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Individual differences and dyadic processes in conversations with peers in middle childhood

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Abstract

The goal of the current study was to investigate the contribution of both trait-like individual differences and dyadic processes to the content of children's conversations. Fifty-two groups typically consisting of four same-sex unfamiliar nine-year-old children (*N* = 202) interacted in all possible dyads, resulting in six dyads per group. Each dyad completed a 5-min frustration task and a 5-min planning task. Observers coded children's verbalizations into 10 categories and further summed these categories into prosocial (suggest, agree, solicit input, ask, encourage, state personal) and antisocial (command, disagree, discourage, aggress) verbalizations, resulting in 24 variables (12 per task). Across both tasks, Social Relations Model analyses provided evidence of the role of both individual differences [significant effects for actor variance (15 of 24 variables), actor-actor correlations, and intrapersonal correlations] and dyadic processes [significant effects for partner variance (4 of 24 variables), relationship variance (18 of 24 variables), dyadic reciprocity correlations (10 of 24 variables), and interpersonal correlations] in children's conversations with peers.

Keywords

children's conversations, dyadic processes, individual differences, peer interaction, social relations model

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1 | INTRODUCTION

Our knowledge of children's behavior, social cognition, and emotional functioning when interacting with peers is substantial (e.g., Bookhout et al., 2018; De Castro & van Dijk, 2018; Dirks et al., 2018; Vitaro et al., 2018). It is surprising, then, that we know so little about what children actually say to one another in their conversations; verbal exchanges surely play an essential role in children's interactions. The goal of the current study was to investigate the contribution of both trait-like individual differences and dyadic processes to children's verbalizations, or the content of their conversations (terms used interchangeably).

1.1 | Existing literature on children's conversations with peers

Gottman (1983) conducted a seminal study on children's progression toward friendship, and he found that conversational skills were essential to this process. Dyads whose conversations were characterized by clarity, connectedness, information exchange, common ground, and conflict resolution were most likely to become friends.

Beyond Gottman's study, the small literature on children's conversations falls into three categories, with much of the work conducted decades ago. The first body of research uses the content of peer dialogue to elucidate young children's understanding of theory of mind, emotions, and others' mental states (e.g., Leach et al., 2017; Slomkowski & Dunn, 1996).

The second and most extensive body of work is on gender differences in children's conversations. In brief, males are more likely than females to assert, brag, correct, prohibit, control, and make negative/aggressive comments (Black, 1992; Leaper, 1991; Leaper & Smith, 2004; Leman et al., 2005; McCabe & Lipscomb, 1988; McCloskey & Coleman, 1992; Nohara, 1996). In contrast, females are more likely than males to self-disclose, request, suggest, explain, support, co-ruminate, cooperate, and affiliate (Black, 1992; Burleson, 1982; Leaper, 1991; Leaper, 2019; Leaper & Smith, 2004; Leman et al., 2005; Nohara, 1996; Rose et al., 2014; Strough & Berg, 2000; Tenenbaum et al., 2011). Samples range from preschool to young adulthood, suggesting that these gender differences emerge early in development and persist.

The final body of research is on relations between children's conversational content and social preference/status in preschool and middle childhood. In summary, children who are more popular are more likely to ask questions, respond contingently, offer explanations, and use emotion language than children who are less popular (Austin & Draper, 1984; Black & Logan, 1995; Fabes et al., 2001; Hazen & Black, 1989; Murphy & Faulkner, 2006). In contrast, children who are more rejected more often make irrelevant comments, demand, and argue than children who are less rejected (Black, 1992; Black & Hazen, 1990; Murphy & Faulkner, 2000).

Although these studies have advanced our knowledge of children's conversations with peers, the field has neglected two fundamental questions. First, which types of verbalizations display the strongest individual differences? Second, are peer conversations driven by dyadic processes as well as trait-like individual differences? The goal of the current study was to investigate these two questions through a Social Relations Model (SRM) analysis of children's conversations with peers.

