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Reciprocal and Complementary Sibling Interactions: Relations with Socialization Outcomes in the Kindergarten Classroom

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Abstract

Research Findings—To examine associations between sibling interaction patterns and later social outcomes in single- and two-parent families, 113 kindergarteners took part in naturalistic observations at home with siblings, classmates participated in sociometric interviews, and teachers completed behavior ratings. Sibling interactions were coded using a newly-developed 39-item checklist, and proportions of complementary and reciprocal sibling interactions computed. Complementarity occurred more among dyads where kindergartners were with toddler or infant siblings than among kindergartners with older or near-age younger siblings. Higher levels of complementarity predicted lower levels of internalizing but were not related to externalizing problems. Kindergartners' sociometric status in the classroom differed as a function of sibling interaction patterns, with neglected and controversial children experiencing less complementarity/ more reciprocity than popular, average, and rejected children. Finally, there was some evidence for differential associations of sibling interaction patterns with social outcomes for children in single- versus two-parent families: regressions testing interaction effects show sibling reciprocity positively associated with kindergartners' social skills only in single-parent families, and complementary sibling interactions positively related to internalizing problems only in two-parent families.

Implications for Practice—Those working with divorcing or other single-parent families might consider sibling interactions as a potential target for social skill building.

The nature of sibling interactions makes them especially well-suited for bridging a young child's family and peer systems. In a seminal review, Dunn (1983), drawing on earlier work by Sullivan and Piaget, used the notions of complementarity and reciprocity to argue that

siblings play a unique socialization function because of the dual nature of their relationship. On the one hand, because one sibling is older, there is a complementary nature to sibling interactions, with one sibling having greater power and more advanced cognitive skills than the other; these may be thought of as somewhat like hierarchical parent-child interactions. Thus the older partner teaches and the younger learns; the older partner dominates and the younger submits; and so on. On the other hand, siblings have a peer-like, reciprocal nature to their interactions, sharing things like interests and humor that adult-child pairs do not necessarily share. The current study explores this notion by examining how children's sibling interaction patterns at home relate to their later social relations and behavior at school.

The potential significance of sibling relations as a socialization factor for young children is frequently acknowledged in the developmental literature (see, e.g., Kramer & Conger's special issue of *New Directions for Child and Adolescent Development*, 2009), although it is infrequently tested. The link between sibling interactions and the younger child's social behavior is thought to be explained by attachment and social learning mechanisms (Dunn, 2007; Whiteman, Becerra, & Killoren, 2009) and, in theory, operates throughout childhood, as children develop cognitive and affective expectations about relationships via attachment and interactional skills through observation, imitation, practice, and feedback via social learning. However, empirical studies tend to be of very young sibling dyads (e.g., infants imitate the behavior of preschool siblings) or adolescent sibling dyads (e.g., older adolescents' drug use predicts that of their younger adolescent siblings). Examination of the impact of siblings on children entering school, when peer relations become particularly salient, is rare. Additionally, many studies focus on the transmission of negative behavior like aggression (from sibling-to-sibling then sibling-to-peer; e.g. Natsuaki, Ge, Reiss, & Neiderhiser, 2009) rather than the facilitation of positive social behavior and relationships.

There is some evidence, though, that sibling relationships can serve a positive function for children in early and middle-childhood. For example, Downey and Condrón (using Early Childhood Longitudinal Study data, 2004) found that kindergarten children with siblings had better peer-related social skills than children without siblings. Stormshak, Bellanti, and Bierman (1996) examined the link between sibling and peer relations among aggressive children in 1st and 2nd grade and found that, if levels of sibling conflict and warmth were moderate (not extremely high and not extremely low, respectively), children did well with peers at school, despite being a socially at-risk group. Pike, Coldwell, and Dunn (2005) found a modest but significant main effect of sibling relationship closeness during early and middle childhood on children's social competence. Using data from a large national twin study, Bowes, Maughan, Caspi, Moffitt, and Arseneault (2010) found that sibling warmth was a protective factor for elementary school children experiencing bullying. Finally, in their review, Stormshak, Bullock, and Falkenstein (2009) summarize evidence that sibling relationships that offer support and skill-building practice can facilitate the development of emotion understanding and self-regulation, which bode well for positive peer relations in the early years of school.

Together, these studies suggest that sibling interactions can facilitate social skill development and positive peer relations. To help refine our understanding of the functions

siblings serve as children move into the formal peer context, in the current study we go “beyond warmth and control” (Bascoe, Davies, & Cummings, 2012) to (a) classify naturally-occurring interactions among kindergarten children and their siblings and (b) test whether interaction patterns relate to social skill, behavior problems, and social status later in kindergarten,

Using Dunn’s (1983) framework, the potentially protective interaction qualities highlighted above (teaching skills, support, etc.) would be considered complementary. Yet siblings also interact in reciprocal ways that could serve protective or positive functions, such as cooperating, taking turns, and laughing together. Siblings who are more collaborative in their reciprocal interactions are likely to have healthier complementary interactions (Howe & Recchia, 2005), implying consistency in interaction patterns between siblings across play and learning contexts. It remains to be seen, however, how these types of interactions get generalized to other social contexts, such as the social context of the kindergarten classroom. Based on Dunn’s framework, we propose that experiences of complementarity versus reciprocity with siblings may teach children different social skills such as knowing how to get others to play, acting in a way that leads to acceptance by classmates, and exhibiting low levels of behavior problems. In other words, the level of complementary or reciprocal interactions experienced with siblings may serve as individual-difference variables that predict positive social experiences at school. We are interested in the child’s experience of complementary and reciprocal interactions independent of the global affective quality (e.g., the closeness) of the sibling relationship (i.e., we ask whether the experience of sibling complementarity or reciprocity, per se, benefits children in the peer group). We also examine the impact of age spacing between siblings, given evidence that the quality of interactions and relationships tends to differ in close-age versus near-age siblings (see review by Newman, 1996).

