related to lower proportions of the square root of No Acknowledgement and Acknowledgement behaviors and higher proportions of the square root of Engagement behaviors. This suggests convergent validity between the Engagement category and the Cognitive domain and discriminant validity between the Acknowledgement category and the Cognitive domain (Campbell & Fiske, 1959).
When evaluating the correlations at each age group, no significant relationships between the proportion of the four social behavior categories and the proportion of the BDI-2-ST Cognitive domain score were identified; however there were trends across ages. Specifically, the square root of Engagement was negatively correlated with the Cognitive domain score for 12- and 24-month-old children, but positively correlated for 36-month-old children. On the Cognitive domain, three items measure social behaviors as defined by the social behavior categories developed: "attends to a game of peekaboo for 1 minutes," "imitates simple facial gestures," and "looks at, points to, or touches pictures in a book" (Newborg, 2005). Because these behaviors measure similar behaviors to those identified by the Engagement category, a positive relationship between the Cognitive domain and Engagement behaviors would be expected for the oldest age group (i.e., the age group where the most Engagement behaviors were observed). Although not significant, a positive relationship between the Cognitive score and the square root of Engagement behaviors was present for the 36-month-old children. Results across ages suggest convergent validity between the Engagement category and the Cognitive domain for the 36-month-old children (Campbell & Fiske, 1959).
Relationship with DPA Scores

Play provides a setting where caregivers can facilitate social learning (DiCarlo et al., 2014). Therefore, it was hypothesized that there would be a relationship between play activities, as measured by the DPA, and social behaviors, as measured by the four social categories. Within the Project Play database, only 10 children at each age group had coded play data. All children displayed individual play activities (DPA-I); however, only 10 (three 24-month-old children, seven 36-month-old children) of the 30 children with play data displayed the highest level of play activities (DPA-Q), which were when the child used a substitution during a sequence of activities that were linked together. As such, the relationships found between play and social behaviors should be interpreted cautiously and should be evaluated further with more children. There were no significant correlations within each age group, but there were significant correlations between the social categories and the play categories for the overall sample.

Higher proportions of Acknowledgement behaviors were related to higher proportions of individual, independent play activities (DPA-I) and lower proportions of complex play behaviors (DPA-S, DPA-B, and DPA-Q). This suggests convergent validity between the Acknowledgement category and individual play activities and discriminant validity between the Acknowledgement category and the more complex
play activities (Campbell & Fiske, 1959). Conversely, higher proportions of the square root of Engagement behaviors were related to lower proportions of DPA-I activities and higher proportions of DPA-S, DPA-B, and DPA-Q scores. This suggests convergent validity between the Engagement variable and higher play activities and discriminant validity between the Engagement variable and the least complex play activities (Campbell & Fiske, 1959). No correlations were observed between the square root of Attention Seeking behavior and play behavior.

Play provides the means through which children can engage with their caregivers and learn about the world around them (Vygotsky, 1978). Although types of early social behaviors that young children display with their caregivers in play were not identified in the review of the literature, the results suggest that both Acknowledgment and Engagement behaviors were related to play behaviors in infants and toddlers during natural play with their caregivers. When children spent the greatest proportion of their time Acknowledging the caregiver, they also spent the greatest proportion of time participating in independent, individual play activities. Acknowledgement and DPA-I activities represent the lowest category of social behavior and play activities along the hierarchical categories, suggesting these behaviors may occur most frequently in younger children.
In contrast, as children spent a greater proportion of the play observation participating in Engagement activities with the caregiver, they also spent a greater proportion of time in more complex play activities such as substitutions (DPA-B) and linking multiple activities together in time (DPA-S and DPA-Q). This suggests that the emergence of more advanced social behavior may occur at a similar age as the emergence of more advanced play behavior. These results suggest that Acknowledgement and Engagement behaviors may have an inverse relationship with play activities. In addition, they suggest that social behaviors and play behaviors may not only be related to each other, but may emerge at similar times during a child's development.

**Relevance for School Psychology**

This study has many implications for school psychology. The results suggest that Acknowledgement, Attention Seeking, and Engagement behaviors are social behaviors that can be identified early in development. Attention Seeking behaviors appear to be present throughout early childhood, suggesting that this is a social behavior that can be observed throughout development. Attention Seeking behaviors are important social behaviors as they represent behaviors children express to get their needs met. The function of the behavior is similar across development; however, its form is likely to change.
Acknowledgement and Engagement appear to be inversely related to each other. The results suggest that Acknowledgement may be a precursor to Engagement. Moreover, both appear to be related to other domains of development as measured by the BDI-2-ST as well as with play behaviors as measured by the DPA. Based on these preliminary data showing changes in Acknowledgement and Engagement behaviors between 12-month-old children and 36-month-old children, an evaluation of the Acknowledgement and Engagement variables could be beneficial for both practitioners and researchers who work with young children and with school age children.