1.2 | A social relations model approach

Kenny et al. (2001) and others (Malloy et al., 2005) theorized that multiple forces impact behavior during social interaction. They termed these forces actor, partner, and relationship effects. As an example, a child's likelihood of disagreeing with a peer results from the child's tendency to disagree with peers in general (actor effect), the peer's tendency to elicit disagreement from others in general (partner effect), and the unique tendency of this child to disagree with this

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peer (relationship effect). Thus, actor effects represent individual differences in behavior, while partner and relationship effects index dyadic processes in social interaction. Of note, both actor and partner effects occur at the individual level. However, whereas actor effects represent individual differences in the behaviors children display, partner effects represent individual differences in the behaviors children elicit from others, and thus serve in the current study as a marker of dyadic processes.

To partition the variance of a behavior into these three effects, round-robin data are needed. A round-robin design is one in which participants form groups, and each participant has the opportunity to display the behavior under study toward every other group member.

To our knowledge, only four studies have applied the SRM to children's behavior with peers. In the first investigation, Ross and Lollis (1989) observed toddlers' play behavior and coded for game-play, conflicts, and contingent interactions. In the second study, Coie and colleagues (Coie et al., 1999) observed third-grade boys' aggression. In the third investigation, Simpkins and Parke (2002) observed the play behavior of fourth- and fifth-grade children. In the final study, Jaggy and colleagues (Jaggy et al., 2019) observed preschoolers' pretend play. In all studies, significant actor, partner, and relationship variance emerged, suggesting that each of these behaviors with peers is driven by both individual differences and dyadic processes.

1.3 | Existing SRM research on conversations

We know of only four studies that have taken an SRM approach to peer conversations, although all used adult samples. The first study examined competitive remarks during a block-building task in well-acquainted males (Kenny et al., 2001; re-analysis of data from Kenny et al., 1996). The second study assessed the amount of time unacquainted females spent talking in unstructured conversations (Kenny et al., 2001; re-analysis of data from Levesque & Kenny, 1993). The third analysis focused on question-asking in speed dating (Kluger & Malloy, 2019). The final study investigated listening quality, closeness, and stress reduction in unacquainted females talking about stressful life events (Malloy et al., 2021). In all four studies and for all variables, significant actor, partner, and relationship variance emerged, providing evidence that both trait-like and dyadic processes impact adults' conversations with peers.

Two additional studies explored whether children's remarks differed depending upon their conversational partner, although they did not take an SRM approach. Garvey and BenDebba (1974) paired preschool children with two play partners each and found that children varied their number of utterances based upon their partner. Murphy and Faulkner (2000) paired five- and six-year-old children with popular or unpopular partners as they played a collaborative game. Boys argued less with popular than unpopular partners, and girls reminded their partner about the rules and offered explanations more when playing with unpopular than popular partners. Although these studies enhance our understanding of how children's verbalizations differ depending upon the peer to whom they speak, they do not address the relative contribution of individual differences versus dyadic processes to children's conversations.

1.4 | The current study

The goal of the current study was to address this question of trait-like versus dyadic influences on children's conversations. Participants formed fifty-two groups typically consisting of four same-sex unfamiliar nine-year-old children, and all possible dyads in each group interacted in a round-robin format. Each dyad completed two 5-min tasks, a frustration task and a planning task. We coded children's verbalizations into one of 10 categories, and we conducted analyses both at this fine-grained level and at the aggregated level of prosocial (suggest, agree, solicit input, ask, encourage, state personal) and antisocial (command, disagree, discourage, aggress) verbalizations. We then partitioned the variance of these verbalization variables, with significant actor variance supporting trait-like individual differences in children's remarks and significant partner and relationship variance supporting dyadic processes.