Sibling Relations in Single-Parent Families

We also ask whether sibling interaction patterns function differently for children from single-parent families. Although there are strengths in single-parent families (Martin, Emery, & Peris 2004), research suggests that economic and other family stress associated with single-parenthood place children raised by one parent at elevated risk in some domains (Amato, 2000; Martin et al., 2004). In the social domain, they appear to be at increased risk for negative emotionality and social behavior/peer relations problems during childhood (e.g., Carlson & Corcoran, 2006; Kupersmidt, Griesler, DeRosier, Patterson, & Davis, 1995; Pettit, Bates, & Dodge, 1997; see also review in Hemovich & Crano, 2009) and adolescence (e.g., Spriggs, Iannotti, Nansel, & Haynie, 2007). This appears to be mediated, in part, by low parental monitoring and high parent-child conflict, which tend to occur more in single-parent families than in other families (e.g., Breivik, Olweus, & Endresen, 2009; Simons, Lin, Gordon, Conger, & Lorenz, 1999).

Although the stress associated with single parenthood can spill over into the sibling relationship (e.g., Anderson & North, 1988; Polit, 1984), it can also draw siblings together (see McGuire & Shanahan, 2010). Conger, Stocker, and McGuire’s (2009) review of this literature led to the development of a model to guide research on families experiencing

challenges, wherein particular qualities of the sibling relationship moderate the effects of family stress on child adjustment. They conclude that sibling socialization/interaction patterns are, indeed, impacted by challenges to the family, yet sibling relationship quality (e.g., emotionally close versus distant) makes an independent contribution to sibling interaction patterns. Those patterns, if positive, can buffer the negative effects of family/life challenges on children. An example of this is Gass, Jenkins, and Dunn's (2007) study of 5-year-olds and their older siblings, where an affectionate relationship between siblings ameliorated the impact of stressful events on child internalizing behavior, independent of parent effects.

We propose that, among single-parent families, complementary sibling interactions may serve a protective function against elevated levels of risk for both older and younger siblings. For the younger child in the dyad, certain kinds of complementary sibling interactions may have a compensatory effect on their socioemotional development: If the single parent's provision of monitoring or emotional support is lacking, for example, the older sibling may be able to help provide those functions. Theory supports this notion by suggesting that, if someone is lacking the support of a specific relationship type (e.g., a parent-child relationship), it is adaptive to compensate for the missing support by turning to a functionally similar type of relationship (Furman & Buhrmester, 1985; Widmer & Weiss, 2000). Of course, some children's interactions with older siblings are not parent-child like at all, and even if older siblings engage in adult-like roles such as caretaking, the quality of care often differs from adults' (see review by Goetting, 1986). Yet, if sibling interactions within a single-parent family have enough functional similarity to parent-child interactions, we propose that they may be particularly influential in the younger child's social development. Additionally, the older child in the dyad may benefit from interacting with the younger sibling. There is some evidence, for example, that older siblings experience improved cognitive skills when they act as teachers, managers, or helpers to their younger siblings (e.g., Gregory, 2001; see also review by Brody, 1998).

There have been very few studies examining the interactions of siblings in single-parent families, but they do offer some support for our proposition. For example, Kempton, Armistead, Wierson, and Forehand (1991) found that when experiencing parental divorce, adolescents with siblings displayed less externalizing behavior at school than those without a sibling. Although there was no comparison to two-parent families, Brody and Murry (2001) found that, among African American single-parent families with 9- and 11-year-olds, older siblings' social competence predicted younger siblings' social competence, but only when sibling interactions were low in conflict. In a longitudinal study comparing divorced and step-families, Hetherington (1988) found that some school-age boys were both aggressive and warm in interactions with their siblings, and that this aggressive-but-warm "ambivalent" group tended to have positive relations with their school peers and average ratings on externalizing behaviors.

In their review, Martin et al. (2004) conclude that, to better understand the resilience of some children in single-parent families, specific family interactional patterns need to be studied, particularly by using observational methods. We answer this call by observing young children and their siblings naturalistically and then examining how the observed

interactions relate to social-behavioral outcomes outside the family. The final goal of the current study is, then, to explore potentially protective interactive effects (see Luthar, Cicchetti, & Becker, 2000) between sibling interaction and family status variables.

Current study goals and hypotheses

Specifically, the current study was guided by the following research goals: (1) To provide an expanded description of naturalistically-observed complementary and reciprocal interactions between kindergarten children and their siblings; (2) to examine how complementary and reciprocal sibling interactions may differ as a function of (a) sibling dyad structure (with dyads defined by spacing and older versus younger status of sibling) and (b) family structure (single- vs. two-parent families); (3) to examine how complementary and reciprocal sibling interaction patterns relate to later social-behavioral outcomes in kindergarten; and (4) to explore whether links between sibling and school variables are different for children in single-parent families compared to those in two-parent families.

Our hypotheses for the last three research goals are as follows: (1) *Rates of complementarity and reciprocity will differ as a function of sibling dyad type and family type.* Based on Dunn's conceptual framework and the research supporting the hierarchical nature of some sibling interactions, we expect that rates of complementarity will be greater in sibling dyads that are further apart in age than dyads closer in age. We also hypothesize that complementarity will be higher among dyads in single-parent families, where the older sibling may take on a parent-like role more often than in two-parent families. (2) *Levels of sibling complementarity and reciprocity will be associated with social indicators in kindergarten.* Based on studies showing certain sibling interaction/relationship qualities can facilitate social competence, we speculate that, compared to children with low levels of complementarity and reciprocity, respectively, children experiencing high complementarity may have fewer teacher-rated behavior problems, and children with high levels of reciprocity may be rated by classmates as more well-liked (i.e., have popular or average status) and socially skilled. (3) *Sibling complementarity in single-parent families will serve a protective function, such that, compared to kindergartners in single-parent families who experience low proportions of complementarity, single-parented kindergartners experiencing proportionally high levels of complementarity will receive more positive peer engagement and display fewer behavior problems at school, and these levels will not differ significantly from those of children in two-parent families.* This speculative hypothesis is based on the notion of complementary sibling interactions being particularly salient in single-parent families, where older siblings may function in a parent-like role, and research linking sibling relationships in single-parent families to younger children's social competence.

