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"The chug is coming through!" "There's two chuggas!": A longitudinal study of the social function of imitation in children's play with siblings and friends

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Abstract

Imitation is argued to have an important affiliative function in social relationships. However, children's tendency to imitate different play partners during naturalistic play and associations with social understanding have been overlooked. We investigated the frequency and context of imitation in a longitudinal study of 65 focal children (T1: *M* age = 56.4 months, *SD* = 5.71) during play with their older or younger sibling and a friend in two separate play sessions. Children were observed again approximately three years later (T2: *n* = 46, *M* age = 94.6 months; *SD* = 6.6). We coded focal children's verbal and nonverbal imitation of their play partner, their partner's response to being imitated, the context in which imitation occurred (e.g., pretense), and the focal child's social understanding (i.e., mental state references). Verbal imitation occurred more often than nonverbal imitation and was used most often during the contexts of play negotiations and pretense. Although focal children's imitation of both their siblings and friends increased significantly over time, children imitated friends more than siblings at T1. All play partners responded positively (i.e., smiling, laughing) most often to being imitated. Associations between focal child imitation and mental state talk with friends at T2 approached significance. Our findings provide a deeper understanding of the nature of imitation during children's play interactions and support assertions that imitation is a process whereby children build affiliation, mutuality, and shared meanings in their relationships.

Keywords: Imitation, play, social function, siblings, friends, longitudinal

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Children's close relationships with siblings and friends provide an important context for the development of social understanding via opportunities to co-construct shared meanings during play (Carpendale & Lewis, 2015; Dunn, 2015; Howe et al., 2022). Imitation involves the reproduction of an action or vocalization after observing a model during social interactions (Butterworth, 1999; Meltzoff, 2011; Nielsen, 2012; Over, 2020). In a seminal paper, Uzigiris (1981) argued that young children's early imitative acts have both a cognitive and a social function, a view also advanced by more recent scholars (Over, 2020; Over & Carpenter, 2013; Seehagen et al., 2017). We focus on the social function of imitation during dyadic play as an important process by which children co-construct and establish shared meanings regarding the important elements of a play scenario (e.g., roles, object transformations) to co-create a common frame of reference (Howe et al., 2018; Leach et al., 2019). Imitation may offer a means to establish and maintain affiliative relationships (Over, 2020; Over & Carpenter, 2013), and therefore may be linked with children's developing understanding of others; however, this important developmental question has not been addressed in the literature. Further, given the reciprocal, dyadic nature of imitative acts, Dijksterhuis (2005) argues imitation may be one mechanism that acts as a kind of "social glue" as children co-construct their relationships. Examining how children employ imitation during play over time with siblings (an involuntary relationship) versus with friends (a voluntary relationship) will highlight the dynamics and development of these two critical, early relationships for young children. Thus, we compared children's imitative acts during play with a sibling and friend in a 3-year longitudinal study in early child and middle childhood. Specifically, we investigated the frequency of verbal and

nonverbal imitation, the model's response to being imitated, the context of imitation, and associations with mental state language as a marker of social understanding.

The Social Function of Imitation: A Theoretical and Conceptual Framework

We adopted a broad definition of imitation, namely that a child voluntarily reproduces a model's specific and unique actions or vocalizations observed during ongoing social interactions (Butterworth, 1999), for example during the rich context of social play. In a foundational paper, Uzgiris (1981) stated that imitation has an important social function and is a process to establish affiliation, mutuality, and shared meanings between interactional partners (Over, 2020; Over & Carpenter, 2012). Building on this framework, Over (2020) argued that imitation is a "deeply social process" (p. 93) with the goal of forming and maintaining social relationships and to acquire cultural knowledge. Over (2020) stated that there are three sources of evidence to support this theoretical perspective: (1) having a social goal to affiliate promotes imitative acts, (2) children respond positively to being imitated, and (3) imitation affords children opportunities to use their social understanding regarding relationships. We adopt this theoretical view of imitation as the basis for our research questions.

Relatedly, Meltzoff (2011) argued that imitation is a critical step in social cognitive development, as infants begin to acquire an early understanding that others are "like me." Beyond infancy, children's imitation of others may also reflect their motivations to "be like" their partner by agreeing with their ideas and being in sync with one another, particularly during play, which is the primary context for young children's social interactions with both friends and siblings. Play is also a context for co-constructing shared meanings to create pretend scenarios, connected communication, social understanding (i.e., references to internal states), and humor (Howe & Leach, 2018; Howe et al., 2022; Leach et al., 2019, 2022; Paine, Karajian et al., 2021).

Furthermore, according to classical simulation theory (Harris, 1996), children's understanding of others' minds develops by imagining themselves in others' situations and attributing the mental state they simulate to the other person. It has been suggested, therefore, that imitating others may serve as a mechanism of mental state simulation (Gerrans, 2009). Given this intuitive link between imitation and social cognition, we examined children's imitation during play with siblings and friends and their use of internal state language, as one marker of their social understanding.