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We extended this approach to SRM correlations outlined by Kenny and colleagues (Kenny et al., 2006; see especially Chapter 8). There are two types of SRM correlations (multivariate actor-actor correlations, multivariate intrapersonal correlations) that may provide evidence that some children are more strongly prosocial or antisocial in their remarks, whereas other children are less so, supporting the trait-like nature of children's remarks. Specifically, multivariate actor-actor correlations assess the association between two verbalizations within the same child averaged across partners (e.g., Is Child A's disagreement across partners correlated with Child A's commanding across partners, across all children in the sample?), and multivariate intrapersonal correlations measure the relation between two verbalizations within the same child specific to each dyad (e.g., Is Child A's disagreement with Child B correlated with Child A's commanding of Child B, across all dyads in the sample?). In contrast, two other types of SRM correlations (dyadic reciprocity correlations and multivariate interpersonal correlations) may provide evidence that children synchronize their conversational content with one another, supporting the dyadic nature of children's dialogues. Specifically, dyadic reciprocity correlations assess the link between the same verbalization across dyad members (e.g., Is Child A's disagreement with Child B correlated with Child B's disagreement with Child A, across all dyads in the sample?), and multivariate interpersonal correlations measure different verbalizations associated across dyad members (e.g., Is Child A's disagreement with Child B correlated with Child B's commanding of Child A, across all dyads in the sample?).

We hypothesized that support would emerge for the importance of both individual differences and dyadic processes in children's conversations with peers, with evidence for individual differences arising from significant actor variance, actor-actor correlations, and intrapersonal correlations and evidence for dyadic processes arising from significant partner variance, relationship variance, dyadic reciprocity correlations, and interpersonal correlations. Furthermore, we explored gender and task (frustration, planning) differences in the extent of individual versus dyadic influences on children's conversations; given the lack of literature to support hypotheses for these analyses, we considered them exploratory.

2 | METHOD

2.1 | Participants

Participants included 202 children (55% male) in a mid-Atlantic state. Parents reported children's race as 58% African American, 20% European American, 16% Mixed race, 1% Asian American, and 5% Other and children's ethnicity as 23% Latino/a and 77% Not Latino/a. Children were on average 9.49 years old ($SD = .51$).

Children's families reported annual income averaging $42,183 (range = $1800–$225,000; $SD = $43,889), and 37% of families received some form of welfare benefits. In terms of educational level, 17% of reporting parents did not complete high school, 8% earned a GED, 25% graduated from high school, 18% attended some college, 9% graduated from a four-year college, 5% held a post-graduate degree, and 18% did not report education level.

Most participants were enrolled in a larger longitudinal study on the efficacy of the parenting intervention Attachment and Biobehavioral Catch-Up (ABC; Dozier & Bernard, 2019) on middle childhood outcomes assessed through laboratory visits including a dyadic interaction procedure at the age of nine. We designed the dyadic interaction procedure both to assess the efficacy of the intervention on children's peer relations and to address the goals of this study.

One hundred three children were recruited as infants through referrals from Child Protective Services (CPS) due to allegations of maltreatment. They were randomized to receive either ABC ($N = 50$) or a control intervention (Developmental Education for Families; DEF; $N = 53$). ABC is a ten-session, home-based parenting intervention designed to increase nurturance to child distress, increase sensitivity to child signals, and decrease frightening and harsh behaviors. DEF is delivered in the same format but focuses on teaching parents about child development. A comparison sample of 65 children were recruited through local community centers and schools and matched to the intervention

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sample on race and gender. The final 34 children were recruited through community centers and schools to provide an additional child per group when only three children could be scheduled at the same time, rather than the desired four.

Intervention children only differed from comparison or back-up children on two of 24 verbal variables described below (intervention children were less likely to make suggestions in the Frustration Tasks and more likely to ask questions in the Planning Tasks than back-up children). In addition, children whose parents completed ABC only differed from those whose parents completed DEF on one of 24 variables (children whose parents completed ABC were more likely than children whose parents completed DEF to make personal statements in the Frustration Tasks). Therefore, for this paper, the sample was analyzed as a whole, although we acknowledge that these group differences are a weakness of this approach.