Method

Participants

The sample consisted of 113 target children (referred to as "TC") who were entering kindergarten and their nearest-aged sibling. The sample was drawn from the Child Development Project (CDP; see, e.g., Schwartz, Lansford, Dodge, Pettit, & Bates, 2013), a

multi-site study of almost 600 children and their families, 165 who were selected for home observation. The home-observed subsample was chosen by stratifying the full sample into high-, medium-, and low parent-rated aggression, then randomly selecting an approximately equal number of children from each category and each of the three project sites. Of those 165 families, 113 met the criteria of (a) having at least one sibling living in the home with TC. The 113 families represented a range of socioeconomic statuses, with a median 4-factor index score of 42.5 (the lower end of the “medium business, minor professional, or technical” stratum; Hollingshead, 1975).

At the time of the study, 30 of the 113 children were living in single-parent homes, 29 that were headed by biological mothers (eight who were unmarried at the time of TC’s birth and remained so) and one that was headed by a biological father. Eighty-three of the 113 children were living in two-parent homes: 73 lived with married biological parents, six with a re-married biological mother and non-biological father, two with a biological mother and cohabiting partner, one with a re-married biological father and non-biological mother, and one for which specifics of the parents’ status were not given. Table 1 shows further demographic characteristics of the sample.

Procedures

Home observations—In the late summer before or early fall of TC’s kindergarten year, trained research assistants conducted two 2-hour home observations of TC’s family. Observations took place in the early evenings, spaced approximately one week apart, and at least one of the observations included the family’s dinner time. Observers asked family members to go about their normal routines and to ignore their presence as much as possible. They also asked TC to remain within the perimeter of the family’s home and yard. Before data collection began, families were given about 15 minutes to acclimate themselves to the presence of the observer. Once data collection began, the observer conducted a detailed hand-written narrative record of all social interactions involving TC (see Harrist, Pettit, Dodge, & Bates, 1994, and Volling & Belsky, 1992, for examples of the narrative record approach). Observers detailed the context of the TC’s ongoing social activity in such a way that, after the home observations were done, non-observers (i.e., coders) could classify the affective tone of TC’s social interactions as well as the activity comprising the interaction (e.g., whether teasing was light-hearted or mean-spirited).

While detailing the context of TC’s social interactions, the observer divided the narrative record into interactional episodes termed Social Events, defined as the smallest interactional units having psychological significance for the participants. This approach may be characterized as a molar-level of description, as opposed to a molecular- or global-level scheme (see Harrist & Pettit, 2001, for details about this observational method and the segmenting process that results in identification of Social Events). Instead of breaking down an interaction into its key elements and then reassembling them (e.g., via statistical probabilities), with this approach, an effort is made to retain each episode as an integrated whole. An outsider should be able to read the description of a Social Event and give it a “title” that would be meaningful to the participants (e.g., “This episode is a conversation about what happened at school,” or, “This episode is about the younger child trying to get

control of the television remote.”). The observer is trained to make low-level judgments about the meaning of the observed behavior within a Social Event (e.g., whether a laugh was sarcastic or sincere) based on a variety of cues: situational cues (e.g., change of setting or participants), affective cues (e.g., a sudden change in mood), and content cues (e.g., specific social intent or objective) are used to determine when a Social Event begins or ends. Although affective cues are used to delineate the interactional episodes, affect codes are not used in the operationalization of sibling interactional event types in the current study (see Methods). An example of a Social Event observed between a TC and her older sister (S) in the current study follows.

S starts to brush TC’s hair. TC tells her not to but S tells TC that their mother had told her to fix TC’s hair. TC protests that she wants it to be fluffy. S tries to explain that it will still be fluffy in a ponytail and continues to fix TC’s hair. TC, though not pleased, doesn’t protest further. S, in a very upbeat voice, tells TC she will put the white clip in TC’s hair. TC lets her.

Episodes involving multiple siblings were not coded in the present study. Within this sample, a mean of 46.62 Social Events was observed across all sibling dyads (Range = 11–219, $SD = 30.65$). There was no significant difference in number of Social Events observed as a function of sibling configuration (older vs. younger, near-age vs. not near-age, etc.).

To estimate interobserver reliability—concordance in the segmenting of Social Events (see Wright, 1967)—two observers compiled independent narratives of the same observation session for 14 families. Their narratives were examined by a trained coder who noted matches (i.e., Social Events described by both observers) and non-matches (i.e., Social Events described by one observer but not the other). The concordance index (number of matches $\div$ $\frac{1}{2}$ total number of Social Events seen by both observers) ranged from .68 to .83 ($M = .75$). ANOVAS were computed and showed that there were no significant differences in the total number of events observed as a function of dyad status (e.g., older vs. younger siblings; see below) nor family status (single- vs. two-parent families).

School assessments—In the winter of the TC’s kindergarten year, classroom teachers completed a questionnaire for each participating child in their rooms and research assistants conducted sociometric assessments in each child’s class. All children with parental consent (> 75% of each class) participated in the individual sociometric interviews, where they were shown photographs of all their classmates and asked to choose three classmates who fit each in a series of descriptions or questions. Responses were recorded and children were debriefed regarding the privacy and confidentiality of their answers before being sent back to the classroom.