Relationships with Siblings and Friends. Following the theoretical traditions of Piaget (1972) and Vygotsky (1978), relationship models of development are based on the premise that close, intimate relationships afford children the opportunity to develop social understanding and to construct shared meanings with significant others (Carpendale & Lewis, 2015; Dunn, 2015; Hartup, 1989; Howe et al., 2022). Thus, siblings and friends provide two important but unique relationship contexts for studying imitation's social function. Siblings have an involuntary, long, co-constructed, and often affectively intense relationship characterised by both reciprocal (i.e., equal, mutually reciprocated) and complementary (i.e., hierarchical) interactions (Hinde, 1979; Howe et al., 2022). Friendships are voluntary, characterized by reciprocated exchanges, and based on similar interests (Bukowski et al., 2018). Given the unique characteristics of the two relationships, children may employ imitation in different ways with siblings versus friends, particularly in naturalistic play contexts. Next, we review the peer and sibling imitation literature and note that in the early years these two relationships have been studied separately. Our novel study comparing children's imitation in play with both a sibling and a friend affords an opportunity to assess how the dynamics of these two significant relationships influence children's desire to imitate and affiliate with one another.

Observational Studies of Children's Imitation in their Close Relationships

There is a small corpus of studies on children's imitation of siblings and friends during naturalistic observations at home or a university playroom. In these settings, children are not constrained by restrictions imposed by an adult model in an experimental paradigm but can interact more naturally.

Peer Imitation. In an early series of longitudinal studies, Eckerman and colleagues observed toddlers' imitation of peers during play sessions; the frequency and type of imitation changed from 16 to 32 months (Eckerman et al., 1975; Eckerman et al., 1989). Initially, toddlers mostly engaged in nonverbal imitation; by 24 months these behaviors facilitated cooperative, reciprocal games that included verbal imitation (Eckerman & Didow, 1996). By 32 months, children's games were characterized by verbal imitation that promoted their ongoing play. Initially, nonverbal imitation may serve to help children co-construct an understanding of joint activities. As children develop greater language skills, verbal imitation becomes more prominent (Eckerman & Whitehead, 1999). Grusec and Abramovitch (1978) also observed 4- to 11-year-olds in free play with peers; verbal imitation was most frequent, especially for preschoolers, and although it declined in older children, even they imitated. Moreover, Grusec and Abramovitch (1982) noted that following peer imitative acts, preschoolers increased their social interactions with one another 63% of the time. Thus, naturalistic games and play afford opportunities for children to act with intention and agency regarding the co-construction of their social relationships (Howe & Leach, 2018; Meltzoff, 2011; Over, 2020).

Sibling Imitation. In a longitudinal study (Abramovitch et al., 1979, 1986; Pepler et al., 1981), 20-month-olds imitated their older preschool-age siblings more than the reverse; over the next three years, the rate of younger sibling imitation declined, especially in mixed-gender

dyads. Similarly, Dunn and Kendrick (1982) reported that when preschoolers engaged in affectionate behaviors, they also imitated their infant siblings (ages 1 and 8 months); when the latter were 14 months old, they in turn imitated their older siblings. Howe et al. (2018) noted that sibling dyads, ages 2 and 4 (T1) and again 2 years later (T2), engaged in more verbal than nonverbal imitation; in line with the peer literature, nonverbal imitation declined over time (Abramovitch et al., 1986; Eckerman & Didow, 1996). Imitation mostly occurred during reciprocal play sequences, and models responded positively to being imitated, especially at T1. Howe et al. (2018) also investigated the content of imitation highlighting the behaviors that attracted children's attention. Siblings' T1 verbal imitations involved verbal play (e.g., silly, taboo words), perhaps as a means to build social connections (Paine, Howe et al., 2021); whereas, T2 verbal imitations involved descriptions of ongoing play scenarios, reflecting children's more advanced language and cognitive skills that serve the goal of co-constructing shared meanings in their play (Leach et al., 2019). Developmental differences in nonverbal imitation involved objects (e.g., pretending to drink from a cup) at T1, whereas unique actions (e.g., slithering like a snake) were more frequent at T2. These behaviors mirror developmental changes in children's pretense skills, indicating the transition from dependence on concrete objects to pretending via actions (Trawick-Smith, 1990). In sum, both the peer and sibling studies provide evidence of the social motivation to establish an affiliative, reciprocal relationship and to communicate that "I am like you" via imitative acts (Nielsen et al., 2008).

The Present Study

Close and intimate relationships are an important context that affords children's engagement in behaviors that promote social affiliation (Carpendale & Lewis, 2015; Dunn, 2015); however, sibling and friend relationships typically are studied separately. Our novel study

focuses on the social function of 65 children's imitation during two different play sessions with a sibling and a friend in a longitudinal data set collected at home (Leach et al., 2017, 2019). This data set is unique in affording the opportunity to compare focal children's imitation (ages 4 at T1) with a younger or older sibling and with a same-age, same-gender friend; the same focal children and their sibling were followed up three years later (T2; $n = 46$). At T2 approximately half of the focal child's friends had participated at T1 indicating the stability of many of the friendships. We investigated four issues concerning the role of social imitation in siblings' and friends' play.