Currently, school psychologists primarily rely on caregiver and teacher report through rating scales, such as the Behavior Assessment System for Children, Second Edition (BASC-2; Kamphaus & Reynolds, 2008; Reynolds & Kamphaus, 2002) and the Social Skills Rating Scale (SSRS; Gresham & Elliott, 1990), to identify Kindergarten, first, and second grade children at-risk for delays in social development. Understanding what social behaviors look like in early childhood could help school psychologists have a better understand of how social behaviors should develop in elementary school. It can be argued that Acknowledgement may be a critically important variable to observe as children begin academic instruction because Acknowledgement behaviors may be related to attention, or the child's ability
to attend to classroom instruction (Ballard & Medland, 1985; Eisenberg et al., 2009). Engagement, also may represent an important variable, as a child's ability to participate in mutual interactions is important for group projects, asking the teacher questions when a child does not understand, and social interactions with peers (Eisenberg, Valiente, & Eggum, 2010). Peers, rather than the caregiver, are likely to become the primary sources of interactions in elementary school. Understanding how the form of Acknowledgement and Engagement behaviors changes throughout early childhood may provide information about how social behaviors are expressed throughout grade school and how they relate to other constructs such as cognitive development, attention span, and academic achievement.

**Identification of and Intervention with Children with Maladaptive Social Behaviors**

Based on the results, the social behaviors evaluated could be used to help provide social supports at a young age. Specifically, Acknowledgement behaviors occurred on average 50% of observed intervals for typically developing 12-month-old children, but Engagement behaviors only occurred during 2% of observed intervals for this age group. Because very few Engagement behaviors occurred at 12-months, Engagement would not be an appropriate behavior to evaluate when determining if an infant is developing more slowly than peers. Limitations in Acknowledgement
behaviors, however, would be an appropriate variable to identify infants who may be developing more slowly, and may therefore, be at-risk for delays in social development. Children should be provided interventions at their individual levels of development rather than assuming children should be performing specific activities based on their age. Providing children support based on their developmental levels will likely provide them with the best preventative social supports to help them learn new skills (Cohen & Spenciner, 1994; Cook et al., 2008).

The long-term implications of children with delays in social abilities can be detrimental. Delays in social skills have been related to lower intelligence scores, lower academic performance, attention difficulties, and higher levels of mental health disorders (Greenberg, 1999; National Association of School Psychologists, 2002; Natriello, 1992). Many children with social delays have a long history of maladaptive social behaviors that could have been identified at a younger age (Cook et al., 2008). Because social development is interrelated with multiple developmental domains (i.e., cognitive and communication), providing social supports at a younger age may lead to a decrease in deficits in other developmental domains such as cognitive and emotional development (Cohen & Spenciner, 1994; Cook et al., 2008).

For instance, Acknowledgement behaviors occurred at the highest frequency at 12-months-old, when children are beginning to develop a sense of autonomy, are
cognitively beginning to understand that events and people in their environment are separate from themselves, and are beginning to use single words to express meanings at this time in their development (Snow & McGaha, 2003). This suggests that Acknowledgement may represent the developmental milestone for social behavior that emerges around 12-months-old. Similarly, Engagement behaviors were present at 36-months-old when children display symbolic or pretend play, cognitively use symbolic representations for objects and people in their environment, and use more than 2-words to begin to create complex sentences and questions (Shaffer, 2010). Understanding the interrelatedness of the social, communication, and cognitive domains could help identify appropriate interventions for children with developmental delays.

**Improvement of Current Measures**

The results are promising for the field of school psychology. Current measures of social development primarily rely on caregiver report to determine a child's level of social ability and elicited assessments such as the BDI-2. It is best practice to conduct a multimethod assessment (Elliott et al., 2008; Severson et al., 2007), including direct observation and caregiver rating, when evaluating a child. However, there were few direct observation measures available in the field to observe the social behaviors of infants and toddlers in their natural environment. The goal of this
research was to contribute to the literature by identifying social behaviors that infants, toddlers, and preschoolers demonstrate. This research provides the framework for a new measure of social development that can be created to represent social development for the purposes of identification and intervention. Observing children's social behavior instead of relying solely on caregiver report or elicited measures, will help practitioners and researchers take a more objective and less subjective measure of a child's social development, which can help identify children who may be in need of early intervention, prevention, and support.