Measures

Sibling dyad status—Ages of TC and the participating sibling were used to create five sibling dyad groups: *Teen Sib* (sibling ≥ 7 years older than TC; $n = 11$); *Pre-Teen Sib* (sibling ≥ 3 but < 7 years older than TC; $n = 16$); *Mid-Childhood Sib* (< 3 years older than TC; $n = 40$); *Preschool Sib* (sibling ≥ 3 years younger than TC; $n = 38$); and *Infant/Toddler Sib* (sibling > 3 years younger than TC; $n = 8$).

Family status—Based on parent report, families were assigned one of two statuses, *Single-Parent* and *Two-Parent* families. *Two-Parent* families included married or unmarried couples living in the home, where at least one parent was the biological or adopted parent of the TC. *Single-Parent* families were operationalized as a biological or adoptive parent living without a parenting partner.

Sibling interaction types—A coding system developed by the second author was used to classify the Social Events involving TCs and their siblings. Fifteen codes were initially derived based on existing literature; these included dominating, teaching, imitating, caregiving, helping, observing, arguing, teasing, displaying jealousy, cooperating, competing, playing, sharing secrets, sharing jokes, and displaying affection. This set of codes was then added to and refined using a method similar to a constant-comparative qualitative analysis approach (Boeije, 2002; see Achacoso, 1998, for further details about the development of the coding system). Using ten randomly-selected narratives, where Social Events that did not fit the original 15 codes had been coded as “Other,” research assistants developed new codes and/or refined descriptions of the original 15. Some of these codes reflected greater specificity of content (e.g., “dominance” was divided into “dominance with compliance” and “dominance without compliance”) and some reflected new content (e.g., “acting as the parent’s intermediary”). The final coding system included 39 categories of sibling social interaction. Category descriptors were then categorized as complementary ($n = 22$ of 39 codes, see Table 2) or reciprocal ($n = 17$; see Table 3) based on Dunn’s (1983) conceptualization, wherein complementary (or “vertical”) interactions involve role asymmetry and reciprocal (or “horizontal”) interactions involve role symmetry (see also Harrist & Achacoso, 1994). Some researchers (e.g., Boer, 1990) have noted that reciprocal interactions can sometimes be asymmetrical, for example when there is an affective mismatch (e.g., one sibling is having fun and the other is upset). For our purposes, however, “asymmetry” refers to roles that are unequal due to power differences.

Non-observer research assistants were trained in the coding system and subsequently coded the 5268 Social Events involving TCs and siblings. Coders, blind to the reliability status of their coding, double-coded 7% of the narrative records. Using all 39 categories, inter-coder reliability computed as percent-agreement was $M = .95$ (Range = .67–1.00) and computed as the more-conservative Kappa (Cohen, 1960) was $M = .45$ (Range = .41–.48, a medium level of agreement according to Cohen, 1977). For each Social Event observed, observers also coded the directionality of the event (e.g., For a teaching event, who was teaching whom?).

The number of Social Events observed varied by sibling dyad, therefore proportion scores were computed by dividing the number of each type of sibling event observed for the dyad by the total number of TC-sibling events observed across the four hours of observations. Our first research goal (viz., to provide descriptions of reciprocal and complementary sibling interactions) is addressed by reporting the proportional frequency (as percentages) at which the 39 interaction types were observed. A log transformation was conducted with the percentage scores but analyses were not changed, therefore simple proportion scores are used in the analyses reported here. Because of the large number of interaction types, and the low frequency of occurrence of many of the types, predictive analyses were conducted using summed complementary and summed reciprocal interactions scores, respectively. Mean

Complementarity was 51% (Range = 5%–93%, $SD = 16\%$), and mean *Reciprocity* was 47% (Range = 7%–95%, $SD = 17\%$). Because some TC-sibling Social Events were coded as neither complementary nor reciprocal (viz., when the siblings were together but not interacting nor sharing an activity nonverbally), *Complementarity* plus *Reciprocity* scores did not total 100%. Thus, analyses were conducted separately for *Complementarity* and *Reciprocity* scores. Additionally, because complementary interactions involve an imbalance of power, a *TC-Directed Complementarity* score ($M = 27\%$) was calculated by dividing the number of Complementary Social Events where the “direction” of the action in the episode was from TC to sibling (e.g., TC dominating the sibling, TC rebuffing the sibling; see Table 2, 2nd line of each entry) by the total number of Social Events. To help interpretation of the findings, whenever *Complementarity* was found to be predictive, post hoc analyses were conducted using *TC-Directed Complementarity*.

Social Outcomes in Kindergarten

Positive peer engagement at school—As part of the child interview at school, each child was asked to nominate three classmates who are “good at getting others to play.” The number of nominations TC received from his/her classmates was totaled, normalized as z scores (to account for different-sized classes), and labeled *Positive Peer Engagement* ($M = .27$, $SD = 1.00$). Note that the mean is not zero because scores were standardized using the full CDP sample, not the home-observed sibling subsample.

Sociometric status in the classroom—During the same interview, each child also was asked to nominate the three classmates they liked to play with the most and the three they liked to play with the least. These two sets of nominations were totaled and social preference scores computed for each TC by subtracting the standardized number of “dislike” nominations from the standardized number of “like” nominations, then standardizing the difference. *Sociometric Status* was then computed using Coie, Dodge, and Coppotelli’s (1982) method. The number of TCs classified in each *Sociometric Status* is as follows: popular ($n = 28$), rejected ($n = 14$), neglected ($n = 11$), controversial ($n = 11$), and average ($n = 49$).

Behavior problems at school—Classroom teachers filled out the Teacher’s Report Form of the Achenbach Child Behavior Checklist (TRF; Achenbach & Edelbrock, 1986), an inventory on which they rate the child’s current and recent problem behaviors. Teachers reported whether each item was not true (0), somewhat or sometimes true (1), or very or often true (2) of the child. Ratings for *Internalizing* (items representing withdrawn, anxious, somatic, or depressed behavior, e.g., “Cries a lot”, “Feels hurt when criticized”) and *Externalizing* (items representing aggressive, disruptive, or delinquent behavior, e.g., “Defiant, talks back to staff”, “Disrupts class discipline”, and “Physically attacks people”) were totaled. The two subscale scores, *Externalizing* (34 items, $M = 4.52$, $SD = 7.66$) and *Internalizing* ($M = 3.96$, $SD = 4.89$), showed good internal consistency ($\alpha s = .86$ and $.96$, respectively).