First, we describe the frequency of verbal and nonverbal imitation in each relationship and over time. We expected both siblings and friends would engage in more verbal than nonverbal imitation, especially at T2 due to more advanced linguistic skills (e.g., Grusec & Abramovitch, 1982; Howe et al., 2018). Based on the voluntary nature of their relationship (Hartup, 1989; Hinde, 1979), we expected friends rather than siblings to engage in more imitation to establish the social and affiliative goal to communicate that they are "like their partner". We also examined the contexts in which imitation occurred (i.e., pretense, negotiation, clarification, agreement, conflict, or off-topic). Due to the lack of literature, we did not advance any hypotheses regarding context differences.

Second, we investigated whether verbal and nonverbal imitation differed as a function of structural relationship features. Literature on gender differences in imitation during naturalistic peer and sibling interactions is mixed. Abramovitch and Grusec (1978) reported younger preschool-age boys imitated more than younger girls, but no differences for school-age children. Some authors report more sibling imitation in same-gender (Dunn & Kendrick, 1982; Howe et al., 2018) or boy-boy dyads (Lamb, 1978), whereas others find no gender differences

(Abramovitch et al., 1979, 1980). Thus, we made no hypotheses about gender. Regarding birth order, Howe et al. (2018) reported that 4-year-old older siblings engaged in more nonverbal imitation with younger siblings, whereas 4-year-old younger siblings verbally imitated older siblings. We expected a similar pattern of findings for birth order differences in 4-year-olds.

Third, we examined the model's response to being imitated. Following previous research and theory (e.g., Grusec & Abramovitch, 1982; Howe et al., 2018; Over, 2020), we expected positive responses would be most frequent and facilitate further interaction at both T1 and T2. Given that friends are cognizant of the voluntary nature of their relationship, we expected that they would respond more positively than siblings (Howe et al., 2022).

Finally, we investigated associations between imitation and social understanding, specifically spontaneous references to mental states (i.e., thoughts, knowledge, beliefs; Hughes et al., 2007; Paine et al., 2019) that are associated with activation in brain areas associated with social processing (Hashmi et al., 2022b). In these analyses, given evidence that children's mental state language is associated with the volume of speech during play (e.g., Paine et al., 2019; Hashmi et al., 2022a), we controlled for conversational turns. Given that engaging in affiliative behaviors may require an understanding of social interactions and others' minds, we expected, independent of number of conversational turns, children who imitated their partner would be more likely to talk about mental states.

Method

Participants

At T1, participants included 65 White, mostly middle class, 2-parent (except for 2 single mothers) families with two siblings; families were recruited from childcare centers, schools, and recommended by participating families. Families lived in the Northeastern US and were

representative of the small town, rural, and suburban localities. At T1, each sibling dyad included a 4-year-old focal child (*M* age = 56.4 mos., *SD* = 5.71 mos.) observed with their younger (*n* = 37; *M* age = 34.9 mos., *SD* = 5.3 mos.) or older sibling (*n* = 28; *M* age = 75.8 mos., *SD* = 11.2 mos.). There were 33 same gender (17 brothers, 16 sisters) and 32 mixed-gender (17 brother-sister, 15 sister-brother) dyads. Focal children also were observed playing with a friend (*M* age = 57.8 mos., *SD* = 10.61 mos.) who was invited to participate based on a joint mother-child decision. Three criteria were applied for selecting the friend: a frequent, same age, and same gender playmate. When all three criteria could not be met, the first two were applied; three families selected an opposite gender friend. Parents rated friendship quality on a 5-point scale (1= acquaintance, 3 = friend, 5 = best friend; *M* = 3.96, *SD* = .81) indicating that children were familiar and frequent playmates.

Three years later (T2), 46 families were revisited: focal children (*M* age = 94.58 mos.; *SD* = 6.59 mos.); older siblings (*n* = 25, *M* age = 114.00 mos.; *SD* = 7.12 mos.); younger siblings (*n* = 21, *M* age = 74.29 mos.; *SD* = 5.66 mos.). Gender composition included 27 same-gender (13 sister, 14 brother) and 19 mixed-gender (7 sister-brother, 12 brother-sister) pairs. Family life changes contributed to the attrition (e.g., divorce, maternal employment); no differences were evident in family demographics (i.e., SES, parental education, ethnicity) or focal child factors (i.e., gender, gender composition, age) between participating and nonparticipating families (Stauffacher & DeHart, 2006). At T2, mothers and children jointly nominated the focal child's friend to participate (*M* age = 96.88 mos., *SD* = 11.01 mos.); approximately half of the T1 friends participated at T2 (20/46 = 43%). Parental ratings of friendship quality were high (*M* = 4.2, *SD* = .73).

