

Connectedness in Sibling and Friend Play during Early and Middle Childhood

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ABSTRACT

Connectedness in Sibling and Friend Play during Early and Middle Childhood

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The relationships that children form and maintain with other children are identified as crucial contexts for their social, cognitive, and emotional development (Carpendale & Lewis, 2015; Dunn, 2002; Howe, Ross, & Recchia, 2011; Piaget, 1962; Vygotsky, 1976). Through interactions with others, children construct an understanding of their social and cultural worlds (Piaget, 1962; Vygotsky, 1976). Children spend much of their time engaged in social play, which requires children to establish and maintain connectedness; meaning, they need to coordinate their ongoing social interactions and communicate and share ideas effectively to establish a shared understanding of the pretend scenario (Ensor & Hughes, 2008; Garvey, 1990; Howe et al., 2005). To this end, the three manuscripts examined children's connectedness during play with a sibling and friend from early to middle childhood. The first manuscript investigated children's connectedness in communication across relationship and time, the second manuscript examined features of connected sequences (e.g., emotional tone, length of sequence) based on the coding conducted in Study 1, and the third manuscript conducted a fine-grained analysis of children's communication strategies that were used to initiate, sustain, and end connectedness. Data consisted of previously collected naturalistic observations of semi-structured play sessions (DeHart, 1999). Video and transcripts were used when coding the connectedness of children's speech, the emotional tone and length of connected sequences, children's interaction quality, and communication strategies. Results are discussed in light of previous theoretical and empirical research on children's relationships and social interactions with a focus on the novel findings of

each investigation. Overall, the findings provide new insights into children's connectedness in child-child relationships and across development (i.e., from early to middle childhood). Specifically, Study 1 demonstrated that children made more failed attempts at establishing connectedness with their sibling than friend and sustained connectedness more often with their friend than sibling. In Study 2, the emotional tone of siblings' and friends' connected sequences were more likely to be positive than negative; however, siblings' sequences were more likely to be short than long and friends' sequences were more likely to be long than short. In Study 3, children engaged in more prosocial behavior and employed a play voice when initiating connectedness with their friend than sibling and more clarifications when sustaining connectedness with their sibling than friend. Implications for parents and professionals and future research recommendations are discussed in each study and the general discussion.

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Contributions of Authors

The first author of each manuscript was Jamie Leach, who developed the research questions based on the empirical and theoretical literature, constructed and coded the connectedness, interaction quality, and emotional tone coding schemes, organized the data, planned and executed the analyses, and wrote this dissertation. The second author of each manuscript is Nina Howe, her research supervisor, who oversaw the research ideas and facilitated the production of this document. Ganie DeHart is the last author in each study as she was the primary investigator of the original data collection used in this dissertation.

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General Introduction

Relationship models of development are based on the premise that children's social and cognitive development is promoted during exchanges with significant others in the context of close and intimate relationships (Carpendale & Lewis, 2006; Dunn, 2002; Hartup & Laursen, 1999). Social play, typically with siblings and friends, has been considered a particularly significant context for children to develop an understanding of their social worlds (Howe, Petrakos, Rinaldi, & LeFebvre, 2005; Piaget, 1962; Vygotsky, 1976). For example, during play, children need to negotiate, collaborate, and understand one another's perspectives for the play to progress (Brown, Donelan-McCall, & Dunn, 1996).

The interaction style (e.g., smooth, flowing, disjointed) and content (e.g., pretense session, conflict) may be fundamental in understanding children's development. Synchrony has been identified as an important feature of parent-child interactions (Harrist, Pettit, Dodge, & Bates, 1994). Harrist and Waugh (2002) proposed the general concept of *dyadic synchrony* to capture the array of interactive behaviors between the parent and child. Several terminologies have been used to reflect this phenomenon, such as mutuality (Lindsey, Colwell, Frabutt, Chambers, & MacKinnon-Lewis, 2008a), connectedness (Clark & Ladd, 2000), interactional synchrony (de Mendonca, Cossette, Strayer, & Gravel, 2011), and connected communication (Slomkowski & Dunn, 1996). An analysis of these terms follows below, which provides the rationale for the choice of the terms dyadic synchrony and connectedness in the present set of studies.

While the majority of the research has focused on parent-child interactions, the purpose of the proposed study is to extend the literature and examine dyadic synchrony, or connectedness, in children's social relationships (i.e., siblings, friends) during play. The aims of the study include: (a) examining changes in children's connectedness across social relationships and

developmental periods (i.e., from early to middle childhood), (b) determining dyads' interaction quality and features of connected sequences (e.g., emotional tone and sequence length), and (c) conducting a microanalysis of children's communication strategies used to establish and sustain connectedness.

Relationships as a Context for Development

Relationships are a crucial context for children's social, emotional, and cognitive development (Carpendale & Lewis, 2006; Dunn 2007; Hartup, 1989). From a social constructivist framework, children develop language and communication, social and emotional understanding, and construct an understanding of their social and cultural worlds through interactions with others (Carpendale & Lewis, 2006; Dunn, 2007; Vygotsky, 1978). Studying children's development from a relationships framework affords a unique perspective because the relationship context, individual characteristics, and partner effects can be observed (Hartup & Laursen, 1991). That is, children's interactions with others (e.g., siblings, friends) provide insights into children's understanding of themselves and others as well as the nature of children's relationships (Hughes & Dunn, 2007). Children's relationships, specifically with other children, are meaningful contexts that contribute to their social, cognitive, and emotional development.

Child-child relationships. Children's close relationships with other children are crucial contexts for studying children's social-cognitive understanding because of the presence of two types of interactions: reciprocal and complementary. As defined by Hinde (1979), complementary interactions are characterized by asymmetry and social dominance by one partner due to greater authority or knowledge, which complements the other's developmental level. For example, the more experienced partner can scaffold, or guide, the development of the less experienced partner (Vygotsky, 1976). Reciprocal interactions are equal and returned

exchanges with both partners having relatively matched power and influence. Friends' social exchanges are defined as reciprocal because both individuals are of similar age and skill, thus each partner can influence and contribute to the interaction in similar ways (DeHart, 1999; Hartup, 1989). The sibling relationship is unique in that it encompasses both reciprocal and complementary interactions (Howe et al., 2011). Siblings have opportunities to influence one another and contribute to the interaction equally (e.g., play and conflict) as well as engage in asymmetrical interactions (e.g., teaching) due to the inherent age and developmental differences (DeHart, 1999; Dunn, 2002; Howe et al., 2011).

Moreover, siblings co-construct a history with one another that is based on frequent, intimate, and affectively intense exchanges from highly warm and cooperative interactions to highly conflictual and hostile interactions (Buist & Vermande, 2014; Dunn, 2002; Howe et al., 2011). McGuire et al. (1996) developed a multidimensional characterization of the sibling relationship based on different combinations of sibling warmth and hostility: harmonious (high warmth/low hostility), affect-intense (high warmth/high hostility), hostile (low warmth/high hostility), and uninvolved (low warmth/low hostility). This is unlike friendships whose history is shorter-term, but who typically view one another positively (Dunn, 2002; Rubin, Bukowski, & Bowker, 2015); however, intimate friendships may also experience affectively intense interactions, which will be considered in the present study. Because friends do not share the same family history or experiences as siblings, they may approach their relationship with different perspectives and socialization approaches for managing social interactions. Siblings and friends may also approach their relationships differently because of its level of voluntariness. Friendships are voluntary relationships based on mutual liking and similarity, whereas the sibling relationship is obligatory and will continue, regardless of siblings' compatibility (Howe et al.,

2011; Rubin, Bukowski, & Parker, 2006). As children develop from early to late childhood, their friendships become more intimate and they acquire the understanding that their relationship may persevere through disagreements; whereas with development, sibling relationships may become more egalitarian, amicable, and potentially more similar in structure to friendships (Buhrmester, 1992; Updegraff, McHale, & Crouter, 2002).

Forming and maintaining friendships requires social and emotional regulation skills and social cognition (Howes, 2011; Rubin et al., 2011). Theories of socialization (e.g., Selman, 1980; Youniss, 1980) emphasize that children's understanding of friendships is dependent on underlying social-cognitive development. Skills such as perspective taking, affect regulation, communication skills, the understanding of internal states (e.g., desires, beliefs), and social information processing and problem solving all underlie friendship formation during childhood (Brownell & Brown, 1992; Dunn, 2002; Howes, 2011). Early friendships are thought to make important contributions to children's social-cognitive and social skills because young children need to co-construct cooperative play and resolve conflicts in the context of a shared activity (Dunn & Hughes, 2001). Moreover, Gottman (1983) proposed that children's contingent speech, or connectedness of communication, is one of the most sensitive indexes of social processes in early childhood and the strongest predictor of whether or not children become friends (Gottman, 1986). Interestingly, connected communication has yet to be examined in siblings' interactions, and its function in relationships is discussed below.

Overall, the literature indicates that there are links and contrasts between children's sibling and friend relationships, yet they are fundamentally different contexts for interaction and development (DeHart, 1999). Investigating the contexts that might promote connections between the relationship systems and distinct behaviors within each relationship context warrants

investigation (Parke & Buriel, 1998), thus a relationship perspective with a comparative lens guided this research.

Terminology: Defining Synchrony-Related Constructs

Synchrony-related constructs used in the literature have been defined in a variety of ways and most often in reference to the parent-child relationship. The constructs most pertinent to the purpose of this research include: dyadic synchrony (Harrist et al., 1994; Lindsey et al., 2000a; Lindsey, Cremeens, Colwell, & Caldera, 2008b), dyadic interaction (Moore, Powers, Bass, Cohn, Propper, Allen, et al., 2013), interactional synchrony (de Mendonca et al., 2011), communication patterns (Black & Logan, 1995), connected communication (Slomkowski & Dunn, 1996), connectedness (Clark & Ladd, 2000; Ensor & Hughes 2008), and mutuality (Deater-Deckard & O’Conner, 2000; Lindsey, Cremeens, & Caldera, 2010; Lindsey, Mize, & Pettit, 1997; Piehler & Dishion, 2007). While the terminologies and definitions of the synchrony-related constructs vary across the literature, there seems to be a general consensus among researchers that the constructs include two important characteristics. The first is that there are at least two people involved. Typically, mother-child dyads have been the primary focus followed by father-child dyads (e.g., De Mendonca et al., 2011; Lindsey et al., 2010; Lindsey et al., 1997). More recently, triads have been examined, which included the mother, father, and child (e.g., de Mendonca et al., 2011). The second characteristic of synchrony-related constructs is that there is a reciprocal exchange between the two people in the dyad. In other words, both people are responsive to one another and ultimately, features of the dyadic interaction are captured in such a way that individual attributes alone cannot capture.

While the general consensus of what is included in synchrony-related constructs has contributed to continuity among the various terminologies used in the literature, there is a lack of

consensus on how to operationalize the construct, which has inhibited concordance across studies. For example, Lindsey et al. (2008a), Lindsey et al. (2008b), and Harrist et al. (1994) used the term *dyadic synchrony* to capture the interaction between the parent and child; however, the researchers emphasized different characteristics within their definitions. Harrist et al. (1994) highlighted the importance of focus (i.e., attention) and included a measure to rate the degree of attention between the partners, whereas Lindsey et al. (2008a) and Lindsey et al. (2008b) emphasized the reciprocal exchange between the partners (i.e., a balance of speaking and listening). However, affective tone was also of importance in Harrist et al. (1994), which was similar to Lindsey et al.'s (2008a; 2008b) dyadic synchrony construct.

Similar to the dyadic synchrony definitions, affective (or emotional) tone was a key characteristic among a few of the other terminologies. In Lindsey et al.'s (2010) study that used the term *mutuality*, positive affect was of importance, which was also emphasized in Clark and Ladd's (2000) study on *connectedness*. While Lindsey et al. measured positive affect in terms of being present or absent, Clark and Ladd embedded positive emotion within their definition of *connectedness*. They were interested in the emotional expression of the parent and child and included "happy emotional tone" and "mutual intensity" (in terms of emotion) in their examination of connectedness. Interestingly, the other two studies on *connectedness* (e.g., Ensor & Hughes, 2008; Slomkowski & Dunn, 1996) did not include emotion within their definitions nor in their measures. Rather, both studies focused on the correspondence of the partners, in that the speaker's statements were semantically related to their partner's previous statement. This was a similar approach in Black and Logan's (1995) study that addressed parent-child communication patterns. These studies assumed a less emotional approach and focused on *what*

the individuals said as opposed to *how* they said it. Both the *what* and *how* of communication will be considered in the present study.

Harrist and Waugh (2002) proposed that in addition to researchers asking, “*what* is going on?” they should also ask, “*how* is it going on?”, because the *how* (i.e., emotional tone) is fundamental in understanding children’s development. While some of the studies placed greater emphasis on the *what* and others on the *how*, the *how* might reveal more about the interaction style and the *what* might allude to the communicative interaction and intent. Perhaps a combination of the two (i.e., *how* and *what*) is required for a full and rich understanding of *connectedness* and its impact on children’s development. Children learn a great deal through interactions with others, particularly in intimate relationships, and the ways interactional episodes function to support or inhibit children’s development may be dependent on the style and content of the exchange (Harrist & Waugh, 2002). Thus, it might be most appropriate to define *connectedness* in terms of the *what* (i.e., what is being said) and *how* (i.e., the affective component of how is it being said). For the duration of this dissertation, the term *connectedness* will primarily be used as a general concept to reflect the above-mentioned terminologies; however, *dyadic synchrony* will also be used to when referencing Harrist and Waugh’s (2002) research.

Connectedness and intimate relationships. Close relationships (e.g., parent-child, friend, sibling) have been identified as a crucial context for understanding children’s social, emotional, and cognitive growth (Hartup & Laursen, 1989; Hinde 1979). As well, theories of socialization and child development emphasize the contribution of both the parent and child through a series of bidirectional processes (Kuczynski & De Mol, 2015; Kuczynski, Marshall, & Schell, 1997; Lollis & Kuczynski, 1997). This bidirectional system develops over time within

the context of an enduring parent-child relationship (Dunn, 1983; Hinde, 1987). Such interactions between children and their parents have often been described in terms of parenting dimensions (e.g., warmth, restrictiveness); however, these interactions can also be described in terms of their dyadic style (Harrist & Waugh, 2002), or connectedness.

Connectedness and dyadic synchrony describes the continuous social coordination and mutually co-constructed nature of parent-child interactions and have been proposed to reflect the dynamics of these exchanges (Fogel, 1993; Harrist & Waugh, 2002). Hinde (1979) argues that social behavior is dependent on the contributions of both partners within the interaction; specifically, the behavior of one partner in relation to the other. For example, one person's friendly behavior that is returned by a friendly response would be indicative of synchrony whether the partner is a parent or another child (Howe, Aquan-Assee, & Bukowski, 2001). Additionally, dyadic synchrony reflects the interactional style of the dyad as opposed to each member's individual behavior. While each partner's characteristics may contribute to the establishment of dyadic synchrony, it is more than just the sum of their attributes. Rather, synchrony reflects the unique dynamic of the dyad's interaction as a whole and the repeated patterns of the sequences of interactions that influence the quality of the relationship over the long-term (Hinde, 1979).

According to Harrist and Waugh (2002), dyadic synchrony requires three necessary components. First, the coordination of intentions between the two partners occurs simultaneously over prolonged exchanges. Joint attention and turn taking are evident when observing these interactions. The second component is the rhythm and pacing of the interactions, which facilitates the construction of synchrony as nonverbal and verbal communication is exchanged. The third component is contingency, which occurs when one event increases the

likelihood of the other. As the individuals in the dyad develop an understanding of one another, their behaviors become more coordinated and this allows for coordinated engagement in an activity for longer periods of time.

The function of dyadic synchrony in children's development. Following Harrist and Waugh's (2002) conceptualization of dyadic synchrony, several hypotheses have been put forth in regards to its function in relationships and child development. During infancy, speculations regarding functions include the biosocial functions that primarily serve the infant. For example, the parent has been identified as playing an essential role in facilitating affective homeostatic regulation (Harrist & Waugh, 2002). Additionally, the expectations that emerge from synchronous interactions are foundational for the infant who is forming a secure working model of relationships (Harrist & Waugh, 2002).

The function of dyadic synchrony in toddlerhood and early childhood may foster the developmental goal of the child becoming a sophisticated social partner (Harrist & Waugh, 2002). As children's language acquisition is rapidly developing, they are also learning social communication skills and developing their social understanding. Communication researchers emphasize that turn taking, which has been identified as a key characteristic of dyadic synchrony and connectedness, is important for children to learn about the role of reciprocity in social conversations (Bruner, 1983). Moreover, by engaging in conversations, particularly with an older counterpart, children acquire the vocabulary to label mental states accurately, which provides opportunities for children to represent and reflect on abstract cognitive concepts (Bartsch & Wellman, 1995; Tomasello & Barton, 1994). Ensor and Hughes (2008) state the importance of connected speech in children's social understanding. They were particularly interested in the frequency with which mothers and children made semantically related

statements with one another and concluded that a child's social understanding may be enhanced if the parent returns semantically related statements in response to the child's utterances.

Additionally, connected speech enables the partners to establish and maintain connectedness, as they are able to co-construct a shared perspective.

Moreover, repeated, structured, and reciprocal exchanges lead to the development of shared meanings (Göncü, 1993) as well as language learning. This function becomes even more pronounced during early childhood as children's social circles and experiences begin to widen. Children spend a great deal of time with siblings during early childhood (Howe et al., 2011) and also begin to form peer and friend relationships (Rubin et al., 2015). Children's early experience of dyadic synchrony with their caregiver prepares children for competence within these child-child relationships (Harrist & Waugh, 2002), particularly during the context of play.

Children's Play and Social-Cognitive Development

Pretend play, or pretense, is a theoretical construct often defined as behaviour in a simulative, nonliteral or "as if" mode (Fein, 1981; Garvey, 1990), and requires children to transform objects and actions symbolically (Lillard, 2002). At times, children need to defy reality and act in a mental (i.e., pretend) situation, thus making play a cognitively complex behavior (Vygotsky, 1966). Moreover, contemporary theories of play emphasize its psychological value and significance to children's cognitive, social, and emotional development. Theorists, specifically Piaget (1962) and Vygotsky (1966; 1976) argued that cognitive and social development occurs by interacting with others and these interactions help children construct understandings of their social worlds (Howe et al., 2005). Social pretend play affords children an excellent context for them to foster their socio-cognitive development.

Engaging in social pretend play is complex due to the requirement for children to simultaneously coordinate their actions with one another while maintaining communication between the literal (i.e., reality) and nonliteral (i.e., pretend; Howes, 1985). Namely, play partners need to communicate effectively through a series of reciprocal and mutually agreed upon negotiations in order to establish, maintain, and progress throughout the pretense scenario (Brown et al., 1996). Lillard (2002) theorized that through metarepresentation (i.e., understanding another person's mental representation), more sophisticated forms of play unfold, which fosters children's social understanding. Social understanding has been defined as having the ability to make accurate inferences about another person's mental and emotional states in a variety of social contexts (Dunn, Cutting, & Fisher, 2002). Without negotiating social interactions to arrive at a shared understanding, collaborative pretense and social play will not continue. Perhaps during social play, children may be particularly motivated to understand their partner's thoughts and feelings to initiate and sustain their play (Hughes & Dunn, 1997), and ultimately to establish synchrony or connectedness with their partner.

Children's Play and Connectedness

Child-child relationships (i.e., siblings, friends) become increasingly more pronounced in children's lives as they enter early childhood and begin spending more time engaging in social play than they did during toddlerhood. During play, children need to establish intersubjectivity (i.e., a common frame of reference) with their partner (Göncü, 1993; Piaget, 1962; Vygotsky, 1978), a concept similar to connectedness. Perhaps through connectedness comes the attainment of intersubjectivity, or shared understanding. By being mutually responsive, the members of the dyad develop a shared understanding and become attuned to the other's thoughts and desires (Brophy & Dunn, 2002), which are necessary for successful social interactions, particularly

during play. Members of the dyad must be able to respond contingently to statements made by the other member, which would establish shared meanings with their partner within the social context (e.g., play; Hazen & Black, 1989). Two features of connectedness in early childhood that may be crucial in play include contingent speech and balanced participation by the partners in the interactional sequence.

Contingent speech, or connectedness of communication, has been proposed as the most sensitive index of social processes in early childhood (Gottman, 1983) and may be necessary for children's social play. During early childhood, children are able to make more advanced statements with their social partner than they were able to during toddlerhood. This maturation in their social-cognitive development allows for more sophisticated modes of interaction, specifically, opportunities for social play. For example, Slomkowski and Dunn (1996) examined 4-year-old children's connected turns using Gottman's (1983) three indexes that reflect a hierarchy of the demandingness of the response required during peer interaction: (a) connected turns (i.e., when one child's statement was logically related to another child's); (b) play turns (i.e., connected turns in which children were playing a game or engaging in a joint activity); and (c) pretend turns (i.e., children were engaging in pretend play). The increase in complexity from connected turns to pretend turns reflects the ability to shift from one's own perspective to the partner's perspective (Gottman, 1986), which also provides insight into the child's social understanding. In a similar vein, Howe et al. (2005) examined siblings' shared meaning strategies and found semantic tying strategies, specifically extending the partner's idea, was highly correlated with the dyads' frequency of pretense as well as internal state language, which is a marker of children's social understanding (Hughes, 2011).

A second feature that captures connectedness during early childhood is a balance of participation by partners in the interaction. As children develop from infancy to early childhood, they may play an even greater role in achieving synchrony, or connectedness, with parents because the responsibility of establishing and maintaining synchrony falls more equally on both partners (Harrist & Waugh, 2002). Children begin to play a more equal role in the interaction with parents, which may be due to their expanding development of social cognition (e.g., theory of mind, perspective-taking) and language skills. These interactions with the parent may be crucial for the child as her or his social circle begins to widen during this stage of development.

To study the notion of balance, Black and Logan (1995) examined balance in the form of turn taking between parent-child and child-peer dyads, as this would capture rates of equal participation within the play interaction. As well, Harrist et al. (1994) emphasized the need for reciprocity, with the participation of both partners being nearly equal and neither under- or over-involved in the interaction. Similarly, Lindsey et al. (1997) emphasize a balance of initiations and compliance from both partners in the interaction. Both partners should make equal, or near equal, attempts to direct the sequence of exchanges (i.e., initiations) and both partners should comply equally, or nearly equally, to the partners' directions (i.e., compliance). If both partners are initiating and complying relatively equally, then the interaction should suggest a bidirectional process and consequently, affect the quality of the relationship over time (Hinde, 1979). Since friends are of equal status, a balance of participation in their interaction should be expected whereas social dominance (i.e., imbalance of participation) may be observed between siblings due to the hierarchical nature of the relationship (Dunn, 2002; Hartup, 1989). Comparing children's balance of participation across siblings and friends forms one of the primary research questions for the proposed study.

The Present Research Studies

Prior research has provided insights into children's connectedness in the parent-child relationship (e.g., Ensor & Hughes, 2008; Harrist & Waugh, 2002; Lindsey et al., 2010); however, few studies have extended this research to children's relationships with other children. Thus, the purpose of the present studies was to examine the concept of connectedness in children's social play by conducting a comparative analysis of social context (i.e., interactions with siblings and friends) and developmental periods (i.e., from early to middle childhood). In the present studies, connectedness was defined as statements that are semantically related to a partner's previous statement (Ensor & Hughes, 2008; Gottman, 1983; Slomkowski & Dunn, 1996). Given the characteristics of siblings (e.g., shared history, emotionally intense) and friends (e.g., close, mutual), connectedness is possible and highly likely in these two intimate relationship contexts. Therefore, examining connectedness in friend and sibling dyads extended the synchrony-related literature and made an important theoretical contribution to understanding the dynamics of connectedness in child-child relationships. Additionally, by following children's relationships across time, the stability, form, and function of connectedness was illuminated. The theoretical basis that supported the proposed research came from theorists and researchers who emphasized the importance of intimate relationships for children's development (e.g., Carpendale & Lewis, 2006; Dunn, 2002; Hartup, 1989; Hinde, 1979).