Results

Plan of Analysis

The first research goal was addressed by creating the expanded sibling interaction coding system and calculating descriptive statistics for each sibling interaction type. Subsequent research goals were addressed via ANOVA, to test status differences in *Complementarity* and *Reciprocity*; correlation, to examine the associations of *Complementarity* and *Reciprocity* with social outcomes at school; and regression, to examine whether family status interacted with *Complementarity* or *Reciprocity* to predict school social outcomes. To aid in interpretation of the findings from analyses involving *Complementarity*, yet to reduce the total number of analyses, post hoc analyses were conducted with *TC-Directed Complementarity* only when significant results were found using the global *Complementarity* variable.

Research Goal 1

Descriptive statistics computed for the complete set of complementary and reciprocal interactions observed between kindergarten children and their siblings are presented in Tables 2 and 3. Table 2 reports statistics for all complementary interactions (i.e., those directed by sibling or by TC), as well as just those where TC directed the interaction. Interaction types generated in the current study (i.e., classifications that were refinements or additions to the preliminary list generated from the literature search) are identified by “*”s.

The most frequent complementary interactions were domination (more often with compliance than without), rebuffing or ignoring the other’s bid for interactions, rendering approval or disapproval, and observing the other. All but two of the complementary interaction types occurred less than 5% of the time. The most frequent reciprocal interactions were playing, sharing mutual goals (with verbal communication more than without), provoking or teasing the other, sharing resources, and competing with each other. All but three of the reciprocal interaction types occurred less than 5% of the time.

Research Goal 2

Sibling dyad status differences—The first set of predictive analyses examined how complementary and reciprocal sibling interactions differ as a function of sibling dyad structure and family structure. Two one-way ANOVAs were computed to compare patterns of siblings’ *Complementarity* and *Reciprocity* among the five types of sibling dyads: *Teen Sibs*, *Pre-Teen Sibs*, *Mid-Childhood Sibs*, *Preschool Sibs*, and *Infant/Toddler Sibs*. The ANOVA for *Reciprocity* showed no group differences ($F = 1.74, n.s.$). The ANOVA for *Complementarity* showed a trend-level difference ($F = 1.98, p < .10$), therefore LSD post-hoc differences were computed to examine in an exploratory way what groups were contributing to the trend. These post-hoc *t*-tests showed that TCs engaged in significantly more *Complementarity* with *Infant/Toddler Sibs* ($M = .63$) than they did with both *Preschool* ($M = .53$) and *Preteen* ($M = .48$), $ps < .01$ and $.04$, respectively. To further explore these patterns, proportion scores for *TC-Directed Complementarity* were compared across sibling dyad groups, resulting in a significant ANOVA, $F = 8.47, p < .001$, due to significant LSD post-hoc differences between the proportion of *Complementarity* directed by TC toward

Infant/Toddler Sibs ($M = .50$) compared to that directed to other sibling types: *Preschool* ($M = .21, p < .0001$), *Mid-Childhood* ($M = .25, p < .0001$), *Preteen* ($M = .36, p < .03$), and *Teen Sib dyads* ($M = .25, p < .0001$).

Family status differences—Among *Single-Parent* dyads, 55% of the interactions were coded as *Complementarity* and 45% as *Reciprocity*, whereas in *Two-Parent* families, 51% were coded as *Complementarity* and 49% as *Reciprocity*. Two independent sample *t*-tests were computed to compare *Complementarity* and *Reciprocity* among *Single-* versus *Two-Parent Families*. Neither test was statistically significant.

Research Goal 3

The next analysis examined whether *Complementary* and *Reciprocal* sibling interaction patterns were related to social indices in kindergarten. First, bivariate correlations were computed between *Complementarity* and *Reciprocity* and the three continuous kindergarten variables (*Positive Peer Engagement*, *Externalizing*, and *Internalizing*). Only the correlation between *Complementarity* and *Internalizing* was significant ($r = -.19, p < .05$). Post-hoc analysis (*viz.*, a correlation between *TC-Directed Complementarity* and *Internalizing*) showed that the association was not due specifically to rates of complementary events driven by TC ($r = -.11, n.s.$), but rather to overall rates of *Complementarity* experienced by TC with the sibling.

To examine whether children's acceptance by peers was associated with sibling interaction patterns, two one-way ANOVAs were computed comparing *Complementarity* and *Reciprocity* across the five levels of *Sociometric Status* (average, rejected, neglected, controversial, and popular). The ANOVAs for both *Complementarity* and *Reciprocity* were significant, $F_s(4, 112) = 3.35$ and $2.84, p_s < .01$ and $.03$, respectively. Post-hoc LSD tests ($p_s < .05$) showed that popular TCs experienced more *Complementarity* and less *Reciprocity* ($M_s = .55$ and $.43$, respectively) than neglected ($M_s = .43$ and $.57$) and controversial TCs ($M_s = .38$ and $.57$); average TCs had higher *Complementarity* and lower *Reciprocity* ($M_s = .52$ and $.460$ than neglected and controversial TCs; and rejected TCs had experienced higher levels of *Complementarity* and lower levels of *Reciprocity* ($M_s = .57$ and $.43$) than neglected and controversial TCs. An ANOVA using *TC-Directed Complementarity* was computed but sociometric statuses did not differ ($F = 1.21, n.s.$).