Procedure

The same procedure was followed at T1 and T2. Focal children engaged in two counter-balanced 15-minute, videotaped play sessions (i.e., sibling, friend) in the focal child's home. Play sessions, scheduled at the family's convenience, were generally one week apart. At T1, dyads were given one of three counterbalanced wooden play sets; no other toys were provided. The play sets had multiple pieces that included duplicates (e.g., 4 ducks, 8 pine trees, 5 cows, 2 pigs, 12 houses, 4 mailboxes, 4 train cars) designed to promote social pretend play: farm (32 sibling, 30 friend dyads); village (31 sibling, 31 friend dyads); train (2 sibling, 3 friend dyads). (The five dyads who received the train set were recruited late in the T1 data collection and were accidentally given the set designed for T2). T2 counterbalanced play sets included a village (19 sibling, 22 friend dyads) or train set (27 sibling, 23 friend dyads); each dyad received a different set than used at T1. The play sets were selected to be novel to the children and to foster pretend play; families did not own the play sets. Children were simply instructed to play with the sets as they wished, and the RA sat with the mother in a separate room to allow the children privacy. The videotapes were transcribed for language and actions by RAs naïve to the original study's purpose (Stauffacher & DeHart, 2005, 2006). In the present study, two new, naïve RAs verified the accuracy of the original transcriptions by watching the videotapes; they consulted when discrepancies were noted to agree on any changes.

Measures

Imitation Coding Scheme. The coding scheme, adapted from Abramovitch and Grusec (1978), Butterworth (1999), Howe et al. (2018), Nielsen et al. (2015), included two categories of imitation: verbal and nonverbal (See Table 1 for detailed definitions and Supplementary Materials for examples of the coding). Verbal imitation was defined as intentionally copying the partner's language; we were very cautious in only coding examples of unique words or key

phrases that were imitated and did not include filler words (e.g., “this is”) in a conversational turn (see example below). Nonverbal imitation was defined as copying the partner’s actions judged as a non-coincidental act. The imitation coding was event sampling (i.e., noting the occurrence of imitation). Each occurrence included the imitating actor and the model. The 3-step imitation sequences included: (a) model’s behavior (e.g., Friend: “You stand it and go ‘hey taxi, I need uh, I need you!’”), (b) partner’s imitation (e.g., Focal Child: “Taxi, taxi taxi. I need a ride taxi!”), and (c) whether the model responded (or not) to the imitation (e.g., Friend’s positive response, “Yeah, you said it!"). Each imitation sequence was coded for: (a) verbal or nonverbal imitation, (b) actor and model (i.e., focal child, older or younger sibling or friend), (c) model’s response to being imitated (i.e., positive, negative, and imitation response), and (d) context of the imitation (i.e., pretense, game, negotiation, clarification, agreement, disagreement, conflict, or off-topic). The framework for identification of context was drawn from prior work (e.g., Howe et al., 2010).

Mental State Language. The coding scheme was adapted from Howe et al. (2010) and Leach et al. (2017). In the present study, we coded only the number of mental state terms that each child used, specifically words indicating knowledge, thoughts, or beliefs (e.g., know, pretend, remember).

Reliability

At T1, two RAs conducted interrater reliability for the coding on 146/728 (20%) of imitation sequences. Cohen’s *kappas* were: (a) verbal imitation (.99), nonverbal imitation (.96), (b) response (.76), and (c) context (.88). At T2, one RA was replaced by a new coder and *kappas* were: (a) verbal imitation (.98), (b) nonverbal imitation (.95), (c) response (.75), and (d) context (.85). Reliability for the mental state language category coding was conducted by two new, naïve

RAs on 20% (44/221) of the transcripts (.95). In both cases, discrepancies were resolved by discussion between coders.

Data Analysis

To control for slight variability in video length in play sessions (e.g., bathroom breaks, interruptions), all coded variables were prorated, by dividing each variable by the length of the interaction and multiplying by 15 (target interaction time). Our analyses focused on the focal child's behavior in each play session. First, we describe children's verbal and nonverbal imitation in each play session and the context in which imitation occurred. We also examined individual differences in imitation by sibling structural variables (gender, birth order). We then examined verbal and nonverbal imitation by social partner (sibling vs friend) and time (at age 4 [T1] vs age 7 [T2]). Third, we examined differences in responses to being imitated by social partner (sibling vs friend), time (T1 vs T2), and type of response (positive, negative, or imitation). Finally, we investigated associations between focal children's imitation overall (verbal and nonverbal) and references to mental states.

Contrasts were tested using within-subjects ANOVA-based procedures and effect sizes are reported as partial eta-squared (η^2). Significant effects were followed up with univariate analyses (alpha level of $p < .05$). Following Kenny et al. (2006), we used Spearman's correlations to investigate associations between children's total imitation and their mental state references in the same play session, as variables were nonindependent. Significant associations (alpha level of $p < .05$) between imitation and mental states references were followed up with linear regressions to control for children's conversational turns.

Results

Descriptive statistics

Descriptive statistics for imitation produced by the focal children in each relationship context and time point are presented in Table 2 and address our first research question regarding the frequency of verbal and nonverbal imitation by relationship and across time. At T1 most focal children verbally imitated their sibling at least once (59/65, 90.8%). Nonverbal imitation was less common, although still demonstrated by many focal children (39/65, 60%). In line with our hypothesis, children were more likely to imitate their sibling verbally than nonverbally, $t(64) = 11.34$, $p < .001$. Most focal children imitated their friend verbally (62/64, 96.9%) and nonverbally (48/64, 75%) at least once. Verbal imitation with a friend was more frequent than nonverbal imitation, $t(63) = 10.89$, $p < .001$. Children's total tendency to imitate in each play session was not associated across relationship or time (all ps > .05).