Limitations and Future Directions

There are several limitations that are important to consider when evaluating this research study. First, the study design was exploratory and could not evaluate change across age. There were also limitations to the diversity of the sample, the procedures for data collection, and the coding procedures. Each of these limitations is discussed and future research studies to address the limitations are presented.

Study Design

The first limitation is the cross-sectional research design. This study was not designed to critically evaluate change across time, but change at three points in time. It is through a longitudinal design that the process of time or how specific behavior changes across time can be evaluated (McCall, 1977). Therefore, by examining the
change process across time with the same subjects, rather than differences between age groups, a better estimate of the relationship among child social behaviors and age can be determined.

Future studies should examine these social categories within the same group of children as they mature to evaluate whether or not an interaction among age and social behaviors does exist. Longitudinal data allow for the study of development by studying how specific behavior changes in a specific group across time (McCall 1977). According to the bioecological model, the frequency and stability of interactions across time (for an individual) influence how individuals interpret and respond to experiences in their environment (Bronfenbrenner & Morris, 2006). To truly determine if social behavior changes with age, the same sample of children should be observed at 12-, 24-, and 36-months old. If there is an interaction between social behaviors and age for a longitudinal, within-subjects design, then there is more compelling evidence that these four social categories represent a developmental sequence of behaviors (Bronfenbrenner & Morris, 2006).

The present study found that lower Acknowledgement behaviors and higher Engagement behaviors were related to the oldest age group (36-month old children), whereas higher Acknowledgement and lower Engagement behaviors were related to the youngest age group (12-month-old children). The inverse relationship between
Acknowledgement and Engagement may be because Acknowledgement is a prerequisite for Engagement, and Acknowledgement behaviors are replaced by Engagement behaviors as children develop. Future studies should evaluate these trends longitudinally to see if these patterns are consistent. Regression analyses could be conducted to look at the age effects of these trends and determine specific patterns of social behaviors across development. Longitudinal studies will allow for a more complete understanding of the relationship among age and social development.

Future studies should also evaluate how these social behavior categories are related to create an overall scale of social development. Based on the results, three of the variables were transformed using a square root transformation because they were not normally distributed. The necessity to transform the variables suggests that the difference between categories may not be linear (i.e., the difference between Acknowledgement and Attention Seeking behaviors may not represent the same distance as the distance between Attention Seeking and Engagement behaviors). Therefore, future studies should determine how the categories are distributed to help calculate an overall scale score. More participants will be necessary to evaluate this research question. In addition, to then validate an overall scale, construct validity should be measured by comparing the scale with psychometrically sound measurement systems. Relationships between the social categories identified and the
BDI-2-ST were identified; therefore, the full BDI-2 may represent a good psychometrically sound measure to evaluate construct validity (both convergent and discriminant).

Future studies should also evaluate the best way to record data. The current study implemented a partial interval coding system, where only one social behavior was recorded each interval. If Engagement was observed, then Acknowledgement could not be recorded, even if it occurred because Engagement was defined as a more advanced behavior than Acknowledgement. Future studies should evaluate the best method to provide an accurate estimate of child behavior. Specifically, future studies could explore a partial interval system where more than one behavior category could be recorded each interval (i.e., both Engagement and Acknowledgement are recorded if they both occur). In addition, future studies could compare a partial interval system to event recording where every instance of behavior is recorded.

The secondary purpose (Hypothesis 3) was to evaluate the relationship between child and caregiver behaviors. A major difficulty with this measurement system was that the caregiver behavior was observed only once per minute or 17% of the entire observation (14 out of 84 intervals). As a result, there may not have been enough data to obtain a complete assessment of caregiver behavior. To more effectively identify whether or not there is a reciprocal relationship between
caregivers and children, both the caregiver and the child behaviors should be observed regularly over time (longitudinally). Therefore, the same observation system used to record child behaviors should be used to record caregiver behavior (i.e., once every 10-s) to obtain an actual measure of caregiver behavior, rather than just an estimate. To accurately assess the reciprocal nature of the child and caregiver behaviors, both behaviors should be measured for the same child-caregiver dyads at various ages (12-, 24-, and 36-months old).