An existing longitudinal data set was employed that included a group of focal children who were observed playing with their sibling and same-gender close friend at the ages of 4.5 (Time 1) and 7 years (Time 2) (DeHart, 1999; Stauffacher & DeHart, 2005, 2006). Although siblings clearly influence one another's play interactions, many studies confound age and birth order; therefore, approximately half of the focal children were observed with a younger sibling and the

other half with an older sibling, thus furthered our understanding of the role of birth order in children's sibling interactions. Given the theoretical and empirical literature in support for this research, the present studies aimed to investigate connectedness in children's social relationships in three manuscripts, each of which addresses an important aspect of the issue.

Method

Participants

The series of studies conducted secondary analyses on previously collected data from SUNY Geneseo by Dr. Ganie DeHart. The participants included 65 focal children from Caucasian, middle-class families in Western New York State. Of the 65 focal children (M age = 56.4 mos.; SD = 5.71 mos.), 37 were observed with a younger sibling (M age = 34.9 mos.; SD = 5.3 mos.) and 28 were observed with an older sibling (M age = 75.8, mos.; SD = 11.2 mos.). Of the 65 dyads, 33 same-gender pairs (17 brothers, 16 sisters) and 32 mixed-gender pairs (16 brother-sister, 16 sister-brother). Families were contacted for the follow-up (T2) study approximately three years later and 44 families participated; the focal children (M age = 96.77 mos.; SD = 6.23 mos.) were observed with the same younger sibling (n = 20; M age = 74.55 mos.; SD = 5.83 mos.) or older sibling (n = 24; M age = 118.8, mos.; SD = 8.68 mos.). The dyadic gender composition included 26 same-gender pairs (14 brother-brother, 12 sister-sister) and 18 mixed-gender pairs (11 brother-sister, 7 sister-brother).

At both T1 and T2, each family selected a friend of the focal child to participate (T1 friend M age = 57.8 mos.; T2 friend M age = 96.88 mos.). There were three criteria for the selection of a friend: (1) a frequent playmate, (2) same age, and (3) the same gender as the focal child. If families were unable to select a friend based on the three criteria, the first two were applied; at each time point, only three families selected an opposite-gender friend for the focal

child. The mothers rated the closeness of the friendship on a 5-point scale (i.e., 1 = acquaintance, 3 = friend, 5 = best friend) to ensure the children were close friends (T1: $M = 3.96$, $SD = .81$, range = 2 - 5; T2: $M = 4.2$, $SD = .73$; range = 2 to 5). At both time points, only one mother rated the child's friendship as a 2 (in between an acquaintance and a friend). Ethical approval for original data collection was given to Dr. DeHart from the SUNY Geneseo research ethics office and for the secondary analyses in the present study was also given to Nina Howe by the Concordia University Human Research Ethics Committee (protocol number, UH2010-047).

Procedure

Sibling and friend dyads were videotaped in the focal children's homes during semi-structured free play sessions using three, counterbalanced wooden play sets (farm, village, and train) that facilitated cooperative pretend play. At T1, the farm set was given to 32 sibling dyads and 30 friend dyads, the village set was given to 31 sibling dyads and 31 friend dyads, and the train set was given to 2 sibling dyads and 3 friend dyads. At T2, dyads were given either the village (19 sibling, 22 friend dyads) or train set (27 sibling, 23 friend dyads). Each focal child was videotaped in two separate 15-minute semi-structured home play sessions, one with the sibling and another with the friend. At each taping visit, the research assistants set up the camcorder and external microphone, reminded the children that they were being videotaped, and turned on the camcorder. Then, the research assistant would empty the pieces of the play set on the floor and tell the children the toys were for them to play with together. While the children were being videotaped, the research assistant sat with the focal child's mother in another room while the mother completed a demographic questionnaire and a rating scale of the closeness of the child's friendship. The order of the sibling and friend taping visits as well as the wooden play sets were counterbalanced across all families.

The videotapes were transcribed and during the transcription process, the children's language and behaviours were transcribed into separate turns, which were bounded by a verbal response of the partner or a passage of time (approx. 5s). The number of conversational turns on each transcript was determined by counting the reciprocal exchanges or if a turn was separated by a time passage.

Coding Measures

Connectedness. Connectedness was defined as statements that are semantically related to a partner's previous statement (Ensor & Hughes, 2008; Gottman, 1983; Slomkowski & Dunn, 1996). The connectedness codes included: (a) initiated-connected, (b) initiated-end, (c) sustained-connected, (d) sustained-end, (e) self-talk, and (f) unclear statements (see Appendix A for definitions and examples). Frequencies were summed for each category and proportion scores were created accounting for the number of dyadic conversational turns in each session (e.g., the focal child's initiation-connected codes in the friend session divided by the focal child's conversational turns in the friend session). The connectedness coding was established by the first author and a naïve research assistant on 20% of the T1 (26/129) and T2 (18/96) transcripts. Cohen's *kappa* revealed high levels of agreement: T1 ($k = .94$) and T2 ($k = .93$). Coding discrepancies were resolved via discussion.

Interaction quality. To determine the quality of children's play interactions, two 4-point Likert scales were employed based on Howe, Aquan-Assee, and Bukowski (2001) and Youngblade and Dunn (1995) (see Appendix B for definitions). One Likert scale rated the children's conflict and the other scale rated children's cooperation. The behaviors were rated every 30 seconds for each dyad (i.e., focal child and sibling, focal child and friend) and ratings

were based on the intensity and frequency of the behavior (i.e., as intensity and frequency increased, the rating increased).

Conflict was defined as social events in which incompatibilities of behavior occurred and were marked by mutual opposition between the actions and/or statements of two individuals (Deutsch, 1973; Vandell & Bailey, 1992). A rating of “1” indicated no conflict was observed and “4” was based on frequent and intense aggression (e.g., grabbing an object from a partner’s hand with the partner physically or verbally protesting). Cooperation was determined by children’s reciprocal behaviors, such as sharing, following suggestions, helping, collaboration, and working together (Howe et al., 2001; Youngblade & Dunn, 1995). A rating of “1” indicated no cooperation and a “4” indicated frequent attempts to cooperate and suggestions for joint play.

Reliability was established by the first author and a naïve research assistant on 20% of the T1 (18/88) and T2 (18/88) transcripts. Cohen’s kappa revealed high levels of agreement for T1 cooperation = .91, T1 conflict = .92, T2 cooperation = .93, and T2 conflict = .88. Coding discrepancies were resolved via discussion.

Length of connected sequences. After connectedness was coded, connected sequences and the length of sequences were identified based on the connectedness coding. A sequence was identified when it began with an initiated-connected code followed by at least one sustained-connected code and ended with a sustained-end code; thus, a connected sequence required at least three turns. There were 937 connected sequences at T1 and 1011 at T2. Short and long sequences were determined using a median split to dichotomize the scores for ease of interpretation and to create a relatively equal distribution of sequences (Grossman, Hadley, Brown, Houck, Peters, & Tolou-Shams, 2008; Guralnick, Connor, Hammoud, Gottman, & Kinnish, 1996).

Emotional tone. Connected sequences were coded as either positive or negative emotional tone based on Lindsey et al. (2008) (see Appendix C for definitions and examples). Positive emotional tone included indicators of positive affect such as smiling, laughing, chuckling, and expressing oneself or responding to the partner with a neutral or positive tone of voice. Negative emotional tone was identified by the presence of negative affect, such as raised tone of voice, angry or sad facial expressions, or statements with a sarcastic or taunting tone. Reliability was established by the first author and a different naïve research assistant on 20% of the T1 (188/937) and T2 (203/1011) connected sequences. Cohen's kappa revealed high levels of agreement for T1 (.94) and T2 (.91) emotional tone. Coding discrepancies were resolved via discussion.

Communication strategies. The transcripts were coded for each instance of the presence of specific behaviors within each turn that create shared meanings between partners, based on Göncü (1993), Farver (1992), and Howe et al. (2005); repeated codes were not counted within a turn (see Appendix D definitions and examples). The shared meanings categories included: (a) introductions to play (i.e., calls for attention, play themes), (b) simple strategies (i.e., descriptions of action, imitations), (c) semantic tying strategies (i.e., extensions, building-on to the partner's ideas, justifications) and, (d) clarifications (e.g., questions, revisions). The response of the partner was included given that it might facilitate further shared meanings (or not), thus (e) positive (e.g., agreement) and (f) negative (e.g., disagreement, ignoring) responses to negotiations was coded and clarifications and (g) prosocial behavior (e.g., shared affect, sharing). Next, statements were also coded for every instance of (g) play voice to indicate the pretense frame for enactment (i.e., exaggerated high-pitched tone of voice pitch) (Bateson, 1955). Finally, following Howe et al. (2005) some behaviors may disrupt the play and interfere with

constructing shared meanings, thus as a separate category, we coded (i) nonmaintenance behaviors (e.g., conflict, off-task).

The shared meanings reliability coding was conducted by the first author and a naïve research assistant on 15% of the T1 (14/88) and T2 (14/88) transcripts. Training was conducted using a different but similar play data set until RAs reached a high level of percent agreement (i.e., at least 80%). Once established, RAs began coding the current data and ongoing reliability meetings were held regularly. Cohen's *kappa* revealed high levels of agreement: total shared meaning strategies score (.94), introductions = .98, simple strategies = .93, semantic tying = .88, clarifications = .96, positive/neutral responses = .93, negative/ignoring responses = .80, prosocial behavior = .93, play voice = .97, and nonmaintenance behavior = .95. Coding discrepancies were resolved via discussion.

**Study 1: Children's Connectedness with Siblings and Friends from Early to Middle
Childhood**

Abstract

This longitudinal study investigated children's connectedness during play with a sibling and friend from early to middle childhood. Participants included 65 4-year-old focal children at time 1 (T1) and 44 7-year-old focal children at time 2 (T2) who were videotaped at home in separate semi-structured free play sessions with an older or younger sibling and a same-aged friend at both time points. Data were coded for connectedness in communication (e.g., smooth and flowing or disjointed) and revealed relationship and time effects. Focal children made more failed attempts at establishing connectedness and engaged in more self-talk with their sibling than friend and maintained connectedness more often with their friend than sibling. In terms of the partners' balance of participation, at T1 focal children ended connectedness interactions more often than their sibling and the sibling engaged in more self-talk and made more unclear statements. In contrast, the balance of participation did not differ between friends at T1 and T2 nor did siblings differ at T2, suggesting friend partners made equal contributions to the play interactions, whereas developmental differences were apparent for siblings. The findings contribute to our understanding of developmental and relationship differences of children's connectedness during play from early to middle childhood.

Children's Connectedness with Siblings and Friends from Early to Middle Childhood

Social play, particularly with siblings and friends, is a significant context for children to develop an understanding of their social worlds (Dunn, 2002; Howe, Ross, & Recchia, 2011; Piaget, 1962; Vygotsky, 1976). Children need to engage in negotiations, collaborations, and take their partner's perspective to maintain and advance their joint play (Brown, Donelan-McCall, & Dunn, 1996; Göncü, 1993; Howe, Petrakos, Rinaldi, & LeFebvre, 2005). The interaction style (e.g., smooth and flowing or disjointed) and content (e.g., pretend play) may be fundamental in understanding children's social development. Harrist and Waugh (2002) proposed the concept of *dyadic synchrony* to capture the array of interactive behaviors between the parent and child, which is also applicable to child-child interactions. Several terminologies are employed to reflect this phenomenon, such as connectedness (Clark & Ladd, 2000; Ensor & Hughes, 2008), mutuality (Lindsey, Colwell, Frabutt, Chambers, & MacKinnon-Lewis, 2008), interactional synchrony (de Mendonca, Cossette, Strayer, & Gravel, 2011), and connected communication (Slomkowski & Dunn, 1996). For the purposes of the present study, we employ the term *connectedness*, defined as the correspondence between partners, in that the speaker's statements are semantically related to their partner's previous statements (Ensor & Hughes, 2008; Gottman, 1983; Slomkowski & Dunn, 1996), thus capturing *what* is said and the social coordination between partners (Fogel, 1993; Harrist & Waugh, 2002). While most research has focused on connectedness in parent-child interactions, the present study extends the literature by examining connectedness in children's social relationships (i.e., siblings, friends) during play. Siblings and friends were observed at two time points in early and middle childhood to determine if the dyads' connectedness in communication during play sessions is influenced by their relationship.

Relationships as a Context for Development

Relationship models of development emphasize that children's social-cognitive development is facilitated during exchanges within the context of intimate relationships (Carpendale & Lewis, 2015; Dunn, 2007; Hartup, 1989). From a social constructivist framework, children develop language and communication, social and emotional understanding, and construct an understanding of their social and cultural worlds through interactions with others (Carpendale & Lewis, 2015; Piaget, 1962; Vygotsky, 1978). Sibling and friend relationships are intimate, dyadic, and important contexts for development; however, they have different defining features; thus, each relationship may make a unique contribution to children's development (DeHart, 1999; Hartup, 1989). Friends' social exchanges are defined as reciprocal (i.e., equal power base) because of similarities in individuals' age, skill, and ability, making each partner potentially equally influential in the interaction (Hartup, 1989; Hinde, 1979). Siblings have opportunities to engage in reciprocal exchanges and contribute to the interaction equally (e.g., play, conflict), but can also engage in complementary interactions (i.e., asymmetrical and hierarchal) due to the inherent age and developmental differences (Dunn, 2002; Hinde, 1979; Howe et al., 2011). Developmental differences between siblings afford opportunities for the older sibling to guide and scaffold the younger's learning, particularly during social play (Dunn, 1983). For example, younger (i.e., second-born) siblings employ sophisticated communication strategies during play, perhaps learned through interactions with older siblings (Howe et al., 2005; Leach, Howe, & DeHart, 2015; under review a).

Siblings share a long, co-constructed history due to the obligatory nature of the relationship, which renders a degree of familiarity in contrast to friendships (Dunn, 2007). Friendships are formed voluntarily and require a level of trust and companionship that may not

be present, or necessary, between siblings (Furman & Buhrmester, 1985). Moreover, the formation of friendships may require unique bidirectional communicative patterns and social processes. In a seminal study, Gottman (1983) observed that the process of friendship formation required young children to communicate information clearly and effectively to establish a shared understanding in their play. Children use more positive and prosocial communication strategies with their friend than sibling, but engage in more disruptive behaviors with their sibling than friend (Leach et al., 2015; under review a). However, children employ more introductions to new play themes with their sibling than friend, perhaps reflecting the array of experiences siblings can draw upon for their play due to their long, shared history compared to friends (Leach et al., 2015; under review a). The overall differences and similarities between friends' and siblings' patterns of communication suggest that they are indeed not equivalent contexts for children's development, and this constitutes one of the primary aims of the present study.

Connectedness in Intimate Relationships

Following Harrist and Waugh's (2002) definition, connectedness describes the continuous social coordination and mutually co-constructed nature of communication defining relationships, which is proposed to reflect the dynamics of these exchanges (Fogel, 1993). Hinde (1979) argues that social behavior is dependent on the contributions of both partners within the interaction, that is, considering the behavior of one partner in relation to the other. For example, one's friendly behavior returned by a friendly response would be indicative of synchrony (Howe, Aquan-Assee, & Bukowski, 2001). While each person's attributes contribute to the establishment of synchrony, this process reflects the unique dynamics of the dyad's interaction as a whole and the repeated patterns of the sequences of interactions influence the quality of the relationship over the long-term (Hinde, 1979).

The ability to establish connectedness begins during infancy between the infant and parent and extends to other relationships as the child's social circle begins to widen. The function of connectedness in toddlerhood and early childhood may foster the developmental goal for the child to become a sophisticated social partner (Harrist & Waugh, 2002), particularly, the ability to engage in turn taking during conversations (Bruner, 1983). For example, by engaging in conversations, especially with a more experienced counterpart such as an older sibling, children may acquire the vocabulary to label mental states accurately, which provides opportunities for children to be able to reflect on abstract cognitive concepts (Bartsch & Wellman, 1995; Tomasello & Barton, 1994; Tompkins, Benigno, Lee, & Wright, 2018). Ensor and Hughes (2008) emphasize the importance of connected speech in children's social understanding and suggest that such understanding may be enhanced if the parent makes semantically-related statements in response to the child's previous utterance. Additionally, ongoing and contingent speech allows the partners to establish and maintain connectedness and co-construct a shared perspective about the nature and intended goal of their interaction.

These repeated, structured, and reciprocal exchanges may be associated with the co-construction of shared meanings (Göncü, 1993) and become more pronounced during early childhood as children's social circle widens and their social-cognitive and language skills become more sophisticated. Children spend a great deal of time with their siblings and also begin to form peer and friend relationships during this period (Howe & Leach, 2018; Howe et al., 2011; Rubin, Bukowski, & Bowker, 2015). In fact, children, aged 6 and 7, spend more time after school engaging in play with their sibling than friends, parents, or alone (Lehrer, Petrakos, & Venkatesh, 2014). The ability to establish connectedness and co-construct shared meanings

prepares children for successful social interactions within these relationship contexts (Harrist & Waugh, 2002), particularly during social play.

Children's Play and Connectedness

Child-child relationships (i.e., siblings, friends) become increasingly more pronounced throughout early and middle childhood as they spend increasingly more time engaging in social play (Howe & Leach, 2018). During social play, children need to establish intersubjectivity (i.e., a common frame of reference) with their partner to create and maintain the play scenario (Göncü, 1993; Piaget, 1962; Vygotsky, 1978), a concept similar to connectedness. When children respond contingently to their dyadic partner's statements about the course of the play, they develop a shared understanding and become attuned to the other's thoughts and desires, which is necessary for successful social interactions (Brophy & Dunn, 2002; Hazen & Black, 1989).

Contingent speech, or connectedness of communication, is proposed as the most sensitive index of social processes in early childhood (Gottman, 1983) and may be necessary for social play. The maturation in children's social-cognitive abilities from toddlerhood to early and middle childhood allows for more sophisticated modes of interaction, such as social pretense. For example, Slomkowski and Dunn (1996) found that 4-year-old children's social understanding was associated with their sustained connected communication (i.e., continued contingent speech) with a friend, suggesting that children use their perspective-taking abilities to establish and coordinate their interactions. Similarly, Howe et al. (2005) examined siblings' shared meaning strategies and reported positive associations between semantic tying strategies (e.g., extending the partner's idea) and the dyads' frequency of pretense and internal state language (i.e., references to thoughts and feelings), which is considered a marker of children's social understanding (Hughes, 2011).

A second feature of connectedness that may be important in children's play interactions is a balance of participation by both dyadic partners. The need for both partners to participate, initiate interactions, and comply with one another in a relatively equal fashion is emphasized by peer and friend researchers (Black & Logan, 1995; Harrist, Pettit, Dodge, & Bates, 1994; Lindsey, Mize, & Pettit, 1997). When there is a balance of participation by both partners, the interaction should reflect a bidirectional, reciprocal process with both partners co-creating and influencing the interaction, which affects the relationship quality over the long-term (Hinde, 1979; Kuczynski, Marshall, & Schell, 1997; Lollis & Kuczynski, 1997). Since friends are of equal status and in a voluntary relationship, a balance of participation can be expected and may be necessary to maintain the friendship over time, whereas social dominance may be observed between siblings due to the hierarchal nature of their relationship (Dunn, 2002; Hartup, 1989; Howe et al., 2011). Children's balance of participation with siblings and friends (i.e., equal contribution to initiate and sustain interactions) is investigated in the present study.

The Present Study

Prior research provides initial insights regarding children's connectedness in parent-child relationships, specifically during infancy (e.g., Harrist & Waugh, 2002). To extend the current literature, the present study examined connectedness in other close relationship contexts (i.e., siblings and friends) over a 3-year period, from early to middle childhood. This design affords an opportunity to trace developmental differences when focal children were aged 4 and 7 years. Many studies confound children's birth position in the family with age; thus, the design of the present study included same-aged children who were observed with either an older or younger sibling at both time points to further our understanding of the role of birth order in children's social interactions. At each time point, focal children were observed in two counterbalanced,

semi-structured play sessions (i.e., with a same-aged friend and with a sibling) using a counterbalanced play set (i.e., farm, village, train). We assessed connectedness by determining whether an initiation led to connectedness (i.e., initiation-connected) or not (i.e., initiation-end), and if the successful initiation was followed by a connected statement that sustained connectedness (i.e., connected-sustained) or failed to elicit a response from the partner (i.e., connected-end). We also identified self-talk speech and inaudible statements (i.e., unclear).

We addressed three questions. First, does focal children's connectedness vary across relationship context (sibling, friend) and across time? Sibling and friend relationships become more intimate during middle childhood (Buhrmester, 1992; Updegraff, McHale, & Crouter, 2002); therefore, it was hypothesized that children would make more connected statements (i.e., connected-sustained) at T2 than T1 and engage in more self-talk at T1 than T2, regardless of relationship context. In terms of main effects of relationship context, we anticipated that children would make more connected statements with their friend than sibling. Due to their mutual liking and interests as well as developmental and communication abilities, friends may find it easier to build on and expand their partner's ideas than siblings (Howe et al., 2005; Leach et al., 2015; under review a). Because of siblings' inherent age and developmental differences, they might not connect as easily as friends and, thus may engage in more self-talk and failed connectedness attempts (i.e., initiation-end).

Our second research question pertains to the partners' balance of participation in the play session; specifically, which child in the dyad (e.g., focal child or sibling; focal child or friend) makes more attempts to initiate and sustain connectedness? It was expected that friends would make equal contributions to the interactions due to the mutual and reciprocal nature of the relationship (Dunn, 2007; Rubin et al., 2015); thus, we expected no differences in the friend

sessions. However, we anticipated an imbalance in participation in the sibling session due to the hierarchical and asymmetrical characteristics of the relationship (Howe et al., 2011). Siblings use more control during their play compared to friends (Leach et al., 2015) and we expected to see one sibling make more attempts at connectedness and the other sibling reject such attempts by making an irrelevant response or ignoring the partner's previous statement (i.e., initiate-end, connected-end, or self-talk). We also expected the imbalance would be more prevalent at T1 than T2 because the sibling relationship typically becomes more amicable and egalitarian with development (Rubin et al., 2015; Updegraff et al., 2002). The imbalance of participation may also be attributed to birth order, which leads to the third research question.

Lastly, we were interested in the role of birth order in focal children's connectedness with siblings and friends across time. Since birth order impacts children's interactions in various contexts and due to the inherent age difference between siblings, there is opportunity for the older sibling to demonstrate social dominance over their younger sibling (Hinde, 1979; Howe et al., 2011). Thus, we expected first-born focal children would initiate and terminate connectedness more often than second-born focal children, particularly in the sibling context (Leach et al., 2015). Additionally, second-born focal children may have more opportunity to learn from their older sibling about how to make semantically-related statements (Howe et al., 2005; Leach et al., 2015), thus it was expected that second-born focal children would sustain connectedness in both social contexts more often than first-born focal children.