Table 2 also reports the context of the imitation. At T1, imitation was used most often with siblings and friends during negotiation sequences (e.g., "I need three pigs." "I need *all* pigs."). With siblings, the next most common use was often during disagreements (e.g., "All of them." "Not all of them."), followed by pretense (e.g., "Oink." "Oink, oink, oink."), and clarifications (e.g., "Even I don't have a horsey, so I need this horsey." "You need this horsey?"). With friends, the next most common use was pretense (e.g., "Cockle doodle doo." "Cockle doodle doo!"), followed by disagreements (e.g., "I bet it goes like this." "No, it goes like this."), then clarifications (e.g., "There's two banks. There's two of everything." "Where are the two banks?").

At T2, most focal children engaged in verbal imitation (45/46, 97.8%) and nonverbal imitation (36/46, 78.3%) with their sibling at least once. Also, as expected, children were more likely to imitate their sibling verbally than nonverbally, $t(45) = 9.78$, $p < .001$. Most children also engaged in verbal (45/46, 97.8%) and nonverbal imitation (35/46, 76.1%) with their friend at

least once. Verbal imitation with a friend was more frequent than nonverbal imitation, $t(45) = 13.11$, $p < .001$. At T2 siblings used imitation during negotiation (e.g., "Let's put it right here." "Let's not put it under the bridge."), pretense (e.g., "Choo-choo, it's a choo-choo train." "Choo-choo!"), and to make clarifications (e.g., "We need one more piece." "One more?"). Imitation with friends at T2 was most often used in negotiation (e.g., "This is a brown duck." "Okay, this is another little duck."), pretense (e.g., "The chug is coming through!" "There's two chuggas!"), and in disagreements (e.g., "Put it back, [child name]!" "No, let's put it.").

Focal Children's Imitation across Relationships and Time

Our second research question addressed the role of relationship structural features and imitation. A series of independent samples *t*-tests revealed that focal children's verbal and nonverbal imitation in sibling and friend play sessions at T1 and T2 did not differ as a function of gender (all *p*s > .07). Research question two also addressed whether imitation of a sibling differed as a function of birth order. At T1, older focal children verbally imitated their younger sibling ($M = 7.14$, $SD = 4.52$) more than younger focal children imitated their older sibling ($M = 5.02$, SD = 3.87); but this difference only approached significance, $t(63) = 1.99$, $p = .051$. There were no birth order differences in children's verbal imitation at T2 or in nonverbal imitation at T1 or T2 (all *p*s > .09). Given these nonsignificant findings, sibling structural variables were not carried forward as covariates in subsequent analyses.

We conducted a 2 partner (sibling vs friend) x 2 time (T1 vs T2) repeated measures ANOVA to investigate focal children's verbal imitation across relationships and time. We found significant main effects for relationship, Wilk's $\lambda = .85$, $F(1, 43) = 7.46$, $p = .009$, partial $\eta^2 = .15$, and time, Wilk's $\lambda = .77$, $F(1, 43) = 12.90$, $p = .001$, partial $\eta^2 = .23$. No interaction between partner and time was detected ($p = .24$). In support of our hypothesis, at T1 children were more

likely to verbally imitate their friend than sibling, Wilk's $\lambda = .78$, $F(1, 63) = 17.17$, $p < .001$, partial $\eta^2 = .21$. There were no significant T2 differences in verbal imitation by partner ($p = .37$). From T1 to T2, children were more likely to engage in verbal imitation with their sibling, Wilk's $\lambda = .79$, $F(1, 45) = 11.85$, $p = .001$, partial $\eta^2 = .21$ and their friend, Wilk's $\lambda = .92$, $F(1, 44) = 4.05$, $p = .05$, partial $\eta^2 = .08$. We also tested differences in focal children's nonverbal imitation across relationships and time in repeated measures ANOVAs; no significant main effects were detected (all ps > .07).

Siblings' and Friends' Responses to being Imitated

Research question three examined the model's response to being imitated. Descriptive statistics for siblings' and friends' responses to being imitated by the focal children at each time point are presented in Table 3. In both relationships and time points, the most common response to being imitated was positive. We conducted a 2 partner (sibling vs friend) x 2 time (T1 vs T2) x 3 response type (positive, negative, or imitation) repeated measures ANOVA to investigate siblings' and friends' responses to being imitated across time. There were significant main effects for relationship, Wilk's $\lambda = .80$, $F(1, 43) = 10.55$, $p = .002$, partial $\eta^2 = .20$; time, Wilk's $\lambda = .74$, $F(1, 43) = 10.55$, $p < .001$, partial $\eta^2 = .26$; and response type, Wilk's $\lambda = .18$, $F(2, 42) = 99.27$, $p < .001$, partial $\eta^2 = .83$. There was a significant interaction between partner and response type, Wilk's $\lambda = .84$, $F(2, 42) = 4.02$, $p = .025$, partial $\eta^2 = .16$. At T1, friends responded more positively to being imitated than siblings, Wilk's $\lambda = .70$, $F(1, 63) = 26.94$, $p < .001$, partial $\eta^2 = .30$ and also responded by imitating the focal child in return more than siblings, Wilk's $\lambda = .87$, $F(1, 63) = 9.05$, $p = .004$, partial $\eta^2 = .13$. From T1 to T2, siblings made both more positive, Wilk's $\lambda = .87$, $F(1, 45) = 6.46$, $p = .015$, partial $\eta^2 = .13$, and more negative responses to being