In addition, because the data were not normally distributed for children, the Engagement variable was transformed using a square root transformation, whereas the caregiver Engagement variable was not transformed. Similarly, the caregiver Acknowledgment variable was transformed, whereas the child Acknowledgement variable was not transformed. Correlations were explored between these variables that were scaled differently. Future studies should include more participants to ensure that the assumption of normality is not violated, so that similar behaviors can be compared on the same scale.

Another purpose was to evaluate the relationship between the social behaviors and other measures of child development (i.e., social, communication, cognitive, and play; Hypothesis 4). However, the BDI-2-ST is a screening measure and provides an estimate of a child's abilities in each developmental domain. Psychometric data are
not available to determine the reliability and validity of the screening test. Despite this, relationships were identified between developmental domains on the BDI-2-ST and the social behavior categories. Because of these promising results, to better evaluate the relationship between the categories of social behavior observed and the Cognitive, Communication, and Personal-Social developmental domains, social categories could be compared to the full BDI-2 subscale scores, which are psychometrically sound. Future studies could use the full BDI-2 domains as measures of construct validity for these social behavior categories.

Sample

A critical limitation was the limited diversity of the sample. For almost two-thirds of the sample, the primary caregiver had a graduate or professional degree and the families owned their own homes. In addition, over two-thirds of the sample was White-Not Hispanic. Therefore, this study may only represent the social behaviors that are present in children from highly educated, primarily White-Not Hispanic households. In addition, the participants included in the Project Play Database were volunteers who were interested in participating in a research study on how play develops in early childhood. The caregivers who self-selected to participate in this study may represent caregivers who are more interested in child development and more invested in learning how to interact with their children than caregivers who
elected not to participate in the study. High levels of Engagement behaviors were observed across all caregivers, regardless of the children's age, which may be a reflection of the family values and ecology of the microsystem for the families that chose to participate. In order to generalize how social behaviors develop in early childhood, future studies should determine if the same behaviors identified through this study are observed in children of different races/ethnicities, and various socioeconomic levels.

The youngest age group included in this study was 12-month-old children. Future studies should include younger infants to identify at what age Acknowledgement emerges. Future studies should also include older preschoolers to identify how Engagement behaviors continue to develop.

In addition, this study only evaluated social behaviors of typically developing infants and toddlers. These behaviors should be explored with a sample of children identified with a variety of delays and disabilities. It will be important to evaluate if there are differences in the social behavior categories of children with developmental delays. Future studies should be conducted with typically developing children as well as children developing with delays and disabilities to help identify a threshold of Acknowledgement behaviors that is expected for infants. This threshold could then be
used to help identify children who may be at-risk for delays in social development and may benefit from interventions targeting social behaviors.

Finally, only 30 children, 10 from each age group, had available coded play data; therefore, it is important for future research to evaluate this relationship with a larger sample to determine the relationship between play and social categories of behavior.

**Data Collection**

**DPA.** The data were all collected from video recordings of the DPA. It is important to determine if these same four categories of social behaviors are observed in other settings, such as during other play assessments and during play with peers. These samples were all collected in the home with a familiar caregiver present as the play partner. Future research should evaluate these social behaviors in other environments, not just the DPA observation. Future studies should observe children and caregivers in other play situations, in non-play situations (i.e., during meals), and in every-day activities (bath time) to determine if these categories of social development actually represent a developmental continuum of social behavior in different settings.

**Observation interval.** Another limitation in the design of the data collection was how the behaviors were observed. Children were observed during the first 14-
minutes of their DPA session. Other early childhood measures observed children in smaller time segments across multiple days. For the POS, Rubin recommended observing children in 5-minute intervals across several days, with at least 15-minutes of total observation time (2001). For the SocBS, Pierce-Jordan and Lifter (2005) observed children in 5-minute intervals across four days of observation for a total of 20-minutes of assessment. Parten observed children for 1-minute each day (1932) across several weeks of observation. Therefore, future research should consider collecting observations across multiple sessions, to gain a more reliable estimate of a child's social behaviors.

One reason multiple shorter observations is better than one single observation is repeated observation will better ensure that the child's natural behavior is being observed. There are many confounds that could have an impact on the data, such as the child may be scared of the research assistants and be particularly shy at first; the child may be sick, or the child may be distracted by the video camera. These confounds may lead to the child exhibiting social behaviors that are not representative of the child's actual social interactions. By collecting additional observations, over multiple days, the researcher can better determine that the behavior observed is an accurate assessment of the child's behaviors. In addition, shorter observations are recommended for younger children as it can be difficult for children less than a year
to sustain attention for long periods of time (Crawley & Spiker, 1983; Ruff & Capozzoli, 2003).