Method

Participants

Sixty-five middle-class Caucasian families from the Western New York area, who were representative of the local community, participated. At T1, each sibling dyad consisted of a 4-

year-old focal child (M age = 56.4 mos.; SD = 5.71 mos.) observed with a younger sibling (n = 37; M age = 34.9 mos.; SD = 5.3 mos.) or an older sibling (n = 28; M age = 75.8, mos.; SD = 11.2 mos.). The dyadic gender composition included 33 same-gender pairs (17 brothers, 16 sisters) and 32 mixed-gender pairs (16 brother-sister, 16 sister-brother). Further, 21 focal children were first-born, 32 were second-born, and 12 were third- or later-born; therefore, focal children were labeled as either older or younger in relation to the focal sibling included in the study. Approximately three years later, 46 families participated in the follow-up (T2) study. Attrition was mostly due to family life changes (e.g., divorce, maternal employment, moved, or birth of another child); there were no demographic (i.e., parental education, SES, ethnicity) or focal child factors (i.e., age, gender, gender composition of the dyad) differences between the T2 participating and nonparticipating families (Stauffacher & DeHart, 2006). At T2, focal children (M age = 96.77 mos.; SD = 6.23 mos.) were observed with the same younger sibling (n = 20; M age = 74.55 mos.; SD = 5.83 mos.) or older sibling (n = 24; M age = 118.8, mos.; SD = 8.68 mos.). The dyadic gender composition included 26 same-gender pairs (14 brother-brother, 12 sister-sister) and 18 mixed-gender pairs (11 brother-sister, 7 sister-brother). At T2, 15 focal children were older, 20 were second-born, and 9 were third- or later-born; thus, focal children were identified as either older or younger in relation to the sibling included in the study. At both T1 and T2, six mothers had only completed high school, whereas the rest had some or a completed post-secondary degree.

At both T1 and T2, each family selected a friend of the focal child to participate (T1 friends' M age = 57.8 mos., SD = 10.61 mos.; T2 friends' M age = 96.88 mos., SD = 11.01 mos.). There were three criteria for the selection of a friend: (1) a frequent playmate, (2) same age, and (3) the same gender as the focal child. If families were unable to employ the three criteria, the

friend was chosen based on the first two requirements; at both time points, three families selected an opposite-gender friend. Approximately half of the families selected the same friend from T1 to participate at T2 (20/46 = 43%). The parents rated the closeness of the friendship on a 5-point scale (i.e., 1 = acquaintance, 3 = friend, 5 = best friend) to ensure the children were close friends (T1: $M = 3.96$, $SD = .81$, range = 2 - 5; T2: $M = 4.2$, $SD = .73$; range = 2 to 5). At both time points, only one mother rated the child's friendship as a 2 (in between an acquaintance and a friend). Ethical approval for original data collection was given to Dr. DeHart from the SUNY Geneseo research ethics office and for the secondary analyses in the present study was also given to Nina Howe by the Concordia University Human Research Ethics Committee (protocol number, UH2010-047).

Procedure

The same procedure for the semi-structured play session was followed at T1 and T2; each dyad was videotaped in the family home in two separate 15-minute sessions with their sibling and friend. Tapings occurred approximately one week apart and the order of the sibling and friend sessions was counterbalanced across families. At T1, dyads were given one of three counterbalanced wooden play sets (farm, village, or train¹) to facilitate pretend play: farm set (32 sibling, 30 friend dyads); village set (31 sibling, 31 friend dyads); train set (2 sibling, 3 friend dyads). At T2, dyads were given either a village set (19 sibling, 22 friend dyads) or a train set (27 sibling, 23 friend dyads). The research assistant instructed the children to play with the toys

¹ The five dyads who received the train set were recruited late in the first wave of the data collection and were accidentally given the train set for the play session, which was meant to be used only for the T2 data collection.

as they wished, and then sat with the mother in another room to allow the children privacy. Research assistants, blind to the study's purposes, transcribed the children's language and behavior on the videotapes.

Measures

Conversational turns. The number of conversational turns on each transcript was determined by counting the reciprocal exchanges of the children (i.e., a speaker's utterances bounded by the utterances of another speaker) or if there was a break in the speech of one child for more than 3 seconds.

Connectedness. Connectedness was defined as statements that are semantically related to a partner's previous statement (Ensor & Hughes, 2008; Gottman, 1983; Slomkowski & Dunn, 1996). The connectedness codes included: (a) initiated-connected, (b) initiated-end, (c) sustained-connected, (d) sustained-end, (e) self-talk, and (f) unclear statements (see Tables 1 and 2 for definitions and examples). Frequencies were summed for each category and proportion scores were created accounting for the number of dyadic conversational turns in each session. For example, focal child's initiation-connected codes in the friend session divided by the focal child's conversational turns in the friend session. The connectedness coding was established by the first author and a naïve research assistant on 20% of the T1 (26/129) and T2 (18/96) transcripts. Cohen's *kappa* revealed high levels of agreement: T1 ($k = .94$) and T2 ($k = .93$).

Results

Analysis of variance (ANOVA)-based procedures were performed for the focal children's connectedness as a function of relationship context, gender, and birth order, with relationship and time as repeated measures. Effect sizes are reported as partial eta-squares for significant effects. Bonferroni corrections were used for all *post-hoc* pairwise comparisons (alpha level $p < .05$).

Descriptive Statistics

Analyses were conducted using proportion scores (as described previously) because of the range in the number of conversational turns across dyads (siblings: range = 7–163; friends: range = 23-124). See Table 3 for means and standard deviations of the connectedness variables.

Preliminary Analyses

To account for possible gender effects, a 2 (time: T1, T2) by 2 (relationship: sibling, friend) by gender (male, female) MANOVA with the six connectedness codes as the dependent variables was conducted. Findings did not yield significant results. To determine sibling gender composition effects, a 2 (time: T1, T2) by dyadic gender composition (focal boy-girl, boy-boy, focal girl-boy, girl-girl) MANOVA with the six connectedness codes as the dependent variable was conducted. There were no significant results for dyadic gender composition. To determine the effect of play set on children's connectedness, a one-way MANOVA conducted at each time point accounted for the play set at each time point, but no significant differences were revealed. Moreover, about half of the friends who were observed at T1 changed at T2 (20/44 = 45%); thus, to determine if the effect of the friendship change had an impact on children's connectedness, a one-way MANOVA was performed with friendship change as an independent variable, but no significant differences were found.

Children's Connectedness across Relationships and Time

The first goal was to address the hypothesis regarding children's connectedness across relationship and time, thus a relationship (sibling, friend) by time (T1, T2) MANOVA with the six connectedness codes as the dependent variables was conducted. This analysis revealed multivariate effects for time, Wilk's $\lambda = .66$, $F(5, 38) = 3.20$, $p = .012$, $\eta^2 = .34$, and multivariate effects for relationship, Wilk's $\lambda = .47$, $F(5, 38) = 7.17$, $p < .001$, $\eta^2 = .53$.

Follow-up univariate ANOVAs revealed effects of time on initiation-end, $F(1, 43) = 5.80, p = .02, \eta^2 = .12$, self-talk, $F(1, 43) = 4.95, p = .03, \eta^2 = .11$, unclear statements, $F(1, 43) = 5.34, p = .02, \eta^2 = .11$, and a trend for connected-end, $F(1, 43) = 3.87, p = .06, \eta^2 = .08$. Specifically, children made more initiation-end and connected-end statements at T2 than T1, contrary to our hypotheses. Supporting the hypothesis, self-talk and unclear statements occurred more often at T1 than T2 (see Table 4 for *Ms* and *SEs*).

The follow-up univariate ANOVAs revealed an effect of relationship for initiated-end, $F(1, 43) = 23.46, p < .001, \eta^2 = .36$, connected-sustained, $F(1, 43) = 33.53, p < .001, \eta^2 = .44$, and self-talk, $F(1, 43) = 22.62, p < .001, \eta^2 = .35$. Children made more initiated-end and self-talk statements with siblings than with friends and more connected-sustained statements with friends than siblings (see Table 4 for *Ms* and *SEs*).

Comparing Children within the Relationship Dyad (Focal Child vs. Sibling or Focal Child vs. Friend)

A one-way MANOVA was conducted to determine differences between focal children's and siblings' connectedness codes at T1 with sibling age as a covariate. A multivariate effect for child was evident, Wilk's $\lambda = .72, F(5, 59) = 4.59, p = .001, \eta^2 = .28$. Follow-up univariate ANOVAs revealed effects of child on connected-end, $F(1, 63) = 7.09, p = .010, \eta^2 = .10$, self-talk, $F(1, 63) = 7.54, p = .009, \eta^2 = .11$, and unclear statements, $F(1, 63) = 11.40, p = .001, \eta^2 = .11$. Focal children employed more connected-end statements ($M = .14, SE = .01$) than siblings ($M = .12, SE = .01$) and siblings engaged in more self-talk ($M = .12, SE = .02$) and made more unclear statements ($M = .03, SE = .01$) than focal children ($M = .10, SE = .02; M = .02, SE = .00$, respectively). No significant differences were found for connectedness codes between focal children and siblings at T2 or focal children and friends at T1 or T2, supporting the hypothesis.

Focal Children's Birth Order and Connectedness across Relationship and Time

To investigate the role of birth order in children's shared meaning strategies across time and relationship, a 2 (time: T1, T2) by 2 (relationship: sibling, friend) by 2 (birth order: older, younger focal child) MANOVA with the six connectedness codes as the dependent variables was conducted; no significant multivariate effects for birth order were revealed.

Discussion

Our study makes important contributions to understanding children's connectedness across relationship contexts (i.e., siblings, friends) and developmental stages (i.e., early and middle childhood). Connectedness was studied by observing children's interactions with a sibling and a friend in semi-structured play sessions in their home at two time points. The patterns of findings highlight important similarities and differences in children's connectedness and make a unique contribution to our understanding of communication processes evident in the context of two important relationships for young children.

Children's Connectedness across Relationships and Time

Sibling and friend relationships are intimate, dyadic relationships and are important contexts for children to develop social communication and emotional understanding (Carpendale & Lewis, 2015; Dunn, 2015; Howe & Leach, 2018). Connectedness requires ongoing social coordination, which includes mutual and balanced communication (Fogel, 1993; Harrist & Waugh, 2002). Repeated exchanges in various relationship contexts may contribute to the development of children's sophisticated social-cognitive understanding and language skills.

Overall, results indicated three differences in children's connectedness across relationships, thus emphasizing different patterns of communication children use that change depending on their play partner. First, as hypothesized, children made more initiated-end

statements with their sibling than with their friend, which did not elicit a response from their partner. For example, a focal child asked her older brother, “What is that?” and he began singing as he placed roof pieces onto the buildings, thus ignoring, or perhaps not hearing, her question. Siblings have an inherent age difference and may not have mutual play interests, intentions, or developmental and communication abilities as same-aged friends (Dunn, 2007; Howe et al., 2011); therefore, they may not connect as easily as friends. If siblings are not connecting with one another during play, they may engage in more solitary play, which may reflect the second difference identified in children’s level of connectedness.

Children engaged in more self-talk with their sibling than with their friend, which also supported the hypothesis. If siblings are indeed struggling with initiating and sustaining connectedness in their play, children may talk to themselves as they plan out their actions. The self-talk statements were typically play speech (e.g., making sheep noises “baa baa baa”) or narrating their own actions (e.g., “okay. These go on the farm. These go on the side” while constructing the barn). To engage in social play, children require a partner to contribute to the interaction by maintaining and furthering the play scenario either through verbal communications or actions (Garvey, 1990). Crucial verbal strategies include extending the partner’s ideas and building onto one’s own ideas to evolve the play scenario (Howe et al., 2005; Leach et al., 2015; under review a). However, if the sibling is not interested in doing so, the child can either engage in solitary play or withdraw from the play altogether. Previous studies report that siblings ignore their counterparts more often than friends (Leach et al., 2015; under review a), which could also explain why children may engage in more self-talk with their sibling. This behavior may be less likely to occur between friends due to the mutual liking and reciprocal nature of friendships (Howe & Leach, 2018; Rubin et al., 2015).

Third, as hypothesized, children made more connected-sustained statements with their friend than with their sibling. Friends may connect more easily with one another by building on and extending their partner's ideas due to their similar developmental abilities and their mutual liking and shared preferences that characterize their relationship (Hartup, 1989; Hinde, 1979). For example, one friend suggested, "Let's make a little mini park", the focal child extended the idea by stating, "The trees [are] there!" while placing a tree, and the friend added, "Gotta put some kids in". Siblings may not necessarily have similar interests and may intentionally develop their own niche to identify themselves as different from their sibling and family (Whiteman, McHale, & Crouter, 2007). For example, a focal child, who was interested in the train cars, stated, "Ooo! I got the big engine! Hehe!", whereas the older sister focused on building the train tracks, "I'm building the track". These differences may make it more difficult for siblings to connect during play, whereas the similarities between friends may help establish and maintain connectedness.

There was also evidence of a developmental trend in children's connectedness from early to middle childhood. Children's relationships with their siblings and friends typically become more intimate and amicable in middle childhood (Buhrmester, 1992; Updegraff et al., 2002); thus, our findings that children made more failed attempts to initiate connectedness (i.e., initiate-end) and the trend of ending connectedness (i.e., connected-end) at T2 than T1 were unexpected and contrary to our hypothesis. Perhaps at this time point, children were frequently changing play themes or topics, which would affect their connectedness based on the present coding scheme. Further investigation is warranted given the novelty of the present study. However, as expected, children engaged in more self-talk and made more unclear (i.e., inaudible, difficult to understand) statements at T1 than T2. The greater frequency of self-talk at T1 may

reflect children's egocentric thinking as children were in the preoperational stage of cognitive development at this time point (Piaget, 1964). At T1, their self-talk might reflect a means to regulate their thoughts and emotions, whereas in middle childhood external speech is no longer necessary because it becomes internalized (Vygotsky, 1987). For example, at T1, one child narrated her actions as she constructed the barn by quietly stating, "Have to make this a little wider. There's one, there's two..." and once finished putting the barn together, she said, "I got the barn done!" to her friend. Overall, our novel method of analyzing children's communication patterns provides a unique contribution to the literature by extending connectedness research to child-child relationships and highlights differences in children's connectedness with siblings and friends. However, replication of the study's design is warranted.

Comparing Children within the Relationship Dyad

Our second goal was to investigate the balance of participation by the partners within the dyad in the play session (i.e., focal child vs. sibling; focal child vs. friend). As expected, findings revealed an imbalance of participation between siblings at T1, with focal children making more connected-end statements than their siblings, who in turn engaged in more self-talk and unclear statements than the focal children. The imbalance, or lack of connectedness, may reflect the developmental difference in the siblings' social abilities and interests, which might be more prominent in early childhood than middle childhood. The differences at T1 may also be due to children's attempts to control or direct the play. Siblings apparently demonstrate more leadership or controlling behaviors during play compared to friends (Leach et al., 2015; under review a), which may lead one child to resign or withdraw from the social interaction and engage in solitary play as evidenced by their self-talk. For example, one focal child said, "I build the big one now, okay?" The older sister did not answer and instead played with two people figurines

exclaiming, “Ahh! Go get your mother! I’m having a heart attack!”. Both these behaviors, ending connectedness and self-talk, may occur more often between siblings because of the obligatory nature of the relationship and are not as tolerated or accepted between friends, due to the reciprocal and voluntary nature of friendships (Howe & Leach, 2018, Howe et al., 2011; Rubin et al., 2015). The sibling relationship will endure regardless of the positive or negative behavior children direct at the other, whereas friendships may dissolve if interactions are dominated by conflict or disinterest (Howe et al., 2011; Rubin et al. 2015). Perhaps this explanation may illuminate the lack of differences found between focal children and friends at both time points.

Moreover, friends may be more similar than siblings in terms of developmental abilities (e.g., communication skills) and characteristics (e.g., interests), which may be why they chose to become close friends. In fact, children typically choose friends who are similar to them in terms of age, interests, and ability to co-construct play, all of which might be dissimilar between siblings (Howe & Leach, 2018; Rubin et al., 2015). However, these potential differences between siblings may become less prominent in middle childhood because siblings may become more similar in terms of cognitive and linguistic developmental ability than in the preschool years allowing for a more equal opportunity to connect and contribute to the play scenario. This interpretation is supported by the expected lack of significant differences between focal children and sibling’s communication patterns at T2. Perhaps, by T2, siblings may have become more collaborative due to their more developed language, social, and cognitive skills and in conjunction with their more intimate knowledge of their partner, they may be more interested in one another, which is reflected in their more connected communication during play. Moreover, as children grow and mature through childhood, the sibling relationship becomes more amicable

and begins to reflect the egalitarian features that characterize friendships (Updegraff et al., 2002). Overall, the balance of participation within the interaction reflects the reciprocal nature of close relationships and the bidirectional process where both partners co-create and influence the interaction (Hinde, 1979; Kuczynski et al., 1997; Lollis & Kuczynski, 1997), which apparently is evident in both relationship contexts by middle childhood.

Birth Order

Our third research question pertained to the role of birth order in focal children's connectedness with siblings and friends across time. No significant birth order differences were found, which was contrary to our hypothesis. Previous studies have noted birth order differences in siblings' communication and interaction strategies (e.g., Abuhatoum, Howe, & DeHart, 2018; Della Porta, & Howe, 2017; Howe et al., 2005; Leach et al., 2015, 2017, under review a), although some studies examined communication in conflict sequences and not play. Perhaps connectedness reflects the unique dynamics of the relationship, or play interaction, due to the dyadic nature of the construct as opposed to individual factors such as birth order and gender (Hinde, 1979). Future research, including a relationship quality measure, is warranted.

Conclusion

There are some study limitations to note. First, the participants were from middle class, Caucasian American families, and while they were representative of the rural and suburban communities, the homogeneity of the sample limits the generalizability of the results to diverse populations. Further, the sample size was relatively small due to attrition from T1 to T2, which may have reduced statistical power; however, the longitudinal design and detailed observations produced a rich data set. Future research would benefit from replicating the study's procedure

and including a measure of children's relationship quality as well as the specific communication strategies children use to initiate and maintain connectedness with their play partner.

To our knowledge, there is a paucity of research that has examined connectedness in child-child relationships and across time points. The findings presented contribute to our understanding of developmental and relationship differences in children's connectedness during play and provide a means to illuminate their social understanding as they navigate between two important relationships in their young lives. Our findings support the notion that connectedness reflects aspects of the relationship and social coordination (Fogel, 1993; Harrist & Waugh, 2002) and reveals changes in children's connectedness from early to middle childhood.

Table 1

Definitions of Connectedness Coding

<p>1. Initiation: Child initiates (or attempts to initiate) a new topic in the play.</p> <p>A) Initiation-connected: Child initiates communication, which leads to the partner making a connected statement. e.g., friend states, “they’re even bigger than the house” (<i>initiation-connected</i>) and the focal child responds, “notaa cuz you didn’t put the roof on” (<i>connected-end</i>).</p> <p>B) Initiation-end: Child initiates communication, but fails to elicit a response from their partner. e.g., the focal child asks, “I build the big one now, okay?” (<i>initiation-end</i>) and the older sibling says, “Ahh! Go get your mother! I’m having a heart attack!” (<i>self-talk</i>).</p> <p>2. Connected: Child’s utterance is semantically related to the partner’s previous turn (which could be either an initiation or connected) and sustains the interaction.</p> <p>A) Connected-sustained: Child’s statement is connected to the partner’s previous statement and sustains the interaction (as long as the interaction continues and the children share the same goal). e.g., the friend says, “Wait. I think this goes like this. Nope need a red one” (<i>initiation-connected</i>), the focal child responds by saying, “Maybe this goes on that. Nope. What else might go on it?” (<i>connected-sustained</i>), and the friend adds, “This might go on it.... Nope. This! This! Yes! That goes on it” (<i>connected-end</i>).</p> <p>B) Connected-end: Child’s statement is connected to the partner’s previous statement, but fails to elicit a semantically related response from the partner. Typically, the last turn in the sequence. e.g., the older sibling says, “Okay now this is um war headquarters. This’ll be the jail (<i>initiation-connected</i>), the focal child agrees by saying, “Yeah, the jail. Oh yeah we had that last time” (<i>connected-sustained</i>), and the older child says, “No we didn’t (<i>connected-end</i>).</p> <p>3. Other codes</p> <p>A) Self-talk: Speech directed at oneself; usually whispering and during solitary play.</p> <p>B) Unclear statements: Child’s vocalizations are inaudible or difficult to understand.</p>	
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Table 2

Coding Example of Connectedness

Turn	Child	Comments and Actions	Code
1	FC	The rabbit can go in the forest, okay?	Initiated- connected
2	YS	Yeah!	Connected- sustained
3	FC	The picnic table can go in the forest. Where's the chairs?	Connected- sustained
4	YS	Here. (<i>gives chair to FC</i>)	Connected- sustained
5	FC	Thanks!	Connected- sustained
6	YS	Here's the other chair. This is for me! All set up!	Connected-end

Note. FC = focal child; YS = younger sibling.

Table 3

Means and Standard Deviations for Children's Connectedness Across Relationship Context

Connectedness Code	Sibling Session				Friend Session			
	Time 1		Time 2		Time 1		Time 2	
	Focal Child	Sibling	Focal Child	Sibling	Focal Child	Friend	Focal Child	Friend
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Initiation- connected	.14 (.06)	.11 (.06)	.14 (.06)	.15 (.07)	.12 (.06)	.11 (.05)	.12 (.05)	.13 (.06)
Initiation-end	.18 (.13)	.15 (.10)	.19 (.11)	.17 (.11)	.09 (.06)	.09 (.08)	.13 (.08)	.14 (.10)
Connected- sustained	.44 (.21)	.47 (.21)	.45 (.16)	.45 (.18)	.62 (.17)	.64 (.17)	.58 (.19)	.57 (.19)
Connected- end	.13 (.06)	.12 (.06)	.14 (.06)	.15 (.07)	.11 (.05)	.11 (.06)	.14 (.07)	.11 (.04)
Self-talk	.10 (.12)	.12 (.13)	.07 (.06)	.07 (.08)	.04 (.06)	.04 (.05)	.03 (.03)	.04 (.05)
Unclear statements	.02 (.03)	.03 (.05)	.01 (.01)	.02 (.03)	.01 (.03)	.01 (.02)	.01 (.02)	.01 (.01)

Note. Sibling dyads ($N = 65$) and friend dyads ($N = 64$) at T1. Sibling dyads ($N = 44$) and friend dyads ($N = 44$) at T2. Means and standard deviations are proportion scores based on the number of conversational turns in the play session.

Table 4

Means and Standard Errors for Children's Connectedness Across Time and Relationship

Connectedness Code	Time		Relationship	
	Time 1	Time 2	Sibling	Friend
	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>
Initiation-connected	.13 (.01)	.13 (.01)	.14 (.01)	.12 (.01)
Initiation-end	.13 (.01)	.16 (.01)	.18 (.01)	.11 (.01)
Connected-sustained	.53 (.02)	.52 (.02)	.45 (.02)	.59 (.02)
Connected-end	.12 (.01)	.14 (.01)	.13 (.01)	.13 (.01)
Self-talk	.08 (.01)	.05 (.01)	.09 (.01)	.04 (.01)
Unclear statements	.02 (.00)	.01 (.00)	.01 (.00)	.01 (.00)

Note. Focal children in the sibling session ($N = 44$) and friend session ($N = 44$). Means and standard errors are proportion scores based on the number of conversational turns in the play session.

Bridging Studies: Individual to Dyadic Understanding of Children's Connectedness in Early and Middle Childhood

The first study addressed children's connectedness during play with a sibling and friend from early to middle childhood. The findings extend recent work on connectedness in the parent-child relationship by investigating connectedness in child-child relationships.