imitated, Wilk's λ = .86, $F(1, 45) = 7.20$, p = .01, partial η^2 = .14. There was no change over time in friends' positive and negative responses.

Associations between Imitation and Mental State Language

Finally, to address research question four, we investigated associations between focal children's imitation and their references to mental states with each partner. Most children referred to mental states in each play session: 54/65 (83.1%) with their sibling at T1 (M = 5.34, SD = 5.64); 62/64 (96.9%) with their friend at T1 (M = 10.96, SD = 12.16); 42/46 (91.3%); with their sibling at T2 (M = 7.16, SD = 6.06); and 44/46 (95.7%) with their friend at T2 (M = 8.86, SD = 6.38). Children's total (verbal + nonverbal) imitation was associated positively with mental states references at T1 and T2 during sibling sessions, $r_s(65) = .46$, $p < .001$ and $r_s(46) = .49$, p = .001, respectively. Children's total imitation was not associated with mental states references at T1 with their friend $r_s(64) = .16$, p = .20, but a positive association was evident at T2, $r_s(46)$ = .36, p = .013.

To check that these associations were not explained by the amount of children's talk during the sessions, significant associations were followed up with regression analyses, with the focal child's conversational turns controlled. At T1 and T2, the association between siblings' imitation and references to mental states was not significant when conversational turns were controlled, β = .10, p = .38, $F(2, 62) = 15.16$, $p < .001$, adjusted R^2 = .31 and β = .18, p = .15, $F(2, 43) = 18.45$, $p < .001$, adjusted R^2 = .45, respectively. At T2, with conversational turns controlled, the association between children's mental states references and imitation with their friend approached significance, β = .26, p = .056, $F(2, 43) = 6.38$, p = .004, adjusted R^2 = .19.

Discussion

Our longitudinal, observational study examined the social function of imitation during play and developmental changes in children's production of verbal and nonverbal imitation over time with different relationship partners as well as their talk about mental states. These findings highlight the interrelated developmental nature and trajectory of children's interactions and their social understanding in a rich, naturalistic context when they can exercise their agency, intentions, and maintain and strengthen their affiliative ties (Over, 2020).

Characteristics and Context of Imitation with Siblings and Friends from Early to Middle Childhood

Siblings' and friends' play featured frequent bouts of imitation in early and middle childhood, indicating its importance during social interactions across development. As predicted, children engaged in more verbal than nonverbal imitation at both times in line with prior research (e.g., Eckerman & Whitehead, 1999; Howe et al., 2018). This pattern reflects children's developing language skills, especially in contexts dependent on children's communication as the means to co-construct a play scenario (Leach et al., 2019, 2022). Verbal imitation provides the message that the play partner has the social communication goal of being in sync with the model's ideas to create a common frame of reference (Göncü, 1993; Howe et al., 2005). Thus, we view verbal imitation as a strategic, intentional, cognitive behavior that children employ during ongoing naturalistic episodes of play (Howe et al., 2018; Over & Carpenter, 2012; Over, 2020).

Our findings highlight the importance of relationships for children's propensity to imitate one another, particularly in early childhood (Dunn, 1983; Hinde, 1979). Given their voluntary relationship, friends need to communicate that "they are like" their play partner, in comparison to siblings who have less need or desire to make such a declaration given their long, intimate co-

constructed history (Dunn, 2015; Hartup, 1989). At T1, children imitated friends more than siblings, but this difference was not significant at T2, providing partial support for our hypothesis. Yet, children's imitation of both their siblings *and* friends increased significantly over time suggesting its growing importance in social interactions. This finding may also reflect developmental changes in sibling relationships; in middle childhood they assume more characteristics of friendships (e.g., more egalitarian, reciprocal; less affectively intense; Bukowski et al., 2018). Given that a child's tendency to imitate is associated with their affiliative motivations (Over & Carpenter, 2020), future research might investigate developmental changes in children's imitation during play with both partners and associations with relationship quality.

Although we lacked the statistical power to analyse the contexts of imitation, our descriptive examination indicated that the play negotiation context was most frequent at both time points, followed by pretense. Negotiations (e.g., Sibling: "Hey, another *cow*." Focal child "One's a bull and one's a *cow*") ensure that the children establish a common frame of reference to develop shared meanings (Göncü, 1993; Howe et al., 2005). Imitation also commonly occurred during the pretense context (e.g., Focal child: "Pretend there was a *storm* in the morning." Sibling: "The *storm*'s over". Focal child: "Geez, that was a bad *storm*."). Negotiations are often viewed as the stepping stone into a pretend scenario (e.g., Howe et al., 2005). Disagreement between friends was also a common context at both time points (e.g., Focal child: "*Put it* back, [child name]!" Friend "No, let's *put it* in."). Possibly, imitating during disagreements may be a strategy for friends to navigate conflicting ideas while maintaining positive rapport and mutual goals. Future research should examine this speculation.