2.2 | Procedures and measures

2.2.1 | Dyadic interaction procedures

We obtained both written parental consent and child assent for all procedures. In the summers of 2015–2017, participants came to the lab and formed groups of same-sex, unfamiliar peers; the typical group included four children. All interactions occurred in dyads; children did not interact before their dyadic interactions were recorded. Each child interacted with three partners in a round-robin design. In the first set of interactions, Children A and B interacted in one room, while Children C and D interacted in a separate room. Children then switched partners, so that Children A and C could interact at the same time as Children B and D. Finally, children switched partners once again to give Children A and D an opportunity to interact, as well as Children B and C.

Each dyad completed two 5-min tasks chosen because they required collaboration and communication. However, they differed in their difficulty level and affective valence, with the first task being upsetting because it was impossible to complete, and the second task being more enjoyable and rewarding.

The first task was a Frustration Task, in which children searched for a non-existent object. Dyads AB and CD attempted to unlock a box by searching through a ring of hundreds of keys; however, the correct key was not included. Dyads AC and BD searched for a squirrel in a book containing hundreds of animal photos, but no squirrel. Dyads AD and BC tried to find a ball with a smiley face in a bin of hundreds of balls, none of which had a smiley face.

The second task was a Planning Task, in which children planned a perfect event. Dyads AB and CD planned the perfect party, dyads AC and BD planned the perfect school, and dyads AD and BC planned the perfect field trip. Given the analogous nature of the tasks and the interchangeable nature of the dyads, tasks were not counterbalanced across dyads or groups. Due to changes in the Planning Tasks early in data collection, the first two groups completed only the Frustration Tasks and not the Planning Tasks.

Before the tasks began, an experimenter stated that children would earn tickets based on their performance, and she showed them prizes that they could choose if they accumulated 30 tickets. At the beginning of each Frustration Task, an experimenter stated that children would earn 10 tickets each if they could find the object in question, but of course, no dyad earned any tickets. At the beginning of each Planning Task, an experimenter stated that she would give tickets based on the quality of children's ideas for the perfect party/school/field trip. In truth, the number of tickets each dyad received for each Planning Task was pre-determined so that each child accumulated 30 tickets and earned a prize.

In total, 52 groups participated; 46 groups included four members. Due to scheduling difficulties, six groups included only three children (for a total *N* of 202). In these cases, each child interacted with two partners; ticket totals were adjusted so that children still earned prizes.

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2.2.2 | Observational coding of verbalizations

We videorecorded all task interactions without children's awareness for coding using Noldus The Observer XT version 11. A single observer coded both dyad members simultaneously, because accurate coding of one child's verbalizations often depended on knowledge of the other child's previous remarks. All observers were blind to study hypotheses.

Observers transcribed interactions verbatim and segmented verbalizations into "blocks." A new block began when the speaker changed or after pauses of at least two seconds. Observers then coded each block into one of 11 verbalization codes. If the content changed mid-block, observers parsed the verbalization into multiple blocks and assigned a unique code to each block. The 11 verbalization codes and examples pulled from transcripts are included in Table 1. Of note, we did not analyze the General Verbal category but included it to create an exclusive and exhaustive coding scheme.

A graduate student served as the trainer and gold standard for undergraduate coders. She trained observers using pilot videos. During training, we compared undergraduates' coding to the graduate student's coding. We considered coders reliable against the graduate student when they achieved an overall Cohen's kappa of at least .70 and an individual Cohen's kappa of at least .65 for each of the 11 verbalizations for five consecutive video segments (one dyad completing one task). We further assessed reliability by randomly pairing coders with one another on additional video segments. We considered coders well-trained when they achieved these same criteria for five additional video segments coded against their observer peers. Once coders began to work independently, we made frequent and random reliability checks to assess observer drift, and when we did, we re-trained as needed. To assess reliability on the complete data set, 20% of interactions were coded by two observers blind to which video segments served as reliability trials. Final Cohen's kappa was .72 across verbalizations, and Cohen's kappa for each individual verbalization is presented in Table 1.