Connectedness describes the continuous social coordination and mutually co-constructed nature of communication, which reflects the dynamics of the interactions that comprise the relationship (Fogel, 1993; Harrist & Waugh, 2002). Based on this premise, the present study adds to our current state of knowledge regarding the nature of children's interactions in sibling and friend relations. The first study identified key elements of how children connect with siblings and friends. Specifically, we found unique patterns of interaction that vary across relationship context and time, such as children making more failed attempts at establishing connectedness with siblings than friends and maintaining connectedness more often with their friend than sibling.

To further our understanding of children's connectedness, we extended our investigation to include the dyad as a whole (i.e., focal child and sibling, focal and friend) and examine the dyadic interaction quality and features of connectedness over time. Therefore, the goals of the second study were to examine: (a) the dyads' interaction quality; (b) differences in the length of connected sequences (i.e., short, long); (c) emotional tone of connected sequences (i.e., positive, negative); and (d) emotional tone and sequence length of connected sequences (e.g., negative-short, positive-long). A study of this nature allows for a more comprehensive understanding of features of the dyads' connectedness across relationship contexts (i.e., sibling, friend) and developmental stages (i.e., early and middle childhood).

**Study 2: A Longitudinal Investigation of Siblings' and Friends' Features of Connectedness
and Interaction Quality During Play**

Abstract

The present study examined features of sibling and friend dyads' connectedness (e.g., length and emotional tone of connected sequences) and the quality of the dyads' interactions during play from early to middle childhood. Forty-four families with a 4-year-old focal child were observed at time 1 (T1) and again at time 2 (T2) when they were 7 years old in two separate play sessions (i.e., sibling and friend). Play sessions were coded for interaction quality (i.e., conflict, cooperation). Connected sequences were identified based on previous coding and features of the sequences (i.e., emotional tone, length of sequence) were compared across relationship and time. Findings revealed similarities in the dyads' interaction quality, with both siblings and friends increasing in cooperation over time. Similarly, the emotional tone of siblings' and friends' connected sequences were more likely to be positive than negative; however, siblings' sequences were shorter rather than longer and friends' sequences were more likely to be long than short. These findings provide new insights into children's connectedness in child-child relationships and changes in connectedness across developmental stages from early to middle childhood. The study highlights the importance of observing the dyad when using a relationship framework to examine children's interactions.

A Longitudinal Investigation of Siblings' and Friends' Features of Connectedness and Interaction Quality During Play

The relationships that children form and maintain with other children are identified as crucial contexts for their social, cognitive, and emotional development (Carpendale & Lewis, 2015; Dunn, 2002; Howe & Leach, 2018; Howe, Ross, & Recchia, 2011; Piaget, 1962; Vygotsky, 1976). During early and middle childhood, children spend much of their time engaged in social play, which requires partners to negotiate, collaborate, and take the other's perspective to maintain and further their shared activity (Brown, Donelan-McCall, & Dunn, 1996; Göncü, 1993; Howe, Petrakos, Rinaldi, & LeFebvre, 2005; Leach, Howe, & DeHart, 2015, under review a). Children's most frequent play partners include siblings, friends, and peers (Howe & Leach, 2018; Lehrer, Petrakos, & Venkatesh, 2014). During social play, children need to establish and maintain connectedness; meaning, they need to coordinate their ongoing social interactions and communicate and share ideas effectively to establish a shared understanding of the pretend scenario (Leach et al., 2015, under review a; Ensor & Hughes, 2008; Garvey, 1990; Howe et al., 2005). Following the study by Leach et al. (under review b), we provide an examination of the dyadic interaction quality observed in children's play sessions as well as the affect (i.e., emotional tone) of children's connected sequences. Further, we investigate the length of children's connected sequences and how this is intertwined with emotional tone to provide a rich and detailed analysis of children's connectedness sequences across relationships (i.e., siblings, friends) and development (i.e., early to middle childhood).

Children's Relationships with Siblings and Friends

Children's close relationships with other children are crucial contexts for their social and cognitive development due to the presence of two types of interactions: reciprocal and

complementary (Carpendale & Lewis, 2015; Dunn 2002; Hartup, 1989; Hinde, 1979).

Reciprocal interactions are equal and returned exchanges, with both partners having relatively matched power and influence. Friends' social exchanges are defined as reciprocal because both individuals are of similar age and skill, thus each partner can influence and contribute to the interaction in similar ways (DeHart, 1999; Hartup, 1989). Complementary interactions are characterized by asymmetry and social dominance by one partner due to greater authority or knowledge, which complements the other's developmental level (Hinde, 1979); thus, allowing the more experienced partner to scaffold, or guide, the development of the less experienced partner (Vygotsky, 1976). The sibling relationship is unique in that it encompasses both reciprocal and complementary interactions (Howe et al., 2011). Siblings have relatively equal opportunities to influence and contribute to the interaction (e.g., play) as well as engage in asymmetrical interactions (e.g., teaching) given their natural age and developmental differences (DeHart, 1999; Dunn, 2002; Howe et al., 2011).

Moreover, siblings co-construct a shared history based on frequent, intimate, and affectively intense interactions that range from highly warm and cooperative to highly conflictual and hostile (Buist & Vermande, 2014; DeHart, 1999; Dunn, 2002; Howe et al., 2011). McGuire, McHale, and Updegraff (1996) developed a multidimensional characterization of the sibling relationship based on different combinations of sibling warmth and hostility: harmonious (high warmth/low hostility), affect-intense (high warmth/high hostility), hostile (low warmth/high hostility), and uninvolved (low warmth/low hostility). This is contrary to friendships whose history is shorter-term, but who typically view one another positively (Dunn, 2002; Rubin, Bukowski, & Bowker, 2015). However, intimate friendships may also experience affectively intense interactions, which are considered in the present study. Friends do not share the same

family history or experiences as siblings and, as such, they may approach their relationship with different perspectives and socialization styles for managing social interactions, particularly around disagreements. Siblings and friends may also view their relationships differently because of the particular level of voluntariness. Friendships are voluntary relationships based on mutual liking and similarity, whereas the sibling relationship is obligatory and will continue, regardless of their compatibility (DeHart, 1999; Howe et al., 2011; Rubin et al., 2015; Volling, Youngblade, & Belsky, 1997). As children develop from early to late childhood, their friendships increase in degrees of intimacy and trust, and they acquire the understanding that their relationship may persevere through disagreements (Bukowski et al., 2015); whereas with development, sibling relationships become more egalitarian, amicable, and potentially more similar in structure to friendships (Buhrmester, 1992; Updegraff, McHale, & Crouter, 2002).

Overall, the literature indicates that there are links and contrasts between children's sibling and friend relationships, yet they are fundamentally different contexts for interaction and development (DeHart, 1999). The similarities and differences between relationship contexts (e.g., siblings and friends) and distinct behaviors within each relationship context (e.g., siblings' communication style) warrant further investigation (Parke & Buriel, 1998). As such, a relationship perspective with a comparative lens guides this research.

Connectedness, Intimate Relationships, and Play

Connectedness is an important feature of intimate relationships (Clark & Ladd, 2000); it describes the ongoing social coordination and mutually co-constructed nature of communication between the partners (Fogel, 1993; Harrist & Waugh, 2002). Moreover, social behavior is dependent on, and understood by, the behavior of one partner in relation to the other (Hinde, 1979), thus highlighting the dyadic nature of relationships. For example, connected

communication requires one person to initiate the interaction, the second person to respond contingently, and the first person to also respond contingently either by sustaining or ending the connected sequence (Leach et al., under review b; Ensor & Hughes, 2008). The repeated patterns of interaction sequences both reflect and influence the quality of the relationship over time (Hinde, 1979). As children practice the ability to establish and maintain connectedness, they learn the crucial skills to become a sophisticated social partner (Harrist & Waugh, 2002).

Typically, children's first social partner is a parent and it is during infant-parent interactions that children engage in the early steps of social coordination, such as turn-taking and joint attention (Tomasello, 2003; Trevarthan, 1980). As children develop, their social circle widens to include siblings, peers, and friends. Within these social contexts, children practice their social skills, such as engaging in conversations and labeling cognitive and emotional states, which foster children's social understanding (Carpendale & Lewis, 2015; Hughes, Lecce, & Wilson, 2007). Furthermore, Ensor and Hughes (2008) highlight the importance of connected speech in children's social understanding and that it can be enhanced if the more experienced partner makes semantically-related statements to connect to the child's prior statements. As children acquire and rehearse the skills to establish and maintain connectedness, they are learning and preparing to be successful in social interactions within various relationships (Harrist & Waugh, 2002) and across different social contexts, such as play.

During social play, children need to engage in a series of connected and repeated exchanges to establish, maintain, and further the play scenario (Göncü, 1993). By doing so, play partners co-create a common frame of reference to establish intersubjectivity (Piaget, 1962; Vygotsky, 1978), which is similar to the concept of connectedness. By communicating effectively, children form a shared understanding about the roles, scenario, and object

transformations of the play (Howe, Abuhatum, & Chang-Kredl, 2014; Leach et al., 2015, under review a). Contingent speech, or connected communication, allows partners to be attuned to each other's thoughts, desires, and intentions, which provides opportunity for successful social interactions (Hazen & Black, 1989; Brophy & Dunn, 2002). When children's speech is connected, they may spend more time building on and extending play ideas, which may lead to longer and potentially richer connected sequences as opposed to short sequences that may reflect disjointed play ideas that lack narrative development. The length of children's connectedness sequences was one of the research questions in the present study.

Moreover, the characteristics of children's play partners may influence their communication and involvement in the play as well as the dyad's connectedness. A more experienced partner can scaffold the play for the less experienced partner by modeling, leading, and coordinating the social interaction (Vygotsky, 1978). For example, 7-year-old siblings were more likely to extend their 5-year-old siblings' play ideas than the contrary (Howe et al., 2005). Older siblings are also more likely to initiate conflict and respond negatively to their younger sibling (Leach et al., 2015, under review a; Howe et al., 2005), which may reflect their leadership role in the dyad. Conversely, friends respond more positively to one another compared to siblings (Leach et al., 2015, under review a) and non-friends (Rubin et al., 2015; Simpkins & Parke, 2002). While researchers emphasize the importance of positive affect in connectedness (Harrist & Waugh, 2002), dyads can also connect, or engage in connected communication, with negative affect, presumably with a different set of consequences. We examined both positive and negative affect in children's connected sequences and how affect might change across relationship contexts and time.

The Present Study

Following Leach et al. (under review b), we examined the quality of children's interactions and sequences of connectedness with regard to the emotional tone (i.e., positive or negative affect) and the length of the sequences (i.e., short or long) across relationship contexts (i.e., sibling and friend) and time (i.e., early to middle childhood). Conducting observations over a 3-year period affords an opportunity to identify developmental patterns as well as relationship differences in siblings' and friends' dyadic interactions. Connected sequences were identified based on previous coding (Leach et al., under review b). Sequences began with a successful initiation of connectedness (i.e., initiated-connected) followed by at least one connected statement (i.e., connected-sustained), and concluded with an ending statement (i.e., connected-end), thus terminating the connected sequence. Extending Leach et al. (under review b) study, the connected sequences were coded for length (short or long based on number of conversational turns) and affect (conflict, cooperation).

The first research question concerned how dyads' interaction quality varied by relationship and across time. We predicted that siblings would experience more conflict than friends and friends would be more cooperative than siblings, particularly at T1, due to the asymmetrical exchanges that occur between siblings and that friends may need to maintain warm and friendly interactions (Bukowski et al., 2015; DeHart, 1999; Dunn, 2002; Howe et al., 2011). However, we anticipated that siblings would be more cooperative at T2 than T1 and that there would be no difference in the sibling and friend dyads' cooperation at T2, because siblings tend to become more amicable over time (Buhrmester, 1992; Updegraff et al., 2002).

The second research question addressed differences in the length of connected sequences across relationship and time. We anticipated longer connected sequences in friend dyads

compared to sibling dyads at both time points due to friends' mutual liking and similar interests and age, which may aid in maintaining connectedness over a longer period of time (Howe & Leach, 2018; Howe et al., 2011; Rubin et al., 2015; Volling et al., 1997). Sibling dyads may engage in more frequent short sequences than friends because when siblings' ideas for the play scenario are not compatible, they do not have to be as agreeable as friends due to the obligatory nature of the relationship; thus, siblings may be less cooperative than friends in following their partner's play ideas (Howe et al., 2011).

The third research question addressed the emotional tone of dyads' connected sequences across relationship and time. We predicted that both sibling and friend dyads would exhibit more positive than negative connected sequences due to the context (i.e., play is an enjoyable and pleasurable activity; Garvey, 1990); however, we expected that siblings would engage in more negative sequences than friends regardless of time because siblings are more likely to experience affectively intense interactions than friends (Stauffer & DeHart, 2005, 2006; Abuhatum & Howe, 2013; DeHart, 1999).

The last research question investigated emotional tone and sequence length across relationship and time. We predicted that both dyads would engage in more negative-short and negative-long sequences at T1 than T2 and more positive-long sequences at T2 than T1 due to children's more sophisticated social-cognitive skills and an increase in intimacy from early to middle childhood (Hughes & Devine, 2015). Moreover, we expected sibling dyads to engage in more negative-short and negative-long sequences than friend dyads and friends to engage in more positive-short and positive-long sequences at both time points.

Method

Participants

Forty-four middle-class Caucasian families from the Western New York area participated in a longitudinal study examining sibling and friend interaction in early and middle childhood. At T1, sibling pairs consisted of a 4-year-old focal child (M age = 56 mos.; SD = 5.71 mos.), who was observed with a younger sibling (n = 20; M age = 35.1 mos.; SD = 4.8 mos.) or an older sibling (n = 24; M age = 75.6 mos.; SD = 7.38 mos.). The second observation (T2) was approximately three years later. At T2, focal children (M age = 96.77 mos.; SD = 6.23 mos.) were observed with the same younger sibling (n = 20; M age = 74.55 mos.; SD = 5.83 mos.) or older sibling (n = 24; M age = 118.8 mos.; SD = 8.68 mos.). The dyadic gender composition included 26 same-gender pairs (14 brother-brother, 12 sister-sister) and 18 mixed-gender pairs (11 brother-sister, 7 sister-brother). The birth order of the focal children consisted of 15 first-borns, 20 second-borns, and 9 third- or later-borns; thus, focal children were identified as either older or younger in relation to the sibling included in the study.

Families selected a friend of the focal child to participate at both time points (T1 friends' M age = 57.8 mos., SD = 10.61 mos.; T2 friends' M age = 96.88 mos., SD = 11.01 mos.). In order of importance, the three criteria for the selection of a friend included: (1) a frequent playmate, (2) same age, and (3) the same gender as the focal child. If families were unable to select a friend based on the three criteria, the friend was chosen based on the first two requirements; at both time points, three families selected an opposite-gender friend. About half of the friends selected at T1 participated at T2 (20/44 = 45%). Parents rated the closeness of the friendship on a 5-point scale (i.e., 1 = acquaintance, 3 = friend, 5 = best friend) to ensure the children were close friends (T1: M = 3.96, SD = .81, range = 2 - 5; T2: M = 4.2, SD = .73; range

= 2 to 5). At both time points, only one mother rated the child's friendship as a 2 (in between an acquaintance and a friend). Ethical approval for original data collection was given to Dr. DeHart from the SUNY Geneseo research ethics office and for the secondary analyses in the present study was also given to Nina Howe by the Concordia University Human Research Ethics Committee (protocol number, UH2010-047).

Procedure

At both T1 and T2, each dyad was videotaped in the family home on two separate, counter-balanced 15-minute sessions with their sibling and friend; taping sessions occurred about one week apart. At T1, dyads were given one of three counterbalanced wooden play sets (farm, village, or train²) to facilitate pretend play: farm set (22 sibling, 20 friend dyads); village set (20 sibling, 22 friend dyads); train set¹ (2 sibling, 2 friend dyads). At T2, dyads were given either a village set (22 sibling, 22 friend dyads) or a train set (22 sibling, 22 friend dyads). The research assistant instructed the children to play with the toys as they wanted, and then sat with the mother in another room to complete a demographic questionnaire, allowing the children privacy. Research assistants, blind to the study's purposes, transcribed the children's language and behavior on the videotapes.

Measures

Conversational turns. The number of conversational turns on each transcript was determined by counting the reciprocal exchanges of the children (i.e., a speaker's utterances

² The four dyads who received the train set were recruited late in the first wave of the data collection and were accidentally given the train set for the play session, which was meant to be used only for the T2 data collection.

bounded by the utterances of another speaker). If there was a break in the speech of one child for more than 3 seconds, it was considered the end of the conversational sequence.

Connectedness. Connectedness was defined as statements that are semantically related to a partner's previous statement (Leach et al., under review b; Ensor & Hughes, 2008; Gottman, 1983; Slomkowski & Dunn, 1996). In the present study, the connectedness codes included: (a) initiated-connected, (b) sustained-connected, and (c) sustained-end (see Tables 1 and 2 for definitions and examples). The connectedness coding was established by the first author and a naïve research assistant on 20% of the T1 (18/88) and T2 (18/88) transcripts. Cohen's *kappa* revealed high levels of agreement: T1 ($k = .94$) and T2 ($k = .93$). Discrepancies were resolved via discussion.

Interaction quality. To determine the quality of children's play interactions, two 4-point Likert scales were employed based on Howe, Aquan-Assee, and Bukowski (2001) and Youngblade and Dunn (1995). One Likert scale rated the children's conflict and the other scale rated children's cooperation. The behaviors were rated every 30 seconds for each dyad (i.e., focal child and sibling, focal child and friend) and ratings were based on the intensity and frequency of the behavior (i.e., as intensity and frequency increased, the rating increased).

Conflict was defined as social events in which incompatibilities of behavior occurred and were marked by mutual opposition between the actions and/or statements of two individuals (Deutsch, 1973; Vandell & Bailey, 1992). A rating of "1" indicated no conflict was observed and "4" was based on frequent and intense aggression (e.g., grabbing an object from a partner's hand with the partner physically or verbally protesting). Cooperation was determined by children's reciprocal behaviors, such as sharing, following suggestions, helping, collaboration,

and working together (Howe et al., 2001; Youngblade & Dunn, 1995). A rating of “1” indicated no cooperation and a “4” indicated frequent attempts to cooperate and suggestions for joint play.

Reliability was established by the first author and a naïve research assistant on 20% of the T1 (18/88) and T2 (18/88) transcripts. Cohen’s kappa revealed high levels of agreement for T1 cooperation = .91, T1 conflict = .92, T2 cooperation = .93, and T2 conflict = .88. Coding discrepancies were resolved via discussion.

Length of connected sequences. After connectedness was coded, connected sequences and the length of sequences were identified based on the connectedness coding. A sequence was identified when it began with an initiated-connected code followed by at least one sustained-connected code and ended with a sustained-end code; thus, a connected sequence required at least three turns. There were 937 connected sequences at T1 and 1011 at T2. Short and long sequences were determined using a median split to dichotomize the scores for ease of interpretation and to create a relatively equal distribution of sequences (Grossman, Hadley, Brown, Houck, Peters, & Tolou-Shams, 2008; Guralnick, Connor, Hammoud, Gottman, & Kinnish, 1996).

Emotional tone. Connected sequences were coded as either positive or negative emotional tone based on Lindsey et al. (2008) (see Table 2 for examples). Positive emotional tone included indicators of positive affect such as smiling, laughing, chuckling, and expressing oneself or responding to the partner with a neutral or positive tone of voice. Negative emotional tone was identified by the presence of negative affect, such as raised tone of voice, angry or sad facial expressions, or statements with a sarcastic or taunting tone. Reliability was established by the first author and a different naïve research assistant on 20% of the T1 (188/937) and T2

(203/1011) connected sequences. Cohen's kappa revealed high levels of agreement for T1 (.94) and T2 (.91) emotional tone. Coding discrepancies were resolved via discussion.

Results

Analyses were performed for sibling and friend dyads' interaction quality, emotional tone, and length of connected sequences. Analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA)-based procedures were used with relationship and time as repeated measures and the proportion scores of interaction quality and proportional use of emotional tone and length as dependent variables. Effect sizes were reported as partial-eta squares for significant effects. Bonferroni corrections were used for all *post-hoc* pairwise comparisons (alpha level $p < .05$).

Descriptive Statistics

At T1, sibling dyads engaged in 396 connected sequences ($M = 9.00$, $SD = 4.69$, range = 1 - 22 per dyad), and friend dyads engaged in 541 connected sequences ($M = 12.30$, $SD = 4.49$, range = 4 - 21 per dyad). At T2, sibling dyads engaged in 497 connected sequences ($M = 11.30$, $SD = 5.86$, range = 1 - 32 per dyad), and friend dyads engaged in 514 connected sequences ($M = 11.68$, $SD = 4.57$, range = 1 - 23 per dyad). A 2 (dyad total sequences: siblings, friends) x 2 (time) repeated measures ANOVA revealed a significant interaction, $F(1, 43) = 5.32$, $p = .026$, $\eta^2 = .11$. Sibling dyads' total number of sequences significantly increased from T1 ($M = 9.00$, $SE = .71$) to T2 ($M = 11.30$, $SE = .88$). There was no significant difference between friend dyads' total sequences at T1 ($M = 12.30$, $SE = .68$) and T2 ($M = 11.68$, $SE = .69$).

To test for possible sibling gender effects, a series of one-way ANOVAs were conducted with sibling gender composition (i.e., focal boy-brother, focal girl-sister, focal boy-sister, focal girl-brother) and friend gender composition (i.e., focal boy-male friend, focal girl-female friend)

as the independent variables and interaction quality, emotional tone, sequence length, and play set as the dependent variables. No interaction effects were found. As well, a series of one-way ANOVAs were conducted to determine possible birth order differences (i.e., focal child with an older sibling versus with a younger sibling) with birth order as the independent variable and interaction quality, emotional tone, sequence length, and play set as the dependent variables resulting in no interaction effects. To account for sibling age gap, Pearson correlations were performed with age gap and interaction quality, emotional tone, and sequence length, which did not yield significant findings. Lastly, about half of the friends who were observed at T1 also participated at T2 (20/44 = 45%); thus, to determine if the effect of the friendship change had an impact on children's interaction quality and emotional tone and length of sequences, a one-way ANOVAs were performed with friendship change as an independent variable, but no significant differences were found. Thus, dyadic gender composition, birth order, age gap, and friendship longevity were not included or controlled in the subsequent analyses.

Siblings' and Friends' Interaction Quality Across Time

To compare sibling and friend dyads' interaction quality, a 2 (relationship) x 2 (time) x 2 (interaction quality: cooperation, conflict) repeated measures ANOVA was performed with relationship and time as independent variables and interaction quality as the dependent variable. Findings displayed a significant main effect of interaction quality, $F(1, 43) = 81.18, p < .001, \eta^2 = .65$. The quality of the dyads' interactions was rated higher on the cooperation scale ($M = 1.52, SE = .04$) than the conflict scale ($M = 1.11, SE = .02$). There was also a significant interaction effect between time and interaction quality, $F(1, 43) = 14.83, p < .001, \eta^2 = .26$. As predicted, dyads were rated higher in cooperation at T2 ($M = 1.61, SE = .05$) than T1 ($M = 1.43, SE = .04$). As predicted, a significant interaction effect between relationship and interaction quality was

revealed, $F(1, 43) = 19.32, p < .001, \eta p^2 = .31$; friend dyads were more cooperative ($M = 1.66, SE = .05$) than sibling dyads ($M = 1.38, SE = .04$).