Children's Responses to Being Imitated

In line with our expectations and prior studies (e.g., Grusec & Abramovitch, 1982; Howe et al., 2018), children mostly responded positively to being imitated at both time points. This result also accords with theoretical perspectives regarding children's social motivation to affiliate with others by responding positively to being imitated (Over, 2020). Further, as predicted, given the need to be cognizant of their voluntary relationship, friends responded more positively and imitated one another more than siblings, but only at T1. Perhaps in early childhood, friends were still working out relationship dynamics and were careful to respond with positive and imitative behaviors to establish affiliative ties because frequent negative responses might terminate their relationship (Bukowski et al., 2018). Perhaps, three years later (T2) this was of less concern for friends, especially given that approximately half of the same friends participated at both time points. The longevity of these friendships suggests that the children liked each other, thus continuing to view imitation as a positive act in their play. By T2, the lack of differences between siblings' and friends' positive responses suggests that the former relationships were resembling the latter, as noted above.

Sibling Structure and Imitation

We examined differences in imitation as a function of sibling structural variables (i.e., birth order, gender). Following Howe et al. (2018), we expected 4-year-old older siblings would be more likely to imitate younger siblings nonverbally, and 4-year-old younger siblings would engage in more verbal imitation of their older siblings. However, at T1, older focal children tended to verbally imitate their younger sibling more than the reverse; however, this difference was not significant. There were no T2 birth order differences in nonverbal imitation at either time. Possibly, these differences occurred due to methodological differences across studies.

Finally, we did not find any gender differences in imitation in line with other work (e.g., Abramovitch et al., 1979, 1980).

Imitation and Social Understanding

Finally, we investigated associations between imitation and mental state language, considered a marker of social understanding (Hughes et al., 2007; Paine et al., 2019). Given that affiliative social interactions require children to develop an understanding of their partner's minds to successfully co-construct play scenarios and that siblings and friends vary their use of internal state language with one another during play (Leach et al., 2017), we expected positive associations between imitation, mental state language, and relationships. Mental state references (beliefs, knowledge, thinking) also help children to articulate their intentions or goals, demonstrate their appreciation of the partner's perspective, and desire to affiliate by also imitating (Over, 2020). At T2 when conversational turns were controlled, the association between children's references to mental states and their imitation of their friend only approached significance, suggesting that this association might be explained by children's language proficiency (Hughes et al., 2007; Leach et al., 2017). Although replication with larger samples and with independent measures of children's language abilities is warranted, the trend toward significance suggests that children's social cognitive competencies may be associated with imitation during friend interactions. Possibly, children who reflect on and discuss their own and others' mental states are more likely to harness imitation as a tool to communicate their attention and similarity to their play partner (Leach et al., 2017; Over & Carpenter, 2012; 2013; Over, 2020).

Limitations and Conclusions

Our study has some limitations. Although the sample was not diverse, it reflected the local small town, rural, and suburban population at the time of data collection. Also, the T2 attrition reduced the sample size and our ability to detect effects. Only about half of the children's friendships were stable from T1 to T2, which may have affected the findings; however, this likely reflects the fluid nature of friendships in this developmental period and other changes (e.g., different schools, moving away). We examined the association between children's imitation of siblings and friends and their social understanding skills by harnessing speech about mental states. Although mental state references are associated with independent measures of social understanding (e.g., Paine et al., 2019), we consider our results preliminary. Increases in verbal imitation may be attributed to increases in vocabulary over time, therefore, we included a measure of conversational turns to account for the amount that children talked. Further longitudinal investigation of children's imitation within child-child relationships in larger, current, and diverse samples, with additional play sessions, and robust, independent measures of social understanding and vocabulary would address these limitations. Nevertheless, the short-term observational design provided rich data for investigating our research questions.

In conclusion, as Over (2020) states, imitation is a "deeply social process" (p. 93) and is a key means that children use to co-construct affiliative interactions with others. We provide evidence to support this theoretical perspective on the importance of imitation for children's social relationships. Specifically, we provide evidence to support the view that: (1) having a social goal (play) to affiliate promotes imitative acts, (2) children's responses to being imitated are positive, and (3) imitation affords children opportunities to use their social understanding regarding relationships. Our study is based uniquely on naturalistic observations of children playing and highlights how siblings and friends informally and without prompting use imitation

to co-construct shared meanings, demonstrate their social understanding, and motivation to affiliate with one another. In closing, as Dijksterhuis (2005) has argued, imitation may be the "social glue" of relationships.