Research Goal 4

The final research question was whether links between sibling interaction patterns and social/behavioral indices at school might be different for children from single-parent families as compared to those from two-parent families. To address this question, a set of six multiple regression analyses were conducted with the three continuous kindergarten variables (*Positive Peer Engagement*, *Externalizing*, and *Internalizing*) as dependent variables and *Family Status*, *Complementarity* or *Reciprocity*, and *Family Status-by-Complementarity* or *Family Status-by-Reciprocity* as the independent variables.

In three of the six regressions models, the interaction term was significant: *Family Status-by-Complementarity* and *Family Status-by-Reciprocity* in predicting *Positive Peer*

Engagement, and *Family Status-by-Complementarity* in predicting *Internalizing*. Holmbeck's (2002) approach was adopted to probe the significant interactions. Thus, separate coefficients for *Complementarity* and *Reciprocity* in single- versus two-parent families were computed and tested in additional equations. We found that: (a) the relation between *Complementarity* and *Positive Peer Engagement* was only significant for children from single-parent families, $\beta = -.35, p < .04$ (see Figure 1; R^2 for the model = .08, $p < .05$); when the equation was re-run using only *TC-Directed Complementarity*, however, the model ($R^2 = .03$) and interaction term ($\beta = -.18$) were not significant; (b) the relation between *Reciprocity* and *Positive Peer Engagement* was significant for children of both family statuses, but in opposite directions, $\beta = .36, p < .04$ for single-parent families, $\beta = -.24, p < .03$ for two-parent families (see Figure 2; $R^2 = .09, p < .05$); and (c) the relation between *Complementarity* and *Internalizing* was only significant for children in two-parent families, $\beta = -.32, p < .004$ (see Figure 3; $R^2 = .12, p < .05$); when the equation was re-run using only *TC-Directed Complementarity*, the model ($R^2 = .05$) and interaction term ($\beta = .02$) were not significant.

Discussion

We found support for Dunn's (1983) conceptualization of the dual nature of sibling relationships. As operationalized in the current study, there were almost equal proportions of complementary and reciprocal interactions observed. The age-group of target children we studied has been studied in the past primarily with their younger siblings, not their older siblings, yet all dyad types engaged in both complementary and reciprocal interactions. Our first goal was to go "beyond warmth and control" and generate a rich array of observed behaviors in which young children and their siblings engage. We hope that, in the future, researchers with larger data sets will be able to use the 39-item list generated in response to this goal to examine under-studied sibling phenomena. For example, the notions of tattling and of one sibling serving as an intermediary for the parent or for the other sibling are interesting, in that they are related to but not quite the same as the more traditionally-studied classification of "caregiving." They might, therefore, provide insight into processes like parental favoritism (see review by Sutor, Sechrist, Plikuhn, Pardo, & Pillemer, 2008). A researcher might test whether the disfavored child is more likely to tattle on the favored child, or whether the favored child is more likely to try to help parents carry out their commands aimed at the disfavored child. Or does a child who serves as an intermediary at home become skilled at speaking out in class as a group leader? Or does the child learn to generate alternative ways to communicate a message to peers or adults outside the home?

Also, some of the specific interaction types might generalize to the peer group in a straightforward way (e.g., a child who gives help at home and then at school is likely to be appreciated or well-liked by parents, teachers, and peers), but some generalizations might be more complex (e.g., a child who dominates and garners sibling compliance at home might benefit the family by maintaining peace, but might be considered bossy or a bully at school). The fact that, on average, more than 16% of reciprocal interactions kindergartners experienced involved "shared goals or interests" but were not "play" is also interesting; these kinds of interaction may generalize particularly well to the classroom setting, where children are expected to work together cooperatively. In the current study, we grouped

interaction subtypes together and showed preliminary evidence that there is a link between what is going on with siblings at home and what happens later in a formal peer setting; future researchers might be able to choose specific interaction subtypes and generate new mid-level models connecting the sibling and peer contexts.

Boer (1990), who proposes that sibling interactions may be particularly important for understanding the peer relations of middle childhood siblings, notes that both complementary and reciprocal interactions can be symmetrical or asymmetrical, depending on whether or not goals and intentions are shared. Future research examining goals and intentions, as well as the interactional “flow” or synchrony (see review by Harrist & Waugh, 2002) of complementary and reciprocal interactions, may help paint a more complex and informative picture of the overlap between the family and peer systems in future research.

When we examined status or structural differences in sibling dyads and family dyads, we found few differences. Dyads where TC was interacting with the youngest group of siblings—infants and toddlers—differed marginally from other dyads in terms of rates of complementarity. Significant post-hoc analyses demonstrated that this was due primarily to TC-directed interactions. This finding fits older observational research that shows that infants monitor and model the behavior of preschool siblings (Lamb, 1978; Samuels, 1980), and that toddlers will imitate their older siblings’ prosocial behavior (Corter, Pepler, & Abramovitch, 1982). The fact that proportions of complementary or reciprocal interactions did not differ when comparing dyads with near-age older versus near-age younger siblings was unexpected, given that those should be the most peer-like interactions. Perhaps the fact that separate coding of the affect of the siblings was not part of the operationalization of each interaction subtype may account for this finding. In other words, perhaps near- and far-age siblings both engage in domination and rebuffing, but one group tends to be more negative and the other more positive. In the current study, we were interested in types of interactions that potentially taught kindergartners social skills, analyzed separately from the emotional quality of the sibling relationship. Future researchers might use our detailed classification system in conjunction with measures of affective quality to better understand the inter-familial and extra-familial interactional processes in which young children engage.

Patterns of complementary and reciprocal interactions did not differ as a function of family status, contrary to our hypothesis that in single-parent families there would be more complementary interactions, particularly those directed by older siblings. This may be a function of grouping together all complementary interactions types; there could be a subset that occurred more frequently in single-parent families with older siblings. A larger sample size may be needed to test this proposition. Also, inter-coder reliability was relatively low, which may account for not finding a stronger pattern of results.