Length of Connected Sequences Across Relationships and Time

To compare sibling and friend dyads' length of connected sequences across time, proportion scores were calculated per dyad; for example, by dividing the friend dyads' short sequences by all of the friend dyads' sequences (i.e., short + long) at T1. A 2 (relationship) x 2 (time) x 2 (sequence length: short, long) repeated measures ANOVA was performed with relationship and time as the independent variables and the proportion of sequence length as the dependent variable. Findings displayed a significant interaction effect between relationship and sequence length, $F(1, 43) = 6.42, p = .02, \eta p^2 = .13$. As predicted, sibling dyads were more likely to engage in short ($M = .54, SE = .02$) than long sequences ($M = .46, SE = .03$) and friend dyads were more likely to exhibit long ($M = .56, SE = .02$) than short sequences ($M = .44, SE = .03$).

Emotional Tone of Connected Sequences Across Relationships and Time

To determine the emotional tone of sibling and friend dyads' connected sequences across time, proportion scores were calculated per dyad. For example, scores were created by dividing the sibling dyad's positive sequences at T1 by all positive and negative sequences in the sibling dyad at T1. A 2 (relationship) x 2 (time) x 2 (emotional tone) repeated measures ANOVA was performed with relationship and time as independent variables and the proportion scores of emotional tone as the dependent variable. Findings displayed a significant interaction effect between relationship and emotional tone, $F(1, 43) = 15.98, p < .001, \eta p^2 = .27$. As expected, friend dyads' ($M = .92, SE = .02$) sequences were more likely to have a positive emotional tone than sibling dyads' ($M = .82, SE = .03$) sequences and sibling dyads' ($M = .18, SE = .03$)

sequences were more likely to have a negative emotional tone than friend dyads' sequences ($M = .08, SE = .02$).

Sibling and Friend Dyads' Emotional Tone and Sequence Length Across Time

To address the fourth research question, we concatenated (i.e., combined) emotional tone and the length of sequence to create one blended score (i.e., positive-short, positive-long, negative-short, negative-long). To compare sibling and friend dyads use of emotional tone and length of sequence across time, proportion scores were calculated per dyad: for example, by dividing all cases where the sibling dyad's sequence was positive and short by the total emotional tone and sequence length at each time point (e.g., at T1, positive-short/(positive-short + positive-long + negative-short + negative-long)). A 2 (relationship) x 2 (time) MANOVA with the four emotional tone-sequence length variables was performed with relationship and time as the independent variables and the proportional use of each emotional tone-sequence length as the dependent variables. The analysis revealed multivariate effects for time, Wilk's $\lambda = .83, F(3, 41) = 2.73, p = .05, \eta^2 = .17$, and multivariate effects for relationship, Wilk's $\lambda = .63, F(3, 41) = 8.19, p < .001, \eta^2 = .38$.

Follow-up univariate ANOVAs revealed effects of time on short-positive, $F(1, 43) = 4.90, p = .03, \eta^2 = .10$, short-negative, $F(1, 43) = 3.93, p = .05, \eta^2 = .08$, and long-negative sequences, $F(1, 43) = 4.55, p = .03, \eta^2 = .10$. Dyads engaged in more positive-short sequences at T2 than T1 and more negative-short and negative-long sequences at T1 than T2 (see Table 3 for M s and SE s). Follow-up univariate ANOVAs also revealed effects of relationship on positive-short, $F(1, 43) = 4.62, p = .03, \eta^2 = .10$, positive-long, $F(1, 43) = 21.18, p < .001, \eta^2 = .33$, negative-short, $F(1, 43) = 8.08, p < .007, \eta^2 = .16$, and negative-long sequences, $F(1, 43) = 9.95, p < .003, \eta^2 = .19$. Sibling dyads had more positive-short, negative-short, and negative-

long sequences than friend dyads. Friend dyads had more positive-long sequences than sibling dyads (see Table 3 for *Ms* and *SEs*).

Discussion

Our study makes important contributions to understanding the processes of children's interpersonal interactions in siblings' and friends' social play from early to middle childhood. In particular, our more detailed analysis of children's connectedness and the quality of their interactions allows for a fuller understanding of the dynamics of play across relationship contexts and time. The findings revealed similarities and differences in children's features of connectedness (i.e., emotional tone, sequence length) as well as siblings' and friends' interaction quality across time. Results are discussed in light of theory and research.

Children's Interaction Quality

Overall, the dyads were observed as more cooperative than conflictual and were rated higher on the cooperation scale at T2 than T1, as predicted. These findings corroborate earlier reports that characterize the sibling relationship as becoming more amicable and friendships as increasing in level of closeness from early to middle childhood (Buhrmester, 1992; Updegraff et al., 2002). Our findings indicated that children made fewer attempts to cooperate at T1 than T2. Perhaps children were engaging in more solitary or parallel play at T1, thus making no or very few attempts to be a cooperative play partner whereas at T2, children made frequent attempts to cooperate by sharing objects, helping construct the play scenario, and making suggestions to engage in joint play. Moreover, children's social-cognitive skills become more advanced from early to middle childhood (Carpendale & Lewis, 2015; Göncü, 1993). They are able to negotiate, problem-solve, and resolve differing perspectives more effectively as they develop and practice

such skills (Hughes, Lecce, & Wilson, 2007), thus, possibly making them more cooperative play partners than earlier in their development.

As expected, friend dyads were more cooperative than sibling dyads. This finding also adds to reports that friends tend to have a more harmonious relationship than siblings (Stauffacher & DeHart, 2005, 2006; DeHart, 1999; Volling, et al., 1997). For example, Leach et al. (2015, under review a) found that friends engaged in more prosocial behaviors and responded more positively to one another than siblings. Typically, friends view one another and the relationship positively, which may be due to their mutual interests, likings, and skills (Rubin et al., 2015). Many friends quickly and easily agreed on the direction of the play. For example, one child asked, “We can put the village inside it. How about [that]?” with the friend agreeing and extending the idea by stating, “Yeah! And we can put the bridge somewhere! Where you want to put it?” and the dyad continued constructing the play scenario. Furthermore, friendships involve voluntary reciprocal interactions, which places them at a greater risk of terminating the relationship if they engage in too many conflictual exchanges, which is in direct contrast to the obligatory sibling relationship that will persevere regardless of the type of interactions (Howe et al., 2011; Rubin et al., 2015). Perhaps these characteristics of friends and siblings may explain why friends were observed as being more cooperative than siblings in the present study.

Length of Connected Sequences

Analyses revealed a clear contrast when the length of the dyads’ connected sequences was compared. As hypothesized, siblings engaged in short sequences more often than long sequences, whereas the reverse was evident in the play of friends. This pattern suggests that sibling dyads may have struggled to establish and maintain connectedness and perhaps their disjointed interactions may have reflected their differences in mutual interests and abilities.

Because there is an inherent age gap between siblings, there may be differences in what children want to play and how to play. Siblings may have difficulty agreeing on a particular play scenario and instead of negotiating to reach an agreement as friends would, they may play separately and keep their discussions to a minimum, such as only discussing object possession. For example, an older brother said, “I need a flag” to his younger brother who had two flags. The younger brother protested by exclaiming, “No!” The older brother said, “I’ll take that yellow flag” and took the flag from his younger sibling and placed it in the scene he was constructing. Siblings have the option of playing separately while maintaining their obligatory relationship, unlike friends who may terminate their relationship if there is a lack of collaborative play.

The possible reasons why siblings may engage in shorter sequences may also provide an explanation as to why friends engage in long connected sequences. Children are typically in the same development stage as their friends; they have similar abilities and skills as well as mutual interests. Moreover, friendships are a reciprocal relationship and involve egalitarian exchanges (Howe & Leach, 2018; Rubin et al., 2015). Friends may more easily establish and interact collaboratively in co-constructing a shared play idea than siblings. For example, one friend dyad engaged in a series of long connected sequences. The first long sequence regarded the construction of the barn and fence, which was followed by a long sequence that focused on the placement of animals, and then a third long sequence about a pretend scenario (i.e., “a man and a lady” going out to dinner). Although the play theme or topic of connected sequences was not examined and may be a question for future research, the emotional tone was considered and is discussed next.

Emotional Tone and Sequence Length of Connected Sequences

Our third goal was to examine the emotional tone of dyads' connected sequences. As predicted, both sibling and friend dyads had more positive than negative sequences. Play is a pleasurable activity (Garvey, 1990; Howe & Leach, 2018), and the dyads appeared engaged and enjoyed playing at both time points. It seemed that many dyads had shared goals and co-constructed various play scenarios. For example, a focal child said, "here's the lake!" and the friend responded by saying, "there's the lake!" with both children then agreeing to find the sailboats to put on the lake. While the concept of connectedness has been described as only occurring with positive emotional tones (Harrist & Waugh, 2002), we expanded this idea and included negative emotional tone. While positive sequences were observed more frequently than negative sequences, negative sequences did occur in both relationship contexts and at both time points; however, emotional tone differed when sequence length was considered as discussed next.

Our fourth research question examined the intertwined nature of emotional tone and the length of connected sequences. Some similarities were evident across dyads. First, sibling and friend dyads engaged in more positive-short sequences at T2 than T1. Perhaps children spend more time connecting in positive-short sequences before they are able to connect more easily in longer, positive sequences, because it may be a social-cognitive skill that requires practice beyond the early and middle childhood years. Moreover, the increase in positive-short sequences at T2 may also reflect the increase in dyadic cooperation as well as their ability to establish goals that might have taken more turns than at T1. Second, both short and long negative sequences were more prevalent at T1 than T2, which was hypothesized. Dyads spoke to one another in more negative tones in their connected sequences during early childhood compared to middle childhood. This finding complements the previous finding regarding

interaction quality as well as previous literature on the increases in amicability of siblings and friends over time (Buhrmester, 1992; Updegraff et al., 2002).

In contrast to the similarities noted above, a number of differences were evident across sibling and friend dyads' emotional tone and sequence length. First, sibling dyads had more positive-short, negative-short, and negative-long sequences than friend dyads. Siblings tend to respond to oppositions with more aggressive means in contrast to friends, who respond with more conciliatory means (DeHart, 1999; Dunn, Slomkowski, Donelan, & Herrera, 1995). Perhaps siblings used more intensive affect when they interacted, particularly during disagreements, whereas friends may have avoided connecting with negative affect because they were able to negotiate amicably and maintain neutral or positive affect. For example, an older sibling disagreed with his younger brother's actions of flattening the lake by exclaiming, "No! Keep the water over here!" The younger brother justified his actions by explaining, "I'm making it nice and smooth so the cars can go on" and the older child disagreed once again by stating, "No, the cars have to go on there" while grabbing the lake from the older brother. Both children then began setting up the toys in different areas of the play space. Clearly, in this example, the dyad was not able to connect on a common play idea nor negotiate an outcome that was agreeable to both, resulting in short sequences throughout the play session due to the children playing in parallel as opposed to engaging in social play.

Moreover, siblings may have engaged in short-positive sequences more than friends because maintaining connectedness may be particularly challenging for siblings. Siblings may assume complementary interactions during play, which are not conducive for social activity due to the reciprocal nature of play (Garvey, 1990; Göncü, 1993). In some cases, the older sibling may assume a leadership role and direct the play so that the younger sibling responds passively,

thus shortening positive connected sequences. Another possible explanation is that the older sibling may respond minimally or dismissively when the younger sibling suggests play ideas. For example, a younger sibling asked his older brother, “is this a good sleeping place?” while pointing to the small barn he had constructed. The older brother leaned over, looked at where his younger brother pointed, and said, “yeah” then went back to the toys he was constructing, with the younger brother saying, “okay”, thus ending the interaction. There may be qualitative differences in children’s connectedness in terms of the meaning or the level of complexity of what is being communicated in short and long sequences. This speculation warrants future investigation, perhaps using sequential analysis.

The second difference in sibling and friend dyads’ emotional tone and sequence length was that friends had more positive-long sequences than siblings as hypothesized. Friends need to accommodate and respond positively to each other to maintain the voluntary relationship (Rubin et al., 2015), which may have facilitated longer positive connected sequences. Moreover, they may have compatible play ideas due to their similar ages and interests, which may differ for siblings. Several friend dyads were able to establish a play idea at the beginning of the session. For example, a focal child said, “let’s make the school. That’s part of the school! Look!” and the friend agreed, “Oh yeah! But it needs the roofy thing. It goes on the side of the school like that” with the focal child suggesting, “There’s this tower”. The dyad continued to co-construct and extend each other’s play ideas throughout the observation. Other friend dyads began constructing the play together by one child asking the other for help; for example, a friend said, “I need a house. Where’s the house?” the focal child responded, “Here” and handed the friend a house. The dyad continued constructing the play scene that the friend had started building by adding objects and ideas. As demonstrated in these examples, friends seemed to use prosocial

behaviors to initiate long and positive connected sequences. Friends typically respond more positively to one another and engage in prosocial behaviors more often than siblings (Leach et al., 2015, under review a; Rubin et al., 2015; Volling et al., 1997). Future research should examine the specific communication strategies children use to initiate and sustain connected sequences, particularly long-positive sequences.

Conclusion

Our study has some limitations. First, the sample size was relatively small, which may have reduced the statistical power of the analyses; however, the play sessions produced a rich and unique data set. Second, the sample included middle class, rural and suburban, Caucasian Americans, which limits generalizing findings to more diverse populations; additional studies with children from varying cultural, ethnic, and socioeconomic backgrounds would broaden our understanding. Third, the observational sessions were somewhat short; however, the longitudinal design provided the opportunity to identify developmental patterns in children's connectedness.

Implications for parents and practitioners arise from the study's findings. The present findings demonstrate that friends' play is more cooperative than siblings' play; however, there appears to be developmental value in siblings' play as they become more cooperative with one another over time. Parents and practitioners need to be aware that negative interactions are typical in children's play, particularly among siblings, but children are able to negotiate through bouts of disagreements and such bouts will decrease during middle childhood (Howe & Leach, 2018). We recommend parents and practitioners provide ample opportunity for children to play with their siblings to both develop their relationship and practice communication skills that they then use in other relationship contexts (e.g., friends, peers). Due to siblings' inherent age

difference, older siblings have the opportunity to model more sophisticated social strategies for younger siblings (Howe et al., 2011). Moreover, adults may also want to interact sometimes with children so as to model strategies for connected communication. Overall, positive play experiences will increase with practice and age when children are given the time to play with other children.

In sum, the present findings underscore the developmental significance of connectedness in siblings' and friends' interactions during play from early to middle childhood. By examining dyadic interactions, several similarities and differences were highlighted across relationship context and time regarding the quality of the dyads' interactions as well as the features of children's connectedness. Taken together, the findings produce new and novel insights by extending the previous research on connectedness to child-child relationships and identifying patterns across developmental stages.

Table 1

Definitions of Connectedness Coding

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1. **Initiation-connected:** Child initiates (or attempts to initiate) a new topic in the play, which leads to the partner making a connected statement.
 2. **Connected-statement:** Child's utterance is semantically related to the partner's previous turn (which could be either an initiation or connected) and sustains the interaction.
 3. **Connected-end:** Child's statement is connected to the partner's previous statement, but fails to elicit a semantically related response from the partner and is the last turn in the sequence.
-

Note. Examples are illustrated in Table 2.

Table 2

Coding Examples of a Positive and Negative Emotional Tone Sequence

Positive Emotional Sequence			
Turn	Child	Comments and Actions	Code
1	Focal child	I'll start this one. The barn's roof.	Initiated-connected
2	Friend	Here's a part. Now here comes the other part.	Connected-sustained
3	Focal child	I'll put those one.	Connected-sustained
4	Friend	There! Now that's the animal we need.	Connected-sustained
5	Focal child	I'll put those too.	Connected-sustained
6	Friend	We need to have one more. There's a baby one.	Connected-sustained
7	Focal child	Yeah and there's a big one there.	Connected-sustained
8	Friend	It's on. Now we'll put the animals in then we'll put the gate on.	Connected-end
Negative Emotional Tone			
Turn	Child	Comments and Actions	Code
1	Focal child	Don't touch it!	Initiated-connected
2	Younger sibling	I want to use the swing!	Connected-sustained
3	Focal child	Well I'm using it!	Connected-end

Table 3

Means and Standard Errors of Emotional Tone-Sequence Length

	Time		Relationship	
	Time 1	Time 2	Sibling	Friend
Emotional Tone-Sequence Length	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>
Positive-short	.23 (.03) ^a	.30 (.02) ^b	.30 (.01) ^c	.23 (.01) ^d
Positive-long	.60 (.03)	.61 (.02)	.51 (.02) ^c	.70 (.02) ^d
Negative-short	.05 (.01) ^a	.02 (.01) ^b	.05 (.01) ^c	.01 (.01) ^d
Negative-long	.12 (.02) ^a	.07 (.01) ^b	.14 (.01) ^c	.06 (.01) ^d

Note. Means and standard errors are based on the proportion scores. Superscript letters represent the significant differences ($p < .05$) in children's connected sequences between T1 and T2 (i.e., *a* is significantly different from *b*) and between sibling and friend relationship contexts (i.e., *c* is significantly different from *d*).

Bridging Studies: The Dyads' Features of Connectedness to Addressing Children's Communication Strategies Used to Establish, Maintain, and End Connectedness

The second study addressed features of sibling and friend dyads' connectedness (e.g., length and emotional tone of connected sequences) and the quality of the dyads' interactions during play from early to middle childhood. According to Hinde (1979), social behavior is dependent on the contributions of both partners within the interaction. Following this premise, the present study examined sibling and friend dyads' interaction quality and connected sequences and how sequences differ in terms of emotional tone and length across time. We found similarities and differences across social relationships. Siblings and friends increased in cooperation over time and the emotional tone of their sequences was more likely to be positive than negative. However, siblings' sequences were shorter than longer and friends' sequences were longer than shorter. The study highlights the importance of observing both partners within the dyad when investigating children's social interactions.

To further our understanding of children's connectedness, we conducted a fine-grained analysis of children's connectedness and communication strategies. The goal of the third study was to examine children's communication strategies used to initiate, sustain, end, and fail to initiate connectedness with their sibling and friend from early to middle childhood. We also investigated how the play set might influence children's communication given previous findings that revealed effects of play materials on children's social interactions (Howe, Leach, Tavassoli, Farhat, & DeHart, under review). Children's employment of different communication strategies with different relationship partners and different play materials highlights the flexible and bi-directional nature of their play interaction skills.

**Study 3: Children's Communication Strategies Used to Initiate, Sustain, and End
Connectedness during Play with Siblings and Friends Across Time**

Abstract

The present study investigated children's communication strategies used to initiate, sustain, and end connectedness with siblings and friends from early to middle childhood. Forty-four families with a 4-year-old focal child were observed at time 1 (T1) and again at time 2 (T2) when they were 7 years old in two separate play sessions (i.e., sibling and friend). Data were previously coded for communication strategies (e.g., introductions to play, description of actions) and connectedness in communication (e.g., smooth and flowing or disjointed) and the codes were concatenated (e.g., combined) to create a new blended code (e.g., introduction-initiate). Findings revealed children used similar strategies to initiate, sustain, and end connectedness across play sessions with a few notable relationship differences. Specifically, children engaged in more prosocial behavior and employed a play voice when initiating connectedness with their friend than sibling and more clarifications when sustaining connectedness with their sibling than friend. Several differences were found at T2 when the influence of the play set was investigated, with more significant differences in the sibling session than friend session. The findings provide nuanced and novel insights into children's communication and connectedness in child-child relationships across time.

Children's Communication Strategies Used to Initiate, Sustain, and End Connectedness with Siblings and Friends Across Time

Children's relationships in early and middle childhood are important contexts for developing their social, emotional, and cognitive skills (Dunn, 2015; Hartup, 1989; Howe & Leach, 2018; Howe, Ross, & Recchia, 2011). Through interactions with others, children construct an understanding of their social and cultural worlds, particularly during social play, which is a crucial context for children to learn how to interpret the world around them and practice their socialization skills (Piaget, 1962; Smith & Pellegrini, 2013; Vygotsky, 1976). Engaging in social play requires children to communicate effectively, coordinate their actions, and understand their partner's perspective to maintain and further the play scenario. This is a process similar to connectedness, which is defined as the ongoing social coordination and mutually co-constructed communication between partners (Brown, Donelan-McCall, & Dunn, 1996; Göncü, 1993; Harrist & Waugh, 2002; Howe, Petrakos, Rinaldi, & LeFebvre, 2005; Leach, Howe, & DeHart, 2015, under review a). Siblings and friends are children's most frequent play partners and both relationships are significant contexts for developing an understanding of human interaction (Dunn 2015; Hinde, 1979; Howe & Leach, 2018; Howe et al., 2011; Lehrer, Petrakos, & Venkatesh, 2014). Although siblings and friends are considered intimate relationships, as discussed below, they have distinct characteristics and children may communicate and interact differently depending on their partner. The present longitudinal study investigated children's communication strategies used to establish, maintain, and end connectedness during play with their sibling and friend from early to middle childhood.

Sibling and Friend Relationships: Contexts for Interaction and Development

The unique features of siblings and friends throughout development may influence their social interactions within and across relationships. Specifically, the characteristics of sibling and friend relationships vary along the dimensions of reciprocity, closeness, and voluntariness (DeHart, 1999; Hinde, 1979). Both relationships are characterized by reciprocal (i.e., mutually returned) interactions (Dunn, 2015; Howe et al., 2011). Siblings also have opportunities to engage in complementary interactions due to their inherent age difference; meaning, the more experienced partner (e.g., older sibling) can scaffold, or guide, the development of the less experienced partner (e.g., younger sibling) (Dunn, 2015; Hinde, 1979; Vygotsky, 1976). Moreover, both relationships are likely to be close and intimate. Siblings share a long, co-constructed history that fosters closeness and familiarity and is often accompanied by affectively intense interactions ranging from highly positive to highly negative (Dunn, 2015; Howe et al., 2011). Friendships, however, may have a shorter history and are characterized by mutual liking, similarity, and often require support and companionship that is not always evident in the sibling relationship (Bukowski, Laursen, & Rubin, 2018; Furman & Buhrmester, 1985). These differences may be partially due to level of voluntariness of the relationships. Friendships are voluntary and have the potential to dissolve, whereas the sibling relationship is obligatory and will continue regardless of the positive or negative exchanges (DeHart, 1999; Howe et al., 2011).

Sibling and friend relationships have largely been investigated separately and to date, there is a dearth of research examining connectedness (i.e., connected communication) within and across relationship contexts and developmental stages, which forms one of the primary research questions in the present study.

Connectedness and Relationships

Relationships require partners to establish and maintain connectedness, which refers to continuous socially coordinated and mutually constructed communication (Fogel, 1993; Harrist & Waugh, 2002). Coordinating social behavior and engaging in conversations are important features of relationships and for children's social development and understanding (Ensor & Hughes, 2008). Conversations within intimate relationships help children to acquire vocabulary that is necessary for labeling one's own and others' cognitive and emotional states, which is a crucial skill in becoming a sophisticated social partner (Bartsch & Wellman, 1995; Harrist & Waugh, 2002). Moreover, conversations provide children with opportunities to experience dissonance because they will be confronted with differences in their own versus their partner's desires, wants, and needs (Ensor & Hughes, 2008; Nelson, 2005).

The ability to establish connectedness begins during infancy with the parent, typically through interactions that require social coordination such as joint attention and turn-taking (Bruner, 1983; Tomasello, 2003). During conversations, parents often label the child's internal states, which is associated with children's performance on emotional understanding tasks (Devine & Hughes 2016; Tompkins, Benigno, Lee, & Wright, 2018). Moreover, connected speech may play an important role in children's development of social understanding, specifically if the parent makes semantically-related statements in response to the child's previous utterance (Ensor & Hughes, 2008). Ongoing, contingent speech may result in partners establishing and maintaining connectedness and co-constructing a shared perspective about the goals and intentions of their interaction.