**Coding**

Finally, a limitation to the quantitative analyses was that the author was the primary coder of the data. Because the purpose of the study was a descriptive study to explore what social behaviors emerged in early childhood, the credibility of this study was enhanced by having the first author develop, code, and interpret the data (Sandelowski, 1986). The researcher's role in qualitative research was to have direct contact with the research. Instead of objective statistical analyses, the researcher's subjective insights were important to the scientific inquiry and understanding of the phenomena (Patton & Westby, 1992).

In addition, in order to enhance the credibility of qualitative research, individuals other than the researcher needed to be able to identify the social behavior categories (Sandelowski, 1986). Therefore, the secondary coder was not blind to the hypotheses of the study. Inter-rater reliability was conducted throughout data collection and was calculated through two methods to determine if a secondary coder was able to identify the same social behavior categories developed from the descriptive study. Results of the reliability analyses suggest that the observers were recording similar behaviors. There was more variability in the coders' ratings of the
caregiver behaviors, suggesting future studies should evaluate the applicability of the operational definitions for caregiver behavior. Now that categorically different social behaviors have been identified qualitatively, future data collection should be conducted by individuals who are blind to the study hypotheses to determine if these results can be replicated quantitatively.

**Conclusion**

Understanding the components and changes in social behaviors within the natural environment will contribute to what constitutes social development. This descriptive information can then be used to develop methods to identify young children who may be at-risk for future social concerns and who would benefit from early intervention services. This study addressed limitations in the literature regarding what social behaviors are displayed in early childhood through direct observation of child behavior in a natural environment. The results are promising for identifying critical components of social behavior as young children develop, especially for Acknowledgment and Engagement behaviors. The results are also promising for identifying relationships between social behaviors, other developmental domains and play measures. Future research should continue to explore these relationships with a more diverse population and with longitudinal analyses.
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doi: 10.1080/10474410903408885


Rubin, K. H. (1986). *The Play Observation Scale (POS)*.


## Appendix A

### Data Collection Sheet and Social Category Definitions

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No Acknowledgement: child is not engaging in any of the social behaviors described below. There is no active acknowledgement of others.

- **Examples include:**
  - Child is focused on playing with toys, intent on play and not acknowledging another during this play
  - Sitting on Caregiver lap with Caregiver holding child (not child initiated to sit on lap)

- **Caregiver Examples:**
  - Caregiver is not looking or engaging with child during play
    - Talking/texting on cell phone
    - Looking away from child

Acknowledgement: Doing Something: child acknowledges the presence of another; child observes or approaches another through socially directed behaviors. These actions are directed by a child toward another without necessarily implying a response from the other.

- **Examples include:**
  - Bend, turn, or orient toward (glance, look at, watch)
    - Watching RA as place toys down
    - Looking at other as they manipulate toys
    - Glancing or gazing at caregiver, brief eye contact, (less than 2 s) but not shared eye contact
  - Approach, walk, or run toward another
  - Sit, squat, lie toward, lean against without expectation of response from other
    - Child may be engaged in another activity-like play, while leaning against Caregiver
    - These behaviors may be a result of shyness, so child stays close to Caregiver
  - Smiling in reaction to caregiver or RA without oriented towards (child may continue to play with toys but smiles at something caregiver says or does)
  - Makes babbling noises or talks while playing, as a means of acknowledging they know the Caregiver is watching (Caregiver may be responding), but no response is expected. Noises are not to elicit a response from the Caregiver, but may indicate awareness of Caregiver being close. Child does not need to look at Caregiver when making noises
  - Showing, giving, sharing, offering behaviors that do not expect a response from the Caregiver. (do not share in attention or wait for other to reply)
  - Respond to an action that the Caregiver does, to demonstrate child observed Caregiver behavior

- **Caregiver Examples**
  - Caregiver is watching/looking at child, not actively participating in play
  - Wiping child’s nose/mouth
  - Caregiver repeats what child says. Caregiver does not add additional comments about what the child is doing, but just imitates what the child says.

Definitions were adapted from: Barbu, 2003; Parten, 1932; SocBS: Pierce-Jordan & Lifker, 2005; POS: Rubin, 2001; SOCSI: Seider, 2001
Attention Seeking: child expects some response from the caregiver. Child does an action with expectation that Caregiver will respond.