When examining cross-setting associations, we found some support for the idea that sibling interactions are related to social relations and behavior at school. We found that sociometric status differed by level of complementarity and reciprocity. The neglected and controversial children were observed to have had significantly more reciprocity and less complementarity than other children. Given that sociometric neglect and controversy are somewhat undesirable social statuses, this suggests children benefit more from complementarity when

it comes to classmates' perceptions. According to a meta-analysis (Newcomb, Bukowski, & Pattee, 1993), neglected children are typically non-aggressive but low in sociability. Reciprocal interactions with siblings may allow them to act naturally and comfortably, as opposed to complementary interactions that might stretch them beyond what is comfortable, because they may have to engage from a one-down position with older siblings or a one-up position with younger siblings. Thus, if they are shy or withdrawn by temperament, reciprocal interactions might not change their interactional tendencies. Controversial children tend to be aggressive but also tend to have good social and cognitive skills (Newcomb et al.); perhaps children who tend to be temperamentally aggressive, but have high levels of reciprocity with siblings, learn emotional and behavioral regulation skills that allow them to subdue their aggression enough to maintain ongoing reciprocal interactions such as playing, engaging in mutual activities, cooperating, sharing, and competing. The finding that higher complementarity/lower reciprocity was found among the popular and average children suggests that positive social skills (e.g., leadership skills) may derive from the experience of complementarity, perhaps because it involves a power or status difference. A study of leadership skills among Japanese 6-year-olds (Fukada, Fukada, & Hicks, 1997) found that the higher-status children showed leadership skills in play facilitation (e.g., suggesting new rules) and what was termed "consideration-evaluation of playmates" (e.g., giving approval, protecting). These are the kinds of skills needed to get along within a power differential, as do complementary sibling interactions.

We also found that rejected children, who are typically high in aggression and withdrawal and low in sociability (Newcomb et al., 1993), experienced high complementarity/low reciprocity with siblings. This might be a case of a child's temperament interacting with their experience at home; that is, it may be that rejected kindergartners are temperamentally aggressive children who did not learn reciprocity skills from siblings; thus, they are not able to get along with others in play, mutual-activity, and so on, as opposed to the controversial children, who we speculated are the temperamentally aggressive children who *did* learn to get along via sibling reciprocity. This is, of course, all speculative interpretation, but suggests some interesting future research questions.

When we examined levels of behavior problems reported by the kindergarten classroom teachers, we found that, as hypothesized, the higher the proportion of complementary interactions children had with siblings, the lower the level of internalizing problems they displayed at kindergarten, regardless of the age-spacing of the sibling dyad and the "direction" of the complementary events. It could be speculated that children who experience frequent complementary interactions are able to work through emerging internalizing concerns (e.g., anxiety) by being "taken care of" (taught, entertained, helped, etc.) in the one-down position, or by being allowed to have a degree of control in the one-up position. The fact that this correlation was present even without assessment of sibling or target child affect is interesting. The lack of association with externalizing problems in our study, however, might be because we did not assess the affective quality of the relationship; past findings do indicate that negative, conflictual sibling interactions have been shown to increase aggression, at least for already-disruptive children (Garcia Shaw, Winslow, & Yaggi, 2000; Stormshak et al, 1996). Alternatively, the lack of association may be a function

of how complementarity was operationalized, namely, without regard to the position TC was in regarding the power differential: We combined complementary interactions where TC was in a one-up position (e.g., dominating the sibling) with those where TC was in a one-down position (e.g., asking for help). Complementary interactions further classified into sub-categories of dominance versus submission might show a link to future externalizing.

Our final question was whether sibling interaction patterns would relate differently to kindergarten variables for children in single- versus two-parent families. We found some support for this idea: in single-parent families, positive peer engagement—the ability to get other children to play—was predicted positively by reciprocity and negatively by complementarity. It makes sense that positive peer engagement, which is most directly related to peer play, would be predicted by reciprocal interaction patterns, given that play was the most frequently-observed type of reciprocal interaction between siblings. This fits others' findings that, if a family is facing a stressor, the social support siblings provide can benefit the younger sibling (e.g., Widmer & Weiss, 2000). However, our hypothesis that complementarity would protect children in single-parent families from behavior problems was not supported; we found that mean internalizing problems among single-parented children was elevated, regardless of sibling interaction patterns (see Figure 3), but internalizing behavior was high in two-parent families only at low levels of sibling complementarity. Thus, the potential of sibling interactions to buffer children from the negative effects of divorce, for example, may act more at the level of social skills rather than clinical-type behavior problems. Also, we do not know whether children in our sample from single-parent families had regular contact with the non-resident parent or other significant adults. If children had such contact, the functional similarity hypothesis would be weakened; in other words, the child would not be lacking in adult attention (monitoring, support, etc.) and the sibling would not need to function in that role. The functional similarity hypothesis also assumes that children in two-parent families are receiving sufficient attention from both parents, which is not always the case. Future study designs would benefit by assessing the nature of relationships with non-residential significant adults in single-parent families as well as the relationships with both parents in two-parent families to better understand the potential compensatory role of siblings.

Study Limitations

Ours is a cross-sectional study and therefore direction-of-effect must be considered. It could be that children who are liked or disliked at school have behavior characteristics that elicit certain kinds of behaviors from their siblings. A study by East and Rook (1992) suggests that the direction of influence between sibling and peer relations might be somewhat different: they found that children who were isolated at school had somewhat fewer adjustment problems if they had a sibling to whom they felt close. In other words, instead of children learning social skills with siblings (then transferring those skills to their peer relationships), supportive sibling relationships can buffer the negative effect of peer problems on the child. Future research examining sibling and peer relations longitudinally could perhaps better identify the causal interactions between sibling, peer, and individual adjustment variables.