In early and middle childhood, children's social circle broadens and they begin to spend a significant amount of time with their siblings and friends (Howe & Leach, 2018; Lehrer et al.,

2014). During interactions with siblings and friends, children practice their social skills by engaging in conversations and labeling mental states, which fosters their social and emotional understanding (Carpendale & Lewis, 2015; Hughes, Lecce, & Wilson, 2007). They acquire and rehearse the skills to establish and maintain connectedness and are learning and preparing to be successful in social interactions across relationships and social contexts, such as play (Harrist & Waugh, 2002).

Children's Communication During Play

Social play requires children to establish intersubjectivity (i.e., a common frame of reference) (Göncü, 1993; Piaget, 1962; Vygotsky, 1978). Children need to communicate their ideas, goals, and intentions effectively to co-create a shared understanding, or shared meaning, of the play scenario (Garvey, 1990). Children engage in a series of behaviors that aid in co-constructing shared meanings during social pretend play, which includes: creating a new reality by assigning new meanings and transforming objects (Howe, Abuhatum, & Chang-Kredl, 2014; Trawick-Smith, 1990), sustaining the scenario by co-constructing shared meanings and communicating effectively (Bateson, 1955; Göncü & Kessel, 1988), and redefining aspects of the play when necessary (Nielsen, 2012). Social pretend play requires children to coordinate different perspectives, thus making it an important context for developing social-cognitive abilities (Carpendale & Lewis, 2015; Lillard, 2015).

Children use a variety of communication strategies to co-construct shared meanings during play. The process of initiating, maintaining, and moving forward with a play scenario is a complex process that requires a series of reciprocal exchanges with their partner (Brown et al., 1996; Garvey, 1990; Göncü, 1993). Exchanges often begin by introducing a play theme or capturing the partner's attention (Howe et al., 2005; Leach et al., 2015). Once a shared focus has

been established, children engage in a series of negotiations that include describing play objects or the play scenario, imitating the partner's prior utterance or action, clarifying aspects of the play (e.g., asking questions, revising statements), and responding positively or negatively to the other's questions (Göncü, 1993; Howe et al., 2005). Children employ sophisticated strategies (i.e., semantic tying), such as extending their partner's or their own ideas that further the play and facilitate more connected turns (Howe et al., 2005). Positive responses and prosocial behavior (e.g., sharing objects, "we" statements) also facilitate an increase in exchanges, particularly between friends (Leach et al., 2015, under review a). Negotiations occur as children transition from reality to pretense (Doyle, Doehring, Tessier, de Lorimier, & Shapiro, 1992). For example, children discuss setting up play objects and play themes before entering the psychological frame of pretense (i.e., pretend enactment) (Bateson, 1955; Howe et al., 2013). Pretend enactment is often signaled by a play voice; namely, children change the pitch of their voice when assuming the role of a character (Bateson, 1955). Lastly, children engage in nonmaintenance behaviors, which are verbal or nonverbal behaviors that disrupt the play interaction (Howe et al., 2005; Leach et al., 2015). Such behaviors may include disagreements or conflicts about the play (e.g., role assignment, object possession), controlling directives or actions, or statements irrelevant to the play. Children's various communication strategies contribute to our understanding of their socialization patterns with different play partners, which forms part of our primary research question.

The role of play materials. Play materials, most commonly toys, have a great influence on how and what children do in play. Recently, Trawick-Smith, Wolff, Koschel, and Vallarelli (2015) proposed two underlying assumptions of toys. First, they inspire, maintain, and enrich children's play (Pellegrini & Bjorklund, 2004). For example, a toy train can inspire a new play

theme and by including additional materials (e.g., people, boats, houses) children can extend and further their play scenario. Second, the function of toys is also to facilitate social play with other children where they can connect with one another by co-constructing a play theme and establishing joint attention (Mundy & Newell, 2007).

Early studies were interested in the influence of play materials on children's pretend play, social interactions, and more recently, social communication. Such studies revealed that children preferred highly structured and realistic toys (e.g., cars, tea sets) more than nonrealistic and low structured toys (e.g., blocks, paper towel rolls); moreover, children performed more symbolic transformations with the former suggesting such toys facilitate pretend play better than low structured toys (McLloyd, 1983; Trawick-Smith, 1990). Additionally, pretend play props tend to enable frequent and cooperative social interactions among peers compared to cognitively-oriented toys (e.g., puzzles), which increase solitary play (Ivory & McCollum, 1999).

Play materials designed to promote pretend play also influence children's social interactions. Parsons and Howe (2006, 2013) found superhero and generic figurines generated similar amounts of pretense among boys but influenced children's social communication; boys engaged in more pretense negotiations, explanations, and prosocial behavior with the superhero toys than the generic toys. Recently, Howe and colleagues (under review) investigated how play props (thematically open-ended village versus thematically closed-ended train) influenced children's communication with siblings and friends in early and middle childhood. They reported the village set promoted more simple strategies (e.g., descriptions) and clarifications and the train set facilitated more prosocial behavior, regardless of the play partner. Friends were more likely to use introductions (e.g., new play theme, calls for attention) and nonmaintenance (e.g., disruptive) behavior with the train set than village set. The current study extends Howe

and colleague's research by investigating the communication strategies children used to initiate and sustain connectedness with the two play sets (i.e., train, village).

The Present Study

Following our earlier work on connectedness (Leach, Howe, & DeHart, under review b), communication strategies during play (Leach et al., 2015, under review a), and the influence of play materials on children's communication (Howe et al., under review), the current study investigated the communication strategies (e.g., introducing a play theme, describing actions) children use to establish, sustain, and end connectedness during play with siblings and friends from early (i.e., T1: Time 1) to middle (i.e., T2: Time 2) childhood. To conduct this fine-grained analysis, the communication strategies were concatenated (e.g., combined) with the connectedness codes (e.g., initiate connected-simple strategy, connected sustain-clarification strategies, connected end-prosocial behavior; see Tables 1 and 2 for definitions and examples, respectively), which allowed us to address five research questions.

First, which communication strategies do children use to initiate connectedness and are there differences across relationship contexts and developmental periods? We anticipated that children would use introductions to initiate connectedness most often (Howe et al., 2005; Leach et al., 2015). We also anticipated that children would use clarifications (e.g., questions) to initiate connectedness because the strategy is meant to elicit a response from the partner and may be a means to quickly establish a shared meaning in the play. We also anticipated that children would use prosocial strategies (e.g., sharing) more often with their friend than sibling due to the more positive exchanges that characterize friendships (Leach et al., 2015, under review a) and more nonmaintenance strategies (e.g., controlling behaviors) with their sibling than friend given siblings' greater range of affectively intense interactions (Dunn, 2015; Howe et al., 2011).

Second, what communication strategies do focal children use to sustain connectedness and are there relationship and time differences? We expected children to use simple strategies (e.g., descriptions), semantic tying (e.g., extending ideas), and positive responses (e.g., agreements) to sustain connectedness with their partner. Semantic tying and responses are extensions to the partner's previous utterance, thus are likely to sustain the interaction if the strategies are able to elicit a response from the partner. We expected children to sustain their interactions with their friend by using positive strategies (e.g., prosocial, positive responses) (Leach et al., 2015, under review a). We also expected children would use semantic tying strategies more often at T2 than T1 due to their increased social-cognitive abilities.

Third, what communication strategies do focal children use to end connectedness and are there relationship and time differences? We expected children to use nonmaintenance behavior and negative responses to end connectedness with both siblings and friends at both time points. Play is a pleasurable activity (Garvey, 1990) and such negative behaviors are not conducive for the activity, thus most likely to end bouts of connectedness. Fourth, what communication strategies do focal children use that fail to initiate connectedness and are there relationship and time differences? We anticipated children's use of nonmaintenance strategies would most often fail to initiate connectedness. Partners may choose not to respond to such strategies thus the dyad would not establish connectedness. Given the lack of research investigating the specificity of the question, we did not advance further predictions.

Lastly, how might play set (farm, train, village) influence children's communication strategies used to initiate, sustain, end, and fail to initiate connectedness across relationships and time? Given the lack of findings of play set and communication strategies during early childhood (Leach et al., 2015), we did not expect differences at T1; however, we expected

differences at T2 based on Howe et al.'s (under review) findings. At T2, we expected children would sustain connectedness using prosocial strategies more often with the train set than the village set due to the train's clear theme, thus children may work together to construct the play scene. Also, we expected children would use more clarifications to sustain connectedness with the village set because of its more thematically open-ended design; there are more opportunities for various play themes than with the train set (Howe et al., under review). Additionally, we anticipated more simple strategies would be used with the village set due to some of the more open-ended, ambiguous materials that children need to identify and label before using. Further predictions regarding strategies used to initiate and end connectedness were not advanced given the lack of research.

Method

Participants

Forty-four middle-class Caucasian families from the Western New York area participated in a longitudinal study examining sibling and friend interaction in early and middle childhood. At T1, sibling pairs consisted of a 4-year-old focal child (M age = 56 mos.; SD = 5.71 mos.), who was observed with a younger sibling (n = 20; M age = 35.1 mos.; SD = 4.8 mos.) or an older sibling (n = 24; M age = 75.6, mos.; SD = 7.38 mos.). The second observation (T2) was approximately three years later. At T2, focal children (M age = 96.77 mos.; SD = 6.23 mos.) were observed with the same younger sibling (n = 20; M age = 74.55 mos.; SD = 5.83 mos.) or older sibling (n = 24; M age = 118.8, mos.; SD = 8.68 mos.). The dyadic gender composition included 26 same-gender pairs (14 brother-brother, 12 sister-sister) and 18 mixed-gender pairs (11 brother-sister, 7 sister-brother). The birth order of the focal children consisted of 15 first-borns, 20 second-borns, and 9 third- or later-borns; thus, focal children were identified as either

older or younger in relation to the sibling included in the study.

Families selected a friend of the focal child to participate at both time points (T1 friends' M age = 57.8 mos., SD = 10.61 mos.; T2 friends' M age = 96.88 mos., SD = 11.01 mos.). The three criteria, in descending order of importance for the selection of a friend included: (1) a frequent playmate, (2) same age, and (3) the same gender as the focal child. If families were unable to select a friend based on the three criteria, the first two requirements were used; at both time points, three families selected an opposite-gender friend. About half of the friends selected at T1 participated at T2 (20/44 = 45%). Parents rated the closeness of the friendship on a 5-point scale (i.e., 1 = acquaintance, 3 = friend, 5 = best friend) to ensure the children were close friends (T1: M = 3.96, SD = .81, range = 2 - 5; T2: M = 4.2, SD = .73; range = 2 to 5). At both time points, only one mother rated the child's friendship as a 2 (in between an acquaintance and a friend). Ethical approval for original data collection was given to Dr. DeHart from the SUNY Geneseo research ethics office and for the secondary analyses in the present study was also given to Nina Howe by the Concordia University Human Research Ethics Committee (protocol number, UH2010-047).

Procedure

At both T1 and T2, each dyad was videotaped in the family home on two separate, counter-balanced 15-minute sessions with their sibling and friend; taping sessions occurred about one week apart. At T1, dyads were given one of three counterbalanced wooden play sets (farm,

village, or train³) to facilitate pretend play: farm set (22 sibling, 20 friend dyads); village set (20 sibling, 22 friend dyads); train set¹ (2 sibling, 2 friend dyads). At T2, dyads were given either a village (22 sibling, 22 friend dyads) or a train set (22 sibling, 22 friend dyads). The research assistant instructed the children to play with the toys as they wanted, and then sat with the mother in another room to complete a demographic questionnaire, thus allowing the children privacy. Research assistants, blind to the study's purposes, transcribed the children's language and behavior on the videotapes.

Measures

Conversational turns. The number of conversational turns on each transcript was determined by counting the reciprocal exchanges of the children (i.e., a speaker's utterances bounded by the utterances of another speaker). If there was a break in the speech of one child for more than 3 seconds, it was considered the end of the conversational sequence.

Connectedness. Connectedness was defined as statements that are semantically related to a partner's previous statement (Ensor & Hughes, 2008; Gottman, 1983; Slomkowski & Dunn, 1996). The connectedness codes included: (a) initiated-connected, (b) initiated-end, (c) sustained-connected, (d) sustained-end, (e) self-talk, and (f) unclear statements (see Tables 1 and 2 for definitions and examples, respectively). Due to low frequency of self-talk and unclear statements, these were not analyzed. The connectedness coding was established by the first

³ The four dyads who received the train set were recruited late in the first wave of the data collection and were accidentally given the train set for the play session. The train set was selected for the T2 data collection only.

author and a naïve research assistant on 20% of the T1 (18/88) and T2 (18/88) transcripts. Cohen's *kappa* revealed high levels of agreement: T1 ($k = .94$) and T2 ($k = .93$).

Communication strategies. The transcripts were coded for each instance of the presence of specific communication strategies within each turn that create shared meanings between partners, based on Göncü (1993), Farver (1992), and Howe et al. (2005); repeated codes were not counted within a turn (see Tables 1 and 2 for definitions and examples, respectively). The communication categories included: (a) introductions to play (i.e., calls for attention, play themes), (b) simple strategies (i.e., descriptions of action, imitations), (c) semantic tying strategies (i.e., extensions, building-on to the partner's ideas, justifications) and, (d) clarifications (e.g., questions, revisions). The response of the partner was included given that it might facilitate further shared meanings (or not), thus we also coded (e) positive (e.g., agreement) and (f) negative (e.g., disagreement, ignoring) responses to negotiations and clarifications and (g) prosocial behavior (e.g., shared affect, sharing). Next, statements were also coded for every instance of (h) play voice to indicate the pretense frame for enactment (i.e., exaggerated high-pitched tone of voice pitch) (Bateson, 1955). Finally, following Howe et al. (2005) some behaviors may disrupt the play and interfere with constructing shared meanings, thus as a separate category, we coded (i) nonmaintenance behaviors (e.g., conflict, off-task).

The communication reliability coding was conducted by the first author and a naïve research assistant on 15% of the T1 (14/88) and T2 (14/88) transcripts. Training was conducted using a different but similar play data set until RAs reached a high level of percent agreement (i.e., at least 80%). Once established, RAs began coding the current data and ongoing reliability meetings were held regularly. Cohen's *kappa* revealed high levels of agreement: total communication strategies score (.94), introductions = .98, simple strategies = .93, semantic tying

= .88, clarifications = .96, positive/neutral responses = .93, negative/ignoring responses = .80, prosocial behavior = .93, play voice = .97, and nonmaintenance behavior = .95.

Results

Analyses were performed for sibling and friend dyads' communication strategies used to initiate, sustain, and end connectedness. Analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA)-based procedures were conducted with relationship and time as repeated measures and the proportional scores of the communication strategies-connectedness codes as dependent variables. The Greenhouse-Geisser correction was applied when sphericity assumptions were violated (adjusted *df* are reported below). Effect sizes were reported as partial-eta squares for significant effects. Bonferroni corrections were used for all *post-hoc* pairwise comparisons (alpha level $p < .05$).

Data Organization

To determine children's communication strategies used to initiate, maintain, and end connectedness, the connectedness codes were concatenated (e.g., combined) with the communication codes and a new blended code was created. For example, the focal child asked his sibling, "where's the doggy?", which was coded as *initiated-connected* for connectedness and *question* for communication strategies, thus creating the blended code *initiated connected-question*. The sibling's response, "here's the doggy" was coded as *connected-sustain* for connectedness and *positive response* for communication strategies, thus creating the blended code *connected sustain-positive response*.

To account for the number of conversational turns (i.e., amount of verbal communication) in each play session, proportion scores were created. Frequencies were summed for each category and divided by the total number of conversational turns in the play session.

For example, the focal child's initiated connected-simple strategies in the friend session divided by the focal child's conversational turns in the friend session.

Descriptive Statistics and Information

To test for gender effects, a series of MANOVAs were performed with gender as the independent variable and the blended connectedness-communication strategy codes as the dependent variables. Initiated connected-communication strategies, connected end-communication strategies, and initiated end-communication strategies did not yield significant findings. Connected sustained-communication strategies revealed a multivariate effect for time and gender, Wilk's $\lambda = .62$, $F(9, 34) = 2.31$, $p = .038$, $\eta^2 = .38$. Follow-up univariate ANOVAs revealed a main effect of time and gender on connected sustained-positive response, $F(1, 42) = 8.74$, $p = .005$, $\eta^2 = .17$. At T1, boys responded more positively when making connected-sustained statements ($M = .19$, $SE = .02$) than girls ($M = .13$, $SE = .02$). Further sibling gender composition (i.e., focal boy-brother, focal girl-sister, focal boy-sister, focal girl-brother) was also tested using a series of MANOVAs. No main effects or interactions were found.

To test for birth order differences (i.e., focal child with an older sibling vs. a younger sibling) a series of MANOVAs were conducted. Initiated connected-communication strategies, connected sustained-communication strategies, and initiated end-communication strategies did not yield significant findings. Connected end-communication strategies revealed a time, relationship, and birth order interaction effect, Wilk's $\lambda = .54$, $F(9, 31) = 2.98$, $p = .011$, $\eta^2 = .46$. Follow-up univariate ANOVAs revealed an interaction between time, relationship, and birth order on connected end-nonmaintenance, $F(1, 39) = 9.16$, $p = .004$, $\eta^2 = .19$. At T1, older focal children engaged in more nonmaintenance behavior that ended connectedness ($M = .21$, $SE = .03$) with their friend than younger focal children ($M = .10$, $SE = .03$).

Communication Strategies Used to Initiate Connectedness

A one-way ANOVA was conducted to address the first research question regarding the communication strategies focal children used to initiate connectedness. A significant main effect was found for the initiate connected-communication strategies, $F(4.35, 178.42) = 107.89, p < .001, \eta^2 = .73$. Pairwise comparisons indicated that simple strategies were used more often than any other strategy to initiate connectedness (see Table 3 for *Ms* and *SEs*). Introductions were used more often than semantic tying, positive and negative responses, prosocial and nonmaintenance behavior, and play voice. Similarly, clarifications were used more often than semantic tying, positive and negative responses, prosocial behavior, and play voice.

Further, to determine relationship and time differences in focal children's communication strategies used to initiate connectedness, a 2 (relationship) x 2 (time) MANOVA with the nine initiate connected-communication variables was performed with relationship and time as the independent variables and initiate connected-communication strategies as the dependent variables. The analysis revealed multivariate effects for relationship, Wilk's $\lambda = .62, F(9, 33) = 2.23, p = .04, \eta^2 = .38$. Follow-up univariate ANOVAs revealed a main effect of relationship on initiate connected-prosocial behavior, $F(1, 41) = 5.23, p = .027, \eta^2 = .11$, and initiate connected-play voice, $F(1, 41) = 4.14, p = .04, \eta^2 = .09$. Children engaged in prosocial behavior ($M = .16, SE = .02$) and play voice ($M = .11, SE = .02$) when initiating connectedness more often with their friend than sibling ($M = .09, SE = .02; M = .06, SE = .01$, respectively).

Communication Strategies Used to Sustain Connectedness

To determine the second research question regarding which communication strategies children used to sustain connectedness, a one-way ANOVA was conducted; a significant main effect was revealed for the connected sustain-communication strategies, $F(5.42, 232.84) = 57.43,$

$p < .001$, $\eta p^2 = .57$. Pairwise comparisons indicated that simple strategies were used significantly more often than the other strategies. Clarifications were used significantly more often than introductions, semantic tying, positive and negative responses, and play voice. Children engaged in nonmaintenance behavior significantly more often than introductions, semantic tying, prosocial behavior, and play voice.

To determine relationship and time differences in children's communication strategies used to sustain connectedness, a 2 (relationship) x 2 (time) MANOVA with the nine connected sustain-communication variables was performed with relationship and time as the independent variables and connected sustain-communication strategies as the dependent variables. The analysis revealed multivariate effects for relationship, Wilk's $\lambda = .61$, $F(9, 35) = 2.46$, $p = .02$, $\eta p^2 = .39$. Follow-up univariate ANOVAs revealed a main effect of relationship on connected sustain-clarifications, $F(1, 43) = 8.34$, $p = .006$, $\eta p^2 = .16$, and trends for connected sustain-positive response, $F(1, 43) = 3.32$, $p = .07$, $\eta p^2 = .07$, and connected sustain-play voice, $F(1, 43) = 3.43$, $p = .06$, $\eta p^2 = .07$. Children used clarifications when sustaining connectedness more often with their sibling ($M = .23$, $SE = .02$) than friend ($M = .17$, $SE = .02$). The trends indicated children responded more positively ($M = .20$, $SE = .01$) and used a play voice ($M = .06$, $SE = .01$) more often with their friend than sibling ($M = .16$, $SE = .01$; $M = .04$, $SE = .01$, respectively).

Communication Strategies Used to End Connectedness

To address the third research question, which communication strategies focal children use to end connectedness, a one-way ANOVA was conducted. A significant main effect was found for the connected end-communication strategies, $F(5.69, 227.40) = 46.25$, $p < .001$, $\eta p^2 = .54$. Pairwise comparisons revealed that simple strategies were used significantly more often than all other strategies. Semantic tying was used significantly more often than introductions, positive

responses, and play voice. Positive responses were used significantly more often than introductions, clarifications, negative responses, prosocial behavior, and play voice.

To determine relationship and time differences in children's communication strategies used to end connectedness, a 2 (relationship) x 2 (time) MANOVA with the nine connected end-communication variables was performed with relationship and time as the independent variables and connected end-communication strategies as the dependent variables. There were no significant time or relationship effects.

Communication Strategies that Failed to Initiate Connectedness

To determine the fourth research question, which communication strategies focal children used that failed to initiate connectedness, a one-way ANOVA was conducted. A significant main effect was found for the initiate end-communication strategies, $F(4.49, 166.26) = 123.57, p < .001, \eta^2 = .77$. Pairwise comparisons revealed that simple strategies were used significantly more often than the other strategies. Introductions were used significantly more often than positive and negative responses, prosocial behavior, and play voice. Clarifications were used significantly more often than positive and negative responses, and nonmaintenance. Nonmaintenance was used significantly more often than positive and negative responses and play voice.

To determine relationship and time differences in children's communication strategies that failed to initiate connectedness, a 2 (relationship) x 2 (time) MANOVA with the nine initiate end-communication variables was performed with relationship and time as the independent variables and connected end-communication strategies as the dependent variables. The analysis did not yield significant time or relationship effects.

Play Set Differences for Connectedness-Communication Strategies

T1 in sibling and friend sessions. To test for play set differences at each time point and play session, a series of MANOVAs was conducted with the play set as the independent variable and connected-communication strategies as the dependent variables. There were no significant differences.

Initiated connected-communication strategies at T2 in sibling session. The MANOVA for initiated connected-communication strategies revealed multivariate effects for play set, Wilk's $\lambda = .49$, $F(8, 33) = 4.23$, $p = .001$, $\eta^2 = .51$. Follow-up univariate ANOVAs revealed a main effect of play set on initiated connected-clarifications, $F(1, 40) = 20.98$, $p < .001$, $\eta^2 = .34$, initiated connected-prosocial behavior, $F(1, 40) = 4.52$, $p = .04$, $\eta^2 = .10$, and initiated connected-play voice, $F(1, 40) = 4.42$, $p = .042$, $\eta^2 = .10$. Children used more clarifications when initiating connectedness with the village set ($M = .42$, $SE = .04$) than train set ($M = .18$, $SE = .04$). Children engaged in more prosocial behavior when initiating connectedness with the train set ($M = .15$, $SE = .03$) than village set ($M = .06$, $SE = .03$). Lastly, children used a play voice to initiate connectedness more often with the train set ($M = .18$, $SE = .04$) than village set ($M = .05$, $SE = .05$).