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Table 1

Definitions from imitation coding scheme

1. Type of imitation (Coding scheme available from first author on request).
   a) **Verbal:** Intentionally imitating what the partner is saying such as key word(s), phrase(s), sentence(s), or a repetition of sounds (blowing, smacking, humming). Imitator spontaneously decides to imitate model or model requests partner imitate, for example saying: "Repeat after me…". Example:
   Focal Child: Oh, *here's a mailbox* (picks up a mailbox)
   Friend: *Here's a mailbox* (also picks up a mailbox).
   b) **Nonverbal**: Imitating partner's action(s) or gesture(s) (e.g., waving, clapping, pointing). Must be judged as a non-coincidental, intentional and a unique act. Imitator spontaneously decides to imitate model or model requests partner imitate, for example saying "Do what I do". Example:
   Focal Child: Here's a chicken!
   Friend: Okay, put him on that post (*puts chicken on post*).
   Focal Child: (*puts chicken on post*).

2. Model (Child being imitated) and Imitator (child who imitates)
   a) Focal child
   b) Sibling (younger or older sibling)
   c) Friend

3. Response of Model to being imitated
   a) Positive/neutral: Verbal statement (e.g., praise, comment) or nonverbal (e.g., nodding, sharing materials, laughing) indicating agreement.
   c) Negative: Verbal statements (e.g., protests) or nonverbal e.g., (negative headshake, hitting) indicting disagreement.
   d) Model imitates imitator: Model imitates partner's imitation either verbally or nonverbally.

4. Context of Imitation (when do children imitate one another?). See Appendix for examples.
   a) Pretense: Imitation in the pretend context indicated verbally by "play voice" or nonverbally (e.g., making a horse gallop).
   b) Game: Imitation during a game with explicit rules.
   c) Negotiation: Imitation to share/establish ideas/rules about the play.
   d) Clarification: Imitation to clarify partner's act or statement.
   e) Agreement/Disagreement: Imitation to confirm or dispute partner's previous act or statement.
   f) Conflict: Imitation that serves to irritate or tease model.
   g) Off Topic: Imitation that does not fit other contexts and/or is outside of play context (e.g., making faces at camera).

Table 2

Means and standard deviations of total verbal and nonverbal imitation, and context of imitation demonstrated by the focal child in early and middle childhood with a sibling and with a friend

	Early Childhood (T1)				Middle Childhood (T2)			
	Sibling (*N* = 65)		Friend (*N* = 64)		Sibling (*N* = 46)		Friend (*N* = 46)	
	M (SD)	%	*M (SD)*	%	*M (SD)*	%	*M (SD)*	%
Total imitation								
Verbal imitation	6.23 (4.35)	90.77	9.70 (6.02)	96.92	10.04 (6.00)	97.83	11.24 (5.17)	97.83
Nonverbal imitation	1.29 (1.82)	60.00	2.10 (2.43)	75.00	1.90 (1.57)	78.26	1.98 (1.75)	76.09
Context of imitation								
Pretense	0.87 (1.47)	40.00	1.46 (2.36)	45.31	1.75 (2.19)	45.59	2.01 (1.87)	73.91
Game	0.00 (0.00)	0.00	0.08 (0.63)	1.56	0.06 (0.38)	2.17	0.00 (0.00)	0.00
Negotiation	3.75 (3.60)	83.08	5.77 (4.41)	95.31	5.81 (4.77)	93.48	6.66 (4.24)	95.65
Clarification	0.84 (1.08)	64.49	1.23 (1.69)	59.38	1.36 (1.64)	45.65	1.20 (1.51)	54.35
Agree	0.32 (0.63)	24.62	0.84 (1.33)	42.19	0.44 (0.78)	28.26	0.89 (1.66)	32.60
Disagree	0.97 (1.16)	53.85	1.27 (1.50)	56.25	1.24 (1.53)	58.70	1.44 (1.37)	67.39
Conflict	0.39 (0.83)	26.15	0.29 (0.81)	17.19	0.74 (1.35)	34.78	0.28 (0.72)	15.22
Off-topic	0.40 (0.91)	23.08	1.04 (1.43)	45.31	0.50 (1.05)	26.01	0.74 (1.45)	32.60

Note. The context of imitation is the sum of verbal and nonverbal imitation acts.

Table 3

Means and standard deviations of siblings' and friends' responses to being imitated by the focal child in early and middle childhood

	Early Childhood (T1)				Middle Childhood (T2)			
	Sibling (*N* = 65)		Friend (*N* = 64)		Sibling (*N* = 46)		Friend (*N* = 46)	
	M (*SD*)	%	*M* (*SD*)	%	*M* (*SD*)	%	*M* (*SD*)	%
Positive response	3.11 (2.88)	76.92	5.97 (4.07)	93.85	5.02 (4.05)	82.61	6.38 (3.59)	93.48
Negative response	0.52 (0.87)	30.77	0.52 (0.93)	32.81	1.29 (2.06)	50.00	0.98 (1.70)	36.96
Imitation response	1.73 (1.63)	75.38	2.83 (2.17)	85.94	2.67 (2.59)	76.09	3.54 (2.73)	86.96

Note. Responses to being imitated are the sum of responses to verbal and nonverbal imitation.