Another issue that may have impacted our results has to do with our operationalization of peer relations. It could be that the links between sibling and peer relations are stronger when friendships, rather than peer status, are assessed (Stocker & Dunn, 1990). As Dunn and McGuire (1992) point out, sibling relationships have a quality of intimacy that may be present in close friendships but not in larger peer group dynamics. Future work could compare the friendships as well as the peer status of children in single- and two-parent families. We also did not examine parent-child interaction quality. Research demonstrates the interdependence of parent-child and sibling-sibling relationships (e.g., MacKinnon, 1989); this may be particularly true in single-parent families. Finally, our sample was relatively small, particularly when subgroups of children (e.g., rejected children from single-parent families) were examined, so conclusions need to be considered preliminary. Also, because of the sample size, we did not explore the impact of other sibling status characteristics, such as the gender make-up of the dyads, which have been shown to impact some peer-group outcomes (e.g., McHale, Crouter, & Tucker, 2003). Despite these limitations, our findings suggest that future research should benefit from continued exploration of young children's experiences of siblings as a context for the learning of social skills.

Implications for Practice

For practitioners working with families, these findings can be useful in either educational or therapeutic settings. Educating parents about the value of sibling interactions and the differential role of reciprocal and complementary interactions can encourage them to provide an appropriate family context to nurture these interactions. For practitioners working with divorcing parents and children of divorce, our findings provide preliminary support for the role of sibling interactions, specifically reciprocal interactions in enhancing peer interactions of children in single parent families. In their review, Chen and George (2005) have outlined some important intra and extra-familial factors that enhance resilience among children in divorcing families. Missing from this list is the sibling subsystem. Whereas practitioners recognize the importance of promoting positive parent-child relationships to mitigate the effects of divorce, the current study suggests that promoting reciprocal interactions among siblings could also help children in these families.

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Figure 1. Mean level of peer-rated *Positive Peer Engagement* as a function of *Complementarity* and *Family Status*.

Figure 2.
Mean level of peer-rated *Positive Peer Engagement* as a function of *Reciprocity* and *Family Status*.

Figure 3.
Mean level of teacher-rated *Internalizing* as a function of *Complementarity* and *Family Status*.

Table 1

Demographic Characteristics of Target Children (TC) and Siblings

Number of TC-Sibling Dyads	113
Age of TC (years)	
Mean (Range)	5.52 (4.83–6.25)
Sex of TC	
Females	53 (47%)
Males	60 (53%)
Sex of Sibling	
Females	53 (47%)
Males	60 (53%)
Sex Composition of Sibling Dyad	
Same-sex	60 (53%)
Opposite-sex	53 (47%)
Ethnicity of Family	
Euro-American	96 (84%)
African-American	17 (15%)
SES of Family ^a	
Median (Range)	41 (8–66)

^aBased on the 4-factor index (Hollingshead, 1975).

Table 2

Percent of all Social Events Classified as Complementary

Interaction Content	Mean % (SD)
Dominating with compliance	9.41 (7.96)
TC dominating sibling	5.30 (6.30)
* Rebuff or ignore interaction bid	6.10 (5.31)
TC rebuffing/ignoring	2.30 (3.42)
* Approving or disapproving	4.67 (4.38)
TC approving or disapproving	2.49 (3.05)
Dominating without compliance	3.74 (4.00)
TC dominating sibling	1.77 (2.89)
Observing	3.43 (4.72)
TC observing sibling	2.36 (3.87)
* Explaining	3.16 (3.32)
TC explaining to sibling	1.48 (2.19)
* Serving as sibling's intermediary	3.10 (4.38)
TC as intermediary for sibling	1.89 (3.18)
* Seeking information	2.99 (3.51)
TC seeking information from sibling	1.45 (2.19)
* Seeking attention	2.66 (3.66)
TC seeking attention from sibling	1.78 (2.63)
Helping	2.55 (3.69)
TC giving help to sibling	1.23 (2.74)
Teaching	1.76 (3.74)
TC teaching sibling	.84 (2.56)
Imitating	1.61 (2.67)
TC imitating sibling	.69 (1.61)
Caregiving	.91 (2.34)
TC giving care to sibling	.82 (2.36)
* Unilateral verbal affection	.89 (1.81)
TC giving affection to sibling	.57 (1.48)
* Entertaining the sibling	.84 (1.88)
TC entertaining sibling	.50 (1.64)
* Serving as parent's intermediary	.74 (1.55)
TC as intermediary to sibling	.40 (1.13)
* Asking for help	.52 (1.26)
TC asking sibling for help	.40 (1.44)
* Using parent as intermediary	.48 (1.36)
TC using parent as intermediary	.16 (.69)
* Coalitionary behavior with parent	.24 (.89)

<u>Interaction Content</u>	<u>Mean % (SD)</u>
TC in coalition with parent	.07 (.38)
* Social referencing	.21 (.81)
TC referencing sibling	.14 (.60)

Note.

* Classification generated in the current study.

Table 3

Percent of all Social Events Classified as Reciprocal

<u>Interaction Content</u>	<u>Mean % (SD)</u>
Playing	11.2 (12.35)
* Sharing mutual goals/interests with verbal communication	9.69 (8.82)
* Sharing mutual goals/interests with non-verbal communication	6.90 (6.80)
Provoking or teasing	5.56 (5.60)
* Sharing resources	2.26 (4.15)
Competing	1.94 (2.85)
* Tattling	1.92 (3.00)
Cooperating	1.70 (2.45)
Arguing or fighting as equals	1.38 (2.44)
* Negotiating	.96 (1.42)
Displaying jealousy/protests about fairness	.89 (2.10)
* Coalitionary behavior	.85 (1.80)
* Uncooperative behavior	.73 (2.86)
Mutual physical affection	.42 (1.56)
Sharing an inside joke	.40 (1.07)
Sharing secrets	.31 (1.24)
* Non-hierarchical social comparison	.07 (0.41)

Note.

* Classification generated in the current study.