Connected sustained-communication strategies at T2 in sibling session. The MANOVA for the connected sustained-communication strategies revealed multivariate effects for play set, Wilk's $\lambda = .49$, $F(8, 35) = 2.93$, $p = .013$, $\eta^2 = .40$. Follow-up univariate ANOVAs revealed a main effect of play set on connected sustained-prosocial, $F(1, 42) = 4.81$, $p = .03$, $\eta^2 = .10$, and connected sustained-nonmaintenance, $F(1, 42) = 5.68$, $p = .022$, $\eta^2 = .12$. Children engaged in more prosocial behavior when maintaining connectedness with the train set ($M = .12$, $SE = .02$) than village set ($M = .07$, $SE = .02$). Children also engaged in more nonmaintenance

behavior while maintaining connectedness with the train set ($M = .22, SE = .03$) than village set ($M = .11, SE = .03$).

Connected end-communication strategies at T2 in sibling session. The MANOVA for the connected end-communication strategies revealed multivariate effects for play set, Wilk's $\lambda = .49, F(8, 35) = 2.69, p = .02, \eta^2 = .38$. Follow-up univariate ANOVAs revealed a main effect of play set on connected end-clarification, $F(1, 42) = 7.21, p = .01, \eta^2 = .15$. Children made more clarifications when ending connectedness with the village set ($M = .20, SE = .04$) than train set ($M = .07, SE = .03$).

Initiated end-communication strategies at T2 in sibling session. Lastly, the MANOVA for the initiated end-communication strategies revealed multivariate effects for play set, Wilk's $\lambda = .53, F(8, 35) = 3.89, p = .002, \eta^2 = .47$. Follow-up univariate ANOVAs revealed a main effect of play set on initiation end-simple, $F(1, 42) = 14.33, p < .000, \eta^2 = .25$, initiation end-clarification, $F(1, 42) = 4.71, p = .04, \eta^2 = .10$, and initiation end-prosocial behavior, $F(1, 42) = 6.75, p = .013, \eta^2 = .14$. When children failed to initiate connectedness, they used simple strategies more often with the village set ($M = .77, SE = .05$) than train set ($M = .51, SE = .05$). Children used more clarifications when failing to initiate connectedness with the village set ($M = .20, SE = .03$) than train set ($M = .11, SE = .03$). Children engaged in more prosocial behavior when failing to initiate connectedness with the train set ($M = .14, SE = .02$) than village set ($M = .05, SE = .03$).

Initiated connected-communication strategies at T2 in friend session. Significant differences were found for the initiated connected-communication strategies at T2 in the friend session. The MANOVA revealed multivariate effects for play set, Wilk's $\lambda = .59, F(8, 35) = 3.10, p = .009, \eta^2 = .42$. Follow-up univariate ANOVAs revealed a main effect of play set on

initiation connected-prosocial behavior, $F(1, 42) = 13.25, p = .001, \eta^2 = .24$, and initiation connected-nonmaintenance, $F(1, 42) = 5.10, p = .029, \eta^2 = .11$. Children engaged in both prosocial and nonmaintenance behavior when initiating connectedness more often with the train set ($M = .29, SE = .04; M = .21, SE = .04$, respectively) than village set ($M = .09, SE = .04; M = .08, SE = .04$, respectively).

Connected sustained-, connected end-, and initiated end-communication strategies at T2 in friend session. No significant differences were found for connected sustained-communication strategies, connected end-communication strategies, and initiated end-communication strategies at T2 in the friend play session.

Discussion

The present study makes important contributions to understanding children's communication strategies used to initiate, sustain, and end connectedness with siblings and friends during play across time. Specifically, patterns of the communication strategies children used for connectedness are discussed, alongside relationship and time differences, and the influence of play set when taken into account.

Children's Communication Strategies and Connectedness

Strategies to initiate connectedness. Children employed similar strategies to initiate, sustain, end, and failed to initiate connectedness with their siblings and friends. When initiating connectedness successfully (i.e., initiations that were followed by a response from the partner), children used four communication strategies most often: simple strategies, introductions, clarifications, and nonmaintenance behavior. First, children might have employed simple strategies, such as describing an object or an idea about the play, as a means to capture their partner's interest (e.g., "here's a mailbox and a teeny house"; "Oh, that's a cute swing"; "I'm

making a barn with all the animals!”). Children might use such strategies to express their own interests and as a means to draw their partner into their ideas about the play. Second, and as expected, children also used introductions to initiate connectedness. Such statements are meant to initiate communication (Howe et al., 2005; Leach et al., 2015, under review a) and in the present study, lead to connectedness with the play partner. Third, children also used clarifications to initiate connectedness. Specifically, it seemed that children asked their partner questions about the play materials, which resulted in successfully initiating connectedness. For example, a focal child asked his older sister, “what are those?” which was followed by a discussion of the play objects. Lastly, nonmaintenance strategies were often used to initiate connectedness, which were then followed by a sequence of disruptive behavior (e.g., conflict about toy possession; a conversation about playing outside), thus sustaining connectedness in a way that was unrelated to the play.

Strategies to sustain connectedness. In addition to nonmaintenance behavior that children used to sustain connectedness, they also relied on three other strategies: simple strategies, clarifications, and positive responses. As expected, children used simple strategies most often to sustain connectedness. Previous research (e.g., Farver, 1992; Göncü, 1993; Howe et al., 2005; Leach et al., 2015, under review a) reported children used descriptions and imitations (i.e., simple strategies) most frequently during play. Clearly, such strategies maintain the ongoing play and children may use them to inform the partner of their ideas. Children also used clarifications and, in support of our hypothesis, positive responses to sustain connectedness, which are in line with Leach et al. (2015, under review a). Clarifications and positive responses may complement one another; children may ask a question or make a suggestion using a verbal tag (e.g., “okay?”, “right?”) and receive a positive response from their partner. For example, a

focal child said, “let’s work on the playground first, okay?” and her friend said, “okay” in agreement. Children may also respond positively to their partner’s descriptions (i.e., simple strategies). For example, an older sibling said, “I have an idea” while placing two buildings on top of each other and the focal child responded positively with, “oh yeah!” and handed him another building. Ongoing descriptions, clarifications, and subsequent positive responses seem to foster connectedness and may be crucial strategies for children to advance the play scenario.

Strategies to end connectedness. The strategies children used to sustain connectedness were similar to the strategies they used to end connectedness (i.e., simple strategies, positive responses, semantic tying, and nonmaintenance behavior). Children used simple strategies most often to end connectedness, which may have followed their frequent use of initiating and sustaining connectedness. While positive responses often sustained connectedness, they also frequently ended connectedness, which was unexpected given the joyful characteristic of play (Garvey, 1990). Perhaps children wanted confirmation as they interacted with their partner and once a positive response was provided, the verbal interaction ceased temporarily. These sequences may have been shorter in terms of the number of conversational turns. Such speculations warrant further investigation. Moreover, unexpectedly, semantic tying strategies frequently ended connectedness. Semantic tying strategies are complex and meant to further the progression of the play (Farver, 1992; Göncü, 1993; Howe et al., 2005; Leach et al., 2015, under review a). Perhaps once children constructed a shared meaning about the play scenario via extensions and building onto ideas, the play reached a more complex level that the children were satisfied with or unable to continue developing given their developmental age. Lastly, as hypothesized, nonmaintenance behavior was used to end connectedness and, as noted previously, disruptive interactions tend to end playful exchanges.

Strategies that failed to initiate connectedness. Interestingly, the strategies children used to successfully initiate connectedness were also used most often in failed attempts to initiate connectedness (i.e., simple strategies, introductions, nonmaintenance, and clarifications). Perhaps the rates of successfully and unsuccessfully initiating connectedness are similar and ultimately may depend on what the partner finds interesting or not. Children may not respond to such initiations for a few reasons; they may not find the topic of interest and ignore their partner's attempts or respond in a way that does not connect to the child's attempt at initiating connectedness. Children may also not hear or understand their partner's initiation attempt and thus do not make a semantically related statement. Perhaps a detailed, qualitative investigation of children's failed attempts at initiating connectedness as well as the partners' lack of semantically related response may illuminate the specific reasons why initiations fail.

Relationship and Time Differences

Overall, children used similar strategies to initiate, sustain, and end connectedness with their sibling and friend during play with a few notable differences. First, children used prosocial behavior, as hypothesized, and play voice to initiate connectedness and responded positively and used a play voice to sustain connectedness more often with their friend than sibling. Children's kinder initiations and subsequent positive responses with their friends may reflect the nature of friendships; namely that friendships are characterized by mutual and positive exchanges, which are necessary for the relationship to continue (Bagwell & Bukowski, 2018; Dunn, 2015; Hinde, 1979). Friends may view the focal children's play voice as enjoyable and perhaps want to engage in the play in the same way, hence the use of play voice to sustain connectedness. Typically, friends are in the same developmental stage and share similar interests (Rubin, Bukowski, & Bowker, 2015). Children may know what and how their friend likes to play and

may use such knowledge to capture their friend's attention to create a reciprocal play interaction. Given that positive responses and play voice to sustain connectedness were trends, replication is warranted.

Second, children used clarifications more often when sustaining connectedness with their sibling than friend. Children might use clarifications as a means to verify the direction of the play scenario with their sibling such as asking what particular objects were, how objects could be constructed, where objects should be placed, and if their partner agreed with their ideas or actions (e.g., "I need two ducks, okay?"). Perhaps friends do not need to check in with one another as often and more readily share objects, as indicated by the previous finding, as well as ideas for the progression of the play given their similarities in development and interests. Third, at T1, older focal children used more nonmaintenance behavior that ended connectedness with their friend than younger children. As children learned more about friendships and how to be an effective communicator with friends and peers, they may have omitted such strategies from their repertoire, which may be why such strategies were no longer significant at T2.

Lastly, at T1, boys responded more positively when sustaining connectedness than girls. Given there was only one gender difference that did not follow a pattern of findings, it may be spurious and not appear to have an obvious explanation. Also, it does not appear to reflect the mixed literature on gender differences, thus further investigation is warranted. Overall, children mostly used similar strategies across relationship contexts and time; however, the selective use of some strategies may reflect children's flexible understanding of their social relationships.

The Influence of Play Set

The theme of the play sets at T1 (i.e., farm, village) did not influence children's communication strategies used to initiate, sustain, and end connectedness, but significant

differences were found at T2 (i.e., village, train). At T2 in the sibling session, children used more clarifications to initiate and end connectedness with the village set than train set. Perhaps the play theme of the village set is more ambiguous than the obvious theme of the train set; thus, children may have initiated connectedness by clarifying aspects and directions of the play (e.g., “what’s this?”). Children may have also ignored their sibling’s question, hence the greater use of clarifications ending connectedness. Siblings can and do ignore their counterparts (Howe et al., 2005; Leach et al., 2015, under review a), which is less likely to occur between friends due to the mutual characteristic of the relationship (Bukowski et al., 2018).

Furthermore, children were prosocial more often with the train set than village set when initiating connectedness with their sibling. The train set requires cooperation because of the large track that the children can build, which may reflect the greater use of prosocial strategies to initiate as well as sustain connectedness. Perhaps children viewed constructing the track as a common objective (e.g., “we have to make it a circle”) and readily shared objects to achieve their goal. In fact, children tend to make more shared goal statements in middle childhood than early childhood (Leach, Howe, & DeHart, 2017); however, children’s prosocial behavior also ended connectedness. Perhaps at times, their friendly behavior went amiss or simply failed to continue to hold their siblings’ interest who may have chosen to advance a different aspect of the play. Additionally, children used a play voice to successfully initiate connectedness more often with the train set than village set, which may reflect the train set’s clear and recognizable theme. Children are more likely to engage in pretense with more realistic play materials than nonrealistic materials (Parsons & Howe, 2006; Trawick-Smith, 1990). Clearly, such speculations require further investigation, perhaps using a qualitative research design.

In addition to children's prosocial strategies used to sustain connectedness with their sibling, they also engaged in more nonmaintenance behavior with the train set than village set. Perhaps when children need to work together continuously, they will encounter both friendly, cooperative exchanges as well as conflictual, controlling exchanges, particularly for siblings. Unlike friends, siblings do not need to maintain their relationship through friendly exchanges (Dunn, 2015; Howe et al., 2011) and perhaps use more disruptive means to achieve their goals (e.g., a continued disagreement about object possession). Friends used both strategies to initiate connectedness and similar to the explanation above, children may be offering pieces or making "we" statements when initiating connectedness with the train set, yet in other connected sequences, they may be disagreeing with their partner's actions and attempt to change the direction of the play by making controlling statements or using negative behavior to express their disagreement. Interestingly, it is only with children's sibling that such communication strategies continue in their connectedness sequences. Siblings tend to engage in both positive and negative connected sequences, whereas friends typically only engage in positive sequences (Leach, Howe, & DeHart, under review c). Perhaps the nonmaintenance initiations made in the friend session do not continue because they were not conducive for the type of interactions that characterize friendships (i.e., mutual, reciprocal exchanges).

Conclusion

Despite the contributions of the present study, there are some limitations. First, the participants were middle class, Caucasian Americans, which limits the generalization of findings to more diverse populations. Second, the small sample size may have reduced statistical power; however, the naturalistic observations of two play sessions at two time points produced a rich, detailed, and unique data set. Future research would benefit from replicating the design of the

study, increasing the duration of play sessions, and including additional measures (e.g., relationship quality).

In sum, the present findings provide insights into children's social interactions across development and underscore accompanying communicative processes that characterize sibling and friend relationships during play. Our nuanced investigation also revealed the interlinked nature of play set and children's communication; thus, highlighting the importance of providing various play materials to children because they may foster different aspects of development (e.g., cooperation and collaboration, social cognition, language skills, etc.). Taken together, there is a high level of sophisticated play interaction among siblings and friends and such interactions are rich and varied and crucial for young children's development.

Table 1

Definitions of Connectedness and Communication Strategies

Connectedness

- 1) Initiation-connected: a child initiates communication, which leads to the partner making a connected (i.e., semantically related) statement.
- 2) Initiation-end: failed attempt to elicit a connected response from the partner.
- 3) Connected-sustained: statement connected to the partner’s previous statement and sustains the interaction.
- 4) Connected-end: Child’s statement is connected to the partner’s previous statement, but fails to elicit a semantically related response from the partner. Typically, the last turn in the sequence.

Communication Strategies

- 1) Introductions: suggesting a new play theme or calls for attention (e.g., “look”, “hey”)
- 2) Simple strategies: descriptions of actions (e.g., “I’m putting the horse here) or imitations (i.e., repeating partner’s prior utterances or actions).
- 3) Semantic tying: adding new elements to the play by: (a) extending partner’s previous idea (i.e., adding new information); (b) building-on to one’s previously expressed idea; or (c) explaining/justifying play actions that develop a shared understanding about the course or properties of actions (e.g., “we need a gate because the animals might run away!”).
- 4) Clarifications: degrees of agreement with partner’s ideas and sharing same reference in dialogue by: (a) asking questions leading to a shared understanding or agreement (e.g., “where’s the cow?”); (b) asking for help; (c) tags seeking agreement or acknowledgement (e.g., “... okay?”, “... right?”); (d) revising a partner’s idea (e.g., “No, that’s a doggy, not a horse”); or (e) conciliation (e.g., Y: “All the trees go here.” O: “Not all!” Y: “Three of them.” O: “Okay.”).
- 5) Responses to lower level strategies (e.g., simple strategies, clarifications, etc.) and do not include higher level strategies (i.e., semantic tying), includes: (a) positive/neutral (e.g., “yes”, “mmhmm”) and (b) negative/ignoring (e.g., “no”).
- 6) Prosocial behavior: instances of: (a) teaching/helping (e.g., “oh here, I’ll help you”); (b) social statements/actions: giving objects, “we” statements indicating joint activity (e.g., “we’re building a big farm”); or (c) shared affect (e.g., laughing).
- 7) Pretend enactment with play voice: exaggerated high tone of voice indicated by a change in pitch signaling that children are enacting pretense (e.g., “moo!”; “chugga chugga choo choo!”; “I need to feed the horsies”)
- 8) Nonmaintenance actions/statements: disrupt play such as: (a) directive statements to control partner’s action outside of play episode (e.g., “those are mine” in controlling tone of voice); (b) negative behaviors (e.g., hits, throws objects, teasing, mocking); or (c) irrelevant acts/statements that do not reference the play (e.g., “wanna ride bikes after this?”).

Table 2

Examples of Connectedness-Communication Strategies

Turn	Child	Comments and Actions	Communication Strategy	Connectedness Code
1	Younger sibling	Pretend this is a car. Vrrrooom!!	Introduction	Initiation-connected
2	Focal child	Okay.	Positive response	Connected-sustained
3	Younger sibling	Oh wait. This is a boat! It's a boat, boat, boat!	Simple strategy	Connected-sustained
4	Focal child	Uh huh.	Positive response	Connected-sustained
5	Younger sibling	I mean, oh, never mind.	Simple strategy	Connected-end
Turn	Child	Comments and Actions	Communication Strategy	Connectedness Code
1	Focal child	What's this?	Clarification	Initiation-connected
2	Older sibling	I have no idea.	Positive response	Connected-sustained
3	Focal child	Oh that's where the guy sits!	Semantic tying	Connected-sustained
4	Older sibling	This is where the guards sits (points to building). They watch the people.	Clarification (revision)	Connected-end

Table 3

Focal Children's Connectedness-Communication Means and Standard Errors

Communication Strategy	Connectedness Codes			
	Initiate connected <i>M (SE)</i>	Sustain connected <i>M (SE)</i>	Connected end <i>M (SE)</i>	Initiate end <i>M (SE)</i>
Introduction	.28 (.03)	.11 (.01)	.10 (.01)	.20 (.02)
Simple strategy	.50 (.02)	.34 (.01)	.40 (.02)	.61 (.03)
Semantic tying	.11 (.01)	.13 (.01)	.17 (.02)	.13 (.02)
Clarification	.27 (.02)	.20 (.01)	.13 (.01)	.15 (.01)
Positive response	.02 (.00)	.18 (.01)	.19 (.01)	.02 (.01)
Negative response	.03 (.02)	.14 (.01)	.09 (.01)	.03 (.01)
Prosocial behavior	.12 (.11)	.12 (.01)	.10 (.01)	.11 (.01)
Play voice	.09 (.06)	.05 (.01)	.10 (.01)	.09 (.01)
Nonmaintenance behavior	.18 (.15)	.19 (.02)	.17 (.02)	.18 (.02)

Note. Means and standard errors are based on the proportion of conversational turns in the play session.

General Discussion

The overarching goal of the present series of research studies was to investigate connectedness (i.e., connected speech) and its features (e.g., emotional tone, sequence length, communication strategies) in children's play interactions with siblings and friends across early and middle childhood. The three studies, alone and combined, make important contributions to the literature and further our understanding of children's social interactions.

Until recently, the majority of research on connectedness has focused on the parent-child relationship (e.g., Clark & Ladd, 2000; De Mendonca, Cossette, Strayer, & Gravel, 2011; Harrist, Pettit, Dodge, & Bates, 1994; Lindsey, Colwell, Frabutt, Chambers, & MacKinnon-Lewis, 2008) and we extended this area of investigation to child-child relationships to broaden our knowledge and understanding of two important social relationships in children's lives (i.e., siblings, friends) across development. The overall goal of Study 1 was to examine children's connectedness with their sibling and friend from early to middle childhood. Study 2 extended Study 1's purpose by investigating the dyad (e.g., focal child and sibling; focal child and friend) and the features of connectedness (e.g., emotional tone, sequence length) in connected sequences. Study 3 provided a fine-grained analysis of children's connectedness by examining the communication strategies children used to initiate, sustain, and end connectedness. Studies 1 to 3 became more specific in examining aspects of connectedness, which allowed for a comprehensive and unique investigation of children's interactions with siblings and friends.

The findings from the present studies provide support for relationship theories (Dunn, 2002; Hartup, 1983; Hinde, 1979), social constructivist theories (Carpendale & Lewis, 2015; Vygotsky, 1978), and dyadic synchrony (i.e., connectedness) theories (Harrist & Waugh, 2002). Relationship models of development emphasize the importance of reciprocal and hierarchal

interactions that characterize children's sibling and friend relationships for children's social, cognitive, and emotional development (Carpendale & Lewis, 2015; Dunn 2007; Hartup, 1989). Studying children's development from a relationships framework provides opportunities to observe the relationship context, individual characteristics, and partner effects (Hartup & Laursen, 1991). That is, children's interactions with others (e.g., siblings, friends) provide insights into children's understanding of themselves and others as well as the nature of their relationships (Hughes & Dunn, 2007). Moreover, the notion of connected communication between play partners is in line with a social constructivist framework, which emphasizes the importance of social interactions in children's co-construction of knowledge of their social and cultural worlds (Carpendale & Lewis, 2015; Dunn, 2007; Vygotsky, 1978). The bidirectional nature of children's interactions meets two of the three characteristics of dyadic synchrony (i.e., connectedness), that is, at least two people are involved and partners engage in a reciprocal exchange. Our research extended the third characteristic (i.e., positive affect) by broadening the affect feature of dyadic synchrony to include negative emotional tone. Through various types of interactions, partners contribute to and influence each other's social communication skills and emotional understanding (Carpendale & Lewis, 2015; Dunn, 2015; Howe & Leach, 2018).

The patterns of findings from the series of studies highlight several similarities and differences in children's connectedness with siblings and friends across development. Overall, results indicated some differences in children's connectedness across relationships. When focal children's connectedness was examined (Study 1), children made more initiated-end and self-talk statements with siblings than friends and more connected-sustained statements with friends than siblings. The findings from Study 3 may provide a rationale, particularly for the latter finding. Although findings indicated a trend, children tended to respond more positively and use a play

voice more with their friend than sibling when sustaining connectedness. Evidently, such communication strategies are likely to prolong connected interactions, particularly when expressed with positive affect, which was evident in Study 2; specifically, friend dyads were more likely to engage in long and positive sequences compared to sibling dyads. Perhaps these long, positive connected interactions were initiated by children's prosocial behavior and play voice (findings from Study 3). Overall, results from Study 2 indicated that friends were more likely to have positive connected sequences than siblings, whereas siblings were more likely to engage in negative connected sequences than friends. These findings speak to the features of both relationships. Friends are voluntary and reciprocated relationships that are characterized by mutual liking, similar interests, and egalitarian exchanges (Howe & Leach, 2018; Rubin et al., 2015). In contrast, sibling relationships are involuntary and engage in a range of affectively intense exchanges from highly warm and cooperative interactions to highly conflictual and hostile interactions (Buist & Vermande, 2014; Dunn, 2002; Howe et al., 2011). Based on these features, it seems apparent friends would indeed engage in more enjoyable interactions than siblings, whose relationship will persevere regardless of the affect of their exchanges (Howe et al., 2011).

A few developmental differences were also noted across the studies. Interestingly, and unexpectedly, children made more statements that ended connectedness and failed to initiate connectedness more often at T2 than T1 (Study 1). Even though children ended connectedness more often at T2 than T1, their connected sequences were more likely to be positive, albeit short, at T2 compared to T1, which were more likely to be negative (Study 2). Moreover, dyads were more cooperative at T2 than T1, which may further explain the increase in positive connected sequences over time. Such findings may reflect the characteristics of sibling and friend

relationships; specifically, friends are likely to view one another positively throughout childhood whereas siblings become more amicable and more similar in structure to friends with development (Buhrmester, 1992; Bukowski et al., 2015; Updegraff et al., 2002).