- **Examples include: both Positive and Negative Behaviors**
  - Makes babbling noises or talks, with the expectation that the Caregiver will respond.
    - Child is not fully involved in a mutually engaged social interaction
    - Child may continue to play on his/her own, while having a conversation with Caregiver or eliciting noises with the expectation that the Caregiver will respond to the vocalizations
    - Child may talk through play without Caregiver responding in conversational manner, for instance child is not talking with Caregiver about play theme or expecting Caregiver to contribute to play
    - Child may elicit help from the Caregiver or make a request of the Caregiver, without turn taking or mutual engagement in the activity, Caregiver serves as a vehicle not play partner
      - Do this
      - Help me
  - Eye contact for 2 seconds or more, that is shared between the child and caregiver. Child looks at Caregiver and expects a response to this social behavior
  - Does a play activity without engaging the other in the play, but checks-in with play partner, (instances where child will likely do something and be proud of their play and look to Caregiver to see Caregiver's reaction, but Caregiver is not engaged in play participation, just responding to child). This behavior may result in a change in affect, such as smiling or laughing
    - For instance knocks over blocks and then looks to Caregiver to see reaction or
    - Completes nesting cups
    - Shakes wand and looks to Caregiver for reaction
    - Child may continue play theme without engaging the Caregiver (after giving Caregiver a figure to play with, takes figure and continues to play with figure without continued engagement from Caregiver)
  - Child may share or give something to the Caregiver to elicit a response (get attention) from Caregiver, but not to engage in mutual play participation
    - Gives the Caregiver a toy, but takes it back (not both playing with toy)
    - Shows something to the Caregiver to get a response
    - Points to an object
    - OR after Caregiver has reacted to a behavior, engages in behavior again to continue the Caregiver attention/reaction (NOTE: if more than twice it is Engagement)
  - Place self in proximity (sit, stand or lie against), hold on, hug, place arm around, place hand on, nuzzle, tickle, kiss, play with expectation of Caregiver reciprocation or comfort
  - Hit, kick, pull hair, pinch, shake, shove, push, threaten, or have tantrum with expectation of Caregiver verbal or physical response

- **Caregiver examples:**
  - Caregiver is seeking attention by engaging in an activity different from the activity the child is engaged in
    - Trying to get child to play with a specific toy
    - Saying look at me, or come here, or do this

Definitions were adapted from: Barbu, 2003; Parten, 1932; SocBS: Pierce-Jordan & Lifker, 2005; POS: Rubin, 2001; SOCSI: Seider, 2001
**Engagement**: full engagement with other. Child’s verbal and nonverbal behaviors are socially focused, and must be child initiated.

- **Examples** include:
  - Talking, sharing objects (giving for other to play with), making eye contact or physical contact and coordinating that behavior with verbal/nonverbal behavior of the other; that is, the child coordinates his or her attention and timing of language or actions with the focus of attention and timing of language or action of others
    - Turn-taking
    - Joint attention
    - Parallel play
    - Child asks for help, and after being shown how to do something, imitates behavior (Shared attention)
    - Child initiates same play activity as Caregiver (Caregiver puts puzzle piece in, child puts another piece in—or takes a piece out, and then waits for Caregiver’s response to put in another piece)
  - Mutually playing a game (peek-a-boo) with Caregiver
  - More than 2 attempts of attention seeking behavior (showing or giving Caregiver a toy) and child turns it into a game,
    - May involve laughing, smiling, or vocalizations,
    - Must involve a back-and-forth behavior, where both the Caregiver and the child are engaging in social interactions
    - Child seeks out continued engagement
  - Singing a song together
  - Child asks Caregiver to play
    - Hands Caregiver a toy
    - Suggests a play theme to play together, not just asking for help during play
  - **Caregiver examples**:
    - Caregiver is commenting on what child is doing
    - Caregiver is holding a toy related to what the child is doing
    - Caregiver is playing a game with the child

**Uncodable Behaviors**: The child or Caregiver is unable to be observed

- **Examples** include:
  - The child or caregiver is off camera for an extended period of time
    - Child leaves to go to the bathroom
    - No part of the caregiver is on the video, and the caregiver is not talking or responding to the child’s play verbally (some recordings the caregiver is not sitting close enough to be observed)
    - Caregiver leaves the room to make a phone call, answer the door, or attend to another child

Definitions were adapted from: Barbu, 2003; Parten, 1932; SocBS: Pierce-Jordan & Lifker, 2005; POS: Rubin, 2001; SOCSI: Seider, 2001