Furthermore, several consistent findings were revealed across relationships and time. First, the partners within each dyad (i.e., focal child and sibling, focal child and friend) participated relatively equally when initiating, sustaining, and ending connectedness, which is a crucial and necessary feature of connectedness and reflects the bidirectional, reciprocal process of relationships (Black & Logan, 1995; Harrist et al., 1994; Hinde, 1979; Lindsey et al., 1997). There was an exception at T1 between siblings' balance of participation that may reflect the developmental difference in the siblings' social abilities and interests, which might be more prominent in early childhood than middle childhood. The differences at T1 may also be due to children's attempts to control or direct the play. Second, the dyads' interaction quality was rated higher on the cooperation scale than the conflict scale (Study 2). Cooperation between partners is important for social play and may be an important factor in establishing and maintaining connectedness. While connected speech is possible with negative affect, which was demonstrated in Study 2, establishing and maintaining connectedness may be easier when the dyadic partners are cooperative, particularly during social play. Third, children used similar communication strategies with their siblings and friends when initiating, sustaining, ending, and failing to initiate connectedness (Study 3), which may reflect children's social skills and abilities. Simple strategies were used most often and may ease the construction of connectedness and other strategies, such as clarifications, and semantic tying (i.e., sophisticated strategies) may be crucial in progressing the play scenario and constructing a common frame of reference (Göncü,

1993). Investigating children's interactions in other social contexts is an area for future research (e.g., familiar peer, unfamiliar peer, parent, etc.).

A point of departure among the three studies was the influence of play materials on connectedness. Although play set was investigated in all three studies, significant findings were only revealed in Study 3 when communication strategies were considered. In fact, the theme of the play sets did not influence children's communication strategies for connectedness at T1, but significant differences were found at T2 with the train and village sets. The train set seemed to prompt children to collaborate to construct the materials together, which increased both children's prosocial and nonmaintenance behaviors. Whereas children clarified aspects of the play more often with the village set, which may reflect that the play theme was not as obvious as the train set. Moving forward, future research can investigate the specific themes that children created, perhaps utilizing a qualitative research design (e.g., thematic analysis).

Limitations

Although the studies provide a comprehensive analysis of children's connectedness, some limitations are evident. First, the sample size was relatively small, particularly due to the attrition from the first to the second time point, which may have reduced the statistical power of the analyses. Nevertheless, the observations provided a rich and detailed account of children's social interactions and a nuanced pattern of findings regarding children's connectedness and communication were revealed. Second, the participants are a relatively homogeneous group (e.g., Caucasian, American, middle-class families), which limits the generalizability of findings. Third, the observational sessions were somewhat short; however, the longitudinal design provided the opportunity to identify developmental patterns in children's connectedness. Fourth, additional measures were not collected at the data collections, which may have been useful in the analyses

(e.g., children's rating of the sibling relationship, language ability, theory of mind skills). Future research would benefit replicating the present studies, including additional measures, and extending the length of the play sessions.

Implications

Overall, our findings make important and new contributions by examining the processes of connectedness in child-child relationships and implications for parents, practitioners, and professionals arise from the studies' findings. Clearly, social play is a critical context in young children's lives that affords opportunities for the development of crucial skills regarding how to navigate one's relationships and the social world. Providing opportunities to create pretend scenarios and negotiate the course of their play appears to facilitate children's social relationships and cognitive skills. Moreover, parents and educators can act as models by teaching children various social skills such as negotiation strategies, explaining one's own ideas, and sharing materials. Providing other materials (e.g., books, boxes) and experiences (e.g., visiting museums, farms, parks) may afford opportunities for children to develop greater knowledge to integrate into and expand their play. This may be particularly important for parents because children are likely to model behaviors learned at home into other situations, such as in social settings with friends and peers (Leach et al., 2015; Lockwood et al., 2001).

Further, the present findings demonstrated that friends' play is more cooperative than siblings' play; however, there appears to be developmental value in siblings' play as they become more cooperative with one another over time. The adults in children's lives need to be aware that conflict and disagreements are typical in children's play, particularly among siblings, but children are able to discuss and resolve differences and overt differences will decrease during middle childhood (Howe & Leach, 2018). We recommend parents and practitioners provide

siblings ample opportunity to engage in play to develop both their relationship and practice communication and negotiation skills that they then use in other child-child relationships (e.g., friends, peers). Also, due to siblings' inherent age difference, older siblings are able to model more sophisticated social strategies for younger siblings (Howe et al., 2011). Adults may also want to sometimes interact with children so as to model strategies for connected communication.

Moreover, children communicate and interact with their play partner in different ways depending on the play materials that are available; thus, providing a variety of materials will foster their social-cognitive skills. More thematically close-ended play sets (e.g., train set) may provide opportunities for children to collaborate and negotiate differing perspectives, whereas more thematically open-ended play materials (e.g., village set) may enhance children's negotiation strategies and creative skills (Howe et al., under review). Practicing such skills are crucial for children's social development.

Future Research

Despite the limitations noted earlier, the results from the series of studies shed light on directions for future research. To our knowledge, the studies are the first to examine children's connectedness with siblings and friends across early and middle childhood. The studies provide initial and comprehensive findings on children's connectedness and features of connectedness; future research would benefit from further investigation regarding how children's connectedness varies according to the type of interaction during play (e.g., toy set up and organization, disagreement and conflict, within pretense). Additionally, future coding can assess contingency moves to determine specific interaction patterns between play partners, such as employing sequential analysis of children's negotiations preceding and following pretense. Future studies can also extend the present research by including children's self-report measures of relationship

quality that assess the children's perspectives and social understanding measures (e.g., theory of mind, second-order false belief), which may determine underlying mechanisms of children's connectedness and communication strategies used to initiate, sustain, and end connectedness. Moreover, conducting longitudinal studies (e.g., from early childhood to early adulthood) may illuminate possible outcomes associated with connectedness, such as children's social skills and abilities, peer acceptance or rejection, and future intimate relationships.

Future research would also benefit from investigating children's play with an unfamiliar peer in addition to siblings and friends. For example, how do children connect during play with an unfamiliar peer and how do children's interaction with an unfamiliar peer compare to siblings and friends? Such research questions may illuminate how the role of relationship familiarity, intimate knowledge of children's play partner, and previous play experiences influence children's social play interactions. Lastly, regarding cross-sectional designs, it would be beneficial to understand the differences in children's connectedness with others in a normative and clinical sample of families.

General Conclusions

In conclusion, the results from the present studies provide a detailed and rich understanding of children's connectedness during play with siblings and friends in early and middle childhood. The findings contribute to our understanding of developmental and relationship differences in children's connectedness during play and provide a means to illuminate their social understanding as they navigate between two important relationships in their young lives. Our findings support the notion that connectedness reflects aspects of the relationship and social coordination (Fogel, 1993; Harrist & Waugh, 2002) and reveals changes in children's connectedness from early to middle childhood. Moreover, by examining dyadic

interactions, several similarities and differences were highlighted across relationship context and time regarding the quality of the dyads' interactions as well as the features of children's connectedness (e.g., emotional tone, length). Specifically, our findings on children's communication strategies and connectedness underscore the detailed communicative processes that characterize sibling and friend relationships during play. Our nuanced investigation also revealed the interlinked nature of play set and children's communication; thus, highlighting the importance of providing various play materials to children because they may foster different aspects of development (e.g., cooperation and collaboration, social cognition, language skills, etc.). Taken together, there is a high level of sophisticated play interaction among siblings and friends and such interactions are rich, varied, and crucial for young children's development. The present findings produced new and novel insights by extending the previous research on connectedness to child-child relationships and identifying patterns across developmental stages.

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Appendix A

Connectedness Coding Scheme

Adapted from Ensor and Hughes (2008)

1) Initiation: Child initiates (or attempts to initiate) a new topic in the play.

a. Initiation-Connected: Child initiates communication, which leads to the partner making a connected statement.

Example 1:

Friend: They're even bigger than the house (*Initiation-connected*)

Focal child: Notaa cuz you didn't put the roof on (*Connected-end*)

Example 2:

Focal child: Whoa! Look at that! It's a tunnel! (*Initiation-connected*)

Sibling: Yeah I know (*Connected-end*)

Focal child: Mmmm boom boom boom (*Self-talk*)

b. Initiation-End: Child initiates communication but fails to elicit a response from their partner.

Example 1:

Sibling: This is, this is like restricted area (*Initiation-end*)

Focal child: Nah nah nam nam (pretends to eat a tree) (*Self-talk*)

Example 2:

Friend: Upside down world. Not upside down world. Haha (turns building over and over again) (*Initiation-end*)

Focal child: Boopee boope boopee boopee (sets up ducks on the lake) (*Self-talk*)

2) Connected: Child's utterance is semantically related to the partner's previous turn (which

could be either an initiation or connected) and sustains the interaction.

- a. **Connected-Sustained:** Child's statement is connected to the partner's previous statement and sustains the interaction (as long as the interaction continues and the children share the same goal).
- b. **Connected-End:** Child's statement is connected to the partner's previous statement, but fails to elicit a semantically related response from the partner. Typically the last turn in the sequence.

Example 1:

Friend: Wait. I think this goes like this. Nope need a red one. (*Initiation-connected*)

FC: Maybe this goes on that. Nope. What else might go on it? (*Connected-sustained*)

Friend: This might go on it.... Nope. This! This! Yes! That goes on it. (*Connected-end*)

Example 2:

Sibling: Okay now this is um war headquarters. This'll be the jail (*Initiation-connected*)

FC: Yeah, the jail. Oh yeah, we had that last time (*Connected-sustained*)

Sibling: No we didn't (*Connected-end*)

3) Other Codes:

- a. **Self-talk:** Speech directed at oneself. Usually whispering and engaged in solitary play. May also include play voice (e.g., train noises). If play noises become connected (often expressed as imitations), then these are coded as connected statements.

Example 1:

Focal child: ch ch ch ch ch ch (pushes train around track) (*Self-talk*)

b. Unclear Statements: children's utterances are unclear. Often indicated by empty brackets on the transcript.

Example 1:

Focal child: () (*Unclear statement*)

Appendix B

Interaction Quality Coding Scheme

This coding manual is closely based on Youngblade and Dunn's (1995) and Howe, Aquan-Assee, and Bukowski's (1997) schemes. The purpose of the coding is to determine the quality of the children's interactions in the free-play context. Using a 4-point Likert scale, conflict/hostility and cooperation/warmth will be rated every 30 seconds for each dyad (i.e., focal child and sibling, focal child and friend).

Conflict

Conflicts are comprised of social events in which incompatibilities of behavior occur marked by **mutual opposition** between the actions and/or statements of two individuals (Deutsch, 1973; Vandell & Bailey, 1992). The conflict must be **MUTUAL**, meaning both children engage in the conflict. If one child is engaging in name-calling or criticisms and the other child does not respond, then this behavior is not considered conflict.

· Coding is based on **intensity** and **frequency** (i.e., as intensity and frequency increases, the rating increases).

1. **No conflict.** Includes no physical aggression or teasing, no verbal hostility, no protest or disputes, no interaction.

NOTE: The main difference between 2 and 3 is the frequency and intensity of the mild disputes.

2. **Occasional, mild disagreements.** **Mild** protest or negotiation about a conflict. Any disagreements over the course of play are usually **solved without anger** and by negotiation, concession, or ignoring. Can include **mutual** teasing, sarcasm, or name calling (e.g., "Dumbo") and can be said in a playful voice or while laughing.

For example, child A says, “the boats go in the ocean” and child B says, “no they don’t” and child A says, “yes they do.” End of conflict.

3. **Moderate** disputes, arguments, or protests. May be **extended** disagreements over the course of the play session. Can include teasing that is **not** in a playful way. Children may be irritable or angry while arguing. May include a struggle over object possession.

For example, one child shouting “no”, “don’t”, or “stop” while the other child attempts to direct the course of action or steal object(s).

NOTE: The main difference between 3 and 4 is the intensity of the dispute.

4. **Frequent and intense aggression.** Occasional physical or verbal aggression. May include extensive grabbing or taking objects from partner’s hand with the partner protesting physically or verbally. Some criticism of others’ actions, which can include teasing (e.g., child a: “that’s stupid!” Child b: “no it’s not!” End of conflict).

For example, child A grabs fence piece from child B and child B verbally and physically protests. Child A obtains fence piece and child B throws barn at child A’s face.

Cooperation

Cooperative and friendly behavior: children work or act together (e.g., follows partner’s suggestions, both children verbally and/or nonverbally construct a play scene, willing shares or offers objects).

1. No attempts to cooperate. No suggestions for cooperation. Refusal to cooperate or to follow suggestions. May ignore question or comment from partner.

2. Follows suggestions on some occasions. May refuse to follow some suggestions. No attempts to initiate cooperation. Does not reply to questions or comments on more than one occasion.

3. Follows suggestions. Occasionally tentative attempts at cooperation. Shares or gives help if requested. Responds to comments on most occasions, but may fail to respond or reply once.

There may be brief sustained conversation.

- Use this category if combination of 1-2 and 4-5, where there are no problems but also not really any attempts at cooperation. Furthermore, use this category if there are mixed messages, that is, there are some examples of cooperation (e.g., taking turns) but also some examples of lack of cooperation (e.g., taking objects).

4. Frequent attempts to cooperate and makes suggestions of joint play or cooperation. Follows partners' suggestions. Unsolicited sharing or helping. Imitates in a friendly way. Gives objects willingly when requested. Initiates several conversations. Amicable conversation that is sustained.

Appendix C

Emotional Tone Coding Scheme

After coding connectedness, long connected sequences will be determined. Each sequence of connectedness will then be coded for emotional tone (one code per sequence; mutually exclusive).

Emotional tone consists of **two codes**: positive/neutral and negative. Descriptions and behaviors listed below are based on Lindsey, Cremeens, Colwell, and Caldera (2008).

- 1) Positive/Neutral:** Coders look for behavioral indicators of positive affect, such as smiles, chuckles, laughter, or tone of voice.
- 2) Negative:** Coders look for behavioral indicators of negative affect, such as raised tone of voice, angry facial expressions, facial expressions of sadness, or sarcastic, cruel, or taunting comments.

Appendix D

Shared Meanings in Children's Social Play Coding Scheme

Created by: Howe, N., Petrakos, H., Rinaldi, C. M., & LeFebvre, R. (2005)

Updated: June 2012 by Jamie Leach

1) Introduction

Involves incorporation of elements to social play interactions that have not been part of the play before, such as new play themes. Can take place anywhere in a turn, in the beginning, in the middle or at the end.

1.A) Calls for attention

Utterances used to gain partner's attention, "*hey!*" "*look!*"

Only coded once in a turn.

Often used to begin pretense with a partner.

Examples: "*watch this*"; "*look at the cows*"; "*wait a second*" (depending on tone of voice)

1.B) Play themes

Clearly a new direction in play **directed** to sibling. Both are engaged in a new theme.

"Hey let's play" ; *"Let's make a farm, wanna make a farm?"*

Has to be a clear introduction for joint play.

Takes precedence over 2B2. Used to establish a new play scenario.

Examples: "*let's pretend...*"; "*once upon a time...*"

2) Maintenance

Acts that involve maintaining the play interaction by adding information to the ongoing effort, direct expressions of how much players assume their partners know, how much they extend their

partners' ideas and how much the players add knowledge to their own ideas in connecting their ideas to their partners'.

2.A) Simple maintenance strategies

These strategies are not specifically used to maintain the play but they keep the children "connected."

2.A.1) Descriptions of action

Declarative statements accompanying ongoing activity or describing past or future action.

"There, then pigs go in here"

Used to organize the play or preparing to play (places objects). Often an expression of a new idea. Includes when a child repeats or revises self, or answers own question.

Examples: *'this is what I'm doing'* statements; *"I need..."*; *"pig"* (sets pig in farm)

2.A.2) Imitations-Repetitions

Repeating partner's prior utterances

Repetition may not be 100% accurate. Can include imitating behaviours.

Includes clarifying questions (e.g., Child A: *"A chicken!"* Child B: *"A chicken?"*)

2.B) Semantic typing

Adding new semantic elements to partner's previous contribution.

2.B.1) Extension

Children add new information and/or new expectations to partners' idea expressed in the preceding turn. Implicitly assume or explicitly express agreements with the partner as they add new intriguing information to the partner's idea.

Two ways:

- 1) Acceptance can be expressed as first saying "yes" then adding new information to it.
- 2) Acceptance can be implicitly embedded in the partner's newly expressed idea.

Can only occur in the beginning of a turn.

Y: "this is a bad dog you know, he runs and he jumps and he scares all the sheep"

O: "and this mama will be watching him, in case they get hurt"

Once each child adds new elements to the original idea, all subsequent elements will be coded as 2B1.

Examples:

O: The animals go in here (2A1)

Y: And they fall asleep. (2B1)

Can be stated as a question, which would take precedence over 2C1 (questions)

Example: *"The pool is always open" (2A1)*

"What if it's thundering?" (2B1)

2.B.2) Building on

Includes adding new information to one's previously expressed idea with the apparent purpose of contributing to ongoing shared play. The statements always follow the other acts.

O: "This is a dog" (2.A.1)

Y: "I've got the horses" (2.A.1)

O: "The dog goes in the farm" (2.B.2)

If child answers own question and gives new information can be coded.

O: "What's this?" (2.C.1)

O: "Oh, it's a bench for the child to sit on"(2.B.2)

2.B.3) Explanations/Justifications

Explaining why playing in particular way, justifying action to develop shared understanding about course of action, explaining properties of objects *"they are the same size"*

Y: "that's a horse because it has a nice long tail; dogs have short tails"

Words such as *"because"*, *"cause"*, *"so"*, *"like this"*, *"like that"* are often used.

Something is often said before a 2B3 code.

Example: *"The train goes on the track like that."* *"I get the cow 'cause I have the barn."*

2.C) Negotiation Strategies

Direct expression of the degree to which children agree with partner's ideas, indications of sharing the same reference in dialogue.

2.C.1) Questions

Leading to a shared understanding or agreement in the play.

If a child answers their own questions don't code the sibling's response

"What's this for?", *"Where is the other chair?"*

Used to engage partner.

Example:

"I'm going to put the farm here. Okay Taylor?" (2A1, 2C1)

Code questions asked to self as 2C1 and self-answers as 2A1.

Example: “*What’s this? Oh, a roof.*” (2C1, 2A1)

If the question is prosocial, then do not code it as 2C1 (rather 2E2).

Example: “*Should we put the fence here?*”

2.C.2) Ask for help

Explicit request for assistance, help in building

Example: *Roof keeps falling while trying to build the farm and one child says “help me”*

Example: “*How do you do this?*”

2.C.3) Tags

Verbal devices placed at the end of a conversational turn to elicit a response or acknowledgement “*right?*” “*ok*”

Code partner’s response

Always at the end of a statement.

Example: “*Pigs go in the barn, right?*”

2.C.4) Revision

Involves rejecting the partner’s idea and changing it. The principal function of a revision is to express disagreement with the partner and to correct at the same time. To differentiate between a revision and a directive used to control see if the revision is there to maintain or simply to control the other sibling (breakdown)

Y: “Here is a rooster”

O: “No, that’s a chicken”

**Revising self does not count.

Example: “*No Alex, it’s for the roof!*” (2C4)

“*No, those are supposed to go here.*” (2C4)

“*That’s not a cheval (French for horse), that’s a doggie.*” (2C4)

2.C.5) Conciliation

trying to find agreeable ground, suggest a compromise

Y: “*all the sheep are dead, he murdered them*” (2.A1)

O: “*No, come on Emm*” (2.D.2)

Y: “*One of them*” (2.C.5)

O: “*Ok*” (2.D.1)

2.D Responses to negotiation

Maintenance and negotiation strategies can be answered by any of the above. If the answer doesn’t fit any of these categories they can be coded with these following answers. These are “lower” level strategies and they should be coded only if no maintenance or negotiation strategies can be identified.

2.D1) Acceptance

Agreeing with the other child

can be express in terms of such behaviors as explicit approval of the partner’s idea, can also be expressed in terms of implicit acts such as showing interest in the partner’s activity.

Needs to be a clear acceptance, otherwise default to neutral. Tone of voice is important.

2.D.2) Disagreement/Rejection

Child negates the partner's idea, or rejects it. "No"

Needs to be clear disagreement or rejection. Most "no" and "nope" responses will be disagreement.

Example: O: "Do you want this?" (2C1)

Y: "No" (2D2)

2.D.3) Neutral

The child gives a neutral answer or acknowledges other sibling without being positive or negative.

Also coded when sibling is giving an answer to a question, e.g. O: "Where the duckies go?" Y: "the duckies go in the pond"

Example: "I don't know" (2D3)

Y: "What's this?" (2C1)

O: "A cow" (2D3)

2.D.4) No-response (ignoring)

The child doesn't respond.

Or responds with an irrelevant statement.

Example: Y: "Do you wanna put these here?" (2C1)

O: "I like these ducks." (2D4; 2A1)

2.D.5) Submissive

The child submits or complies with the other against his/her will.

Example: O: "Gimme those pieces."

Y: "Fine."

2.E) Teaching-helping statements (prosocial)

2.E.1) Teaching and helping. Explicit helping that may follow a request.

“Let me help you” or “Let me show you how to do that”

Example: *“Oh here, this piece fits there.”*

2.E.2) Prosocial statements/actions (giving objects, friendly approach, supportive, understanding). *“We”* statements that indicate a joint activity or sense of purpose.

“We are making a big farm”

Includes sharing and complements.

Example: *“Your farm is really perfect.”* (2E2)

*“Here you go.” *passes object** (2E2)

“That’s cool!”

2.E.3) Shared affect (shared laughing)

Is coded for both children.

3) Nonmaintenance actions/statements

3.A) Directives/control (Verbal)

Declarative used to control partner’s action outside of pretend episode

“do this”

“I have all the horses” (negative tone)

Can be polite controlling statements. Often determined by the tone of voice.

Example: *“Don’t!”*

“You got too many cars.”

“You don’t need to take them all.”

“Put those here.”

“You don’t need the caboose.”

“Give me those.”

Or taking toys the other child has in front of him/her.

3.B) Negative behaviors (Physical)

Interference in the play, disruptive, attention-getting behavior, derogation, overt aggression (pushing, hitting, name calling, teasing, insulting), break established rules, immature and obnoxious behaviors.

Explicit statements wanting to end play. Throws object to other child instead of passing.

Example: *“This is boring! I’m not playing anymore”*

Or grabs objects from hand.

3.C) Irrelevant act

These acts are irrelevant to the partner’s previously expressed idea, and their point of reference is something other than the play. They express disinterest in or failure to understand the partner’s idea and interrupt play or bring play to an end. These take place in the beginning of turns and constitute a complete turn because the social episode itself is terminated by such acts. Distracted so child is completely off-task and unable to interact with sibling or play materials.

Example: *“Do you know Julie?”*

“Have you been in my tree house?”

“Did you go to the dentist today?”

“I’m hungry”

3.D) Talking to observer

Child clearly talking to observer.

Talking to anyone off-camera including observer, parents, other family members, and so on.

4) Pretend Enactment

4.A. Exaggerated Tone of Voice

change in pitch usually indicated by play voice (PV), making animal noises.

Coding for pretend enactment depends on the type of play:

Solitary play—mostly 2A1 or 2B2

Social pretend play—1A, 2A1, 2B1, 2B2, 2C1, 2C3, 2D1, 2D2, 2D3.

4A is **NOT** to be coded with 3A, 3B, 3C, or 3D.

Often coded as 4A with 2A1, 2B2, and 2B1.