3 | RESULTS

3.1 | Missing data

The SRM analyses described below require at least four members per group (Kenny & La Voie, 1984; Little & Card, 2005). For the six groups with three members, we imputed data for a fourth "child" and his/her partners using estimation procedures for SRM parameters developed by Bond and Malloy (2018), resulting in a total *N* of 208. In addition, we imputed all data for the Planning Tasks for the two groups that did not complete those tasks in the Statistical Package for Social Sciences using imputation procedures with fully conditional specification.

3.2 | Data aggregation, descriptive statistics, and preliminary analyses

Data for each child for each 5-min task were aggregated into ten 30-s intervals. The ten observational variables per task were represented as frequency scores (frequency with which the child made that verbalization in that 30-s interval). Variables were further aggregated into two scores per child per task by averaging across the odd or even intervals of that task. We then summed the variables Suggest, Agree, Solicit Input, Ask, Encourage, and State Personal to create the variable Prosocial Verbalizations, and we summed the variables Command, Disagree, Discourage, Aggress to create the variable Antisocial Verbalizations. Descriptive statistics for all variables are displayed in Table 2. Table 2 also includes gender differences for study variables, and Table 3 includes task differences.

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TABLE 1 Verbalization codes, examples, and reliability

Code	Examples	Kappa
Suggest	*We could take turns getting balls.* *Do you want to make a list of who to invite?* *You should wear your hair like this.* *Let's keep trying.*	.79
Agree	*Okay, you can have a turn.* *Yes, let's do that.* *That's a good idea.* *I know - this is really frustrating.*	.72
Solicit input	*Who do you think we should invite?* *Where do you think we should go on our trip?* *How are we gonna remember all this?* *Does that sound good to you?*	.64
Ask	*How many people did she say we could invite?* *What school do you go to?* *What prize do you want?* *Why do you think she asked us to plan a trip?*	.80
Encourage	*I think we can do it!* *I'll bet we'll be the first ones to find the squirrel!* *Yay! I'm so happy because we're doing great!* *Please, please, please let it be our lucky day!*	.61
State personal	*I've got 8 brothers.* *I'm nine.* *I have to pee.* *I don't like cheese fries* (when discussed as a possible party food).	.77
Command	*Try this key.* *Gimme the keys! Turn the page.* *Come on, go faster!*	.68
Disagree	*No, I'm still working on it.* *Let's not do that.* *I don't want to.* *No, I said….*	.62
Discourage	*We're never going to find the smiley-face ball….* *I think it's impossible to open this box.* *This is really hard, isn't it?* *Ugh! When is this gonna be over?*	.65
Aggress	*Duh!* (meant to imply peer said something stupid). *Man, you really suck at this, don't you?* *Why'd your mama dress you like that?* *I'm gonna punch you if you don't shut up!*	.63
General verbal	Coded whenever previous ten codes do not apply. *That bear is really cute.* *A lot of these balls are red.* *I heard that Beyonce and Jay-Z are breaking up.* *I really like that lady's hair.*	.66

3.3 | SRM analyses

SRM analyses (Kenny et al., 2006; see Chapter 8) used the 24 latent variables, each with two indicators (the two odd-and-even interval aggregation scores), representing the variables listed in Table 2. This table includes an estimate of

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TABLE 2 Descriptive statistics, estimates of stable variance, and gender differences for study variables

	Frustration tasks								
	Minimum	Maximum	*M*	*SD*	Skew	% stable variance	*M* boys	*M* girls	Gender difference *F*
Prosocial	.00	30.00	7.88	5.53	.65	.61	8.20	7.63	*ns*
Suggest	.00	9.00	1.25	1.78	1.69	.47	1.14	1.20	*ns*
Agree	.00	12.00	1.00	1.38	2.11	.67	.74	1.17	11.28***
Solicit input	.00	11.00	.19	.64	10.10	.70	.13	.13	*ns*
Ask	.00	16.00	3.00	2.79	1.25	.50	3.31	2.59	5.59*
Encourage	.00	12.00	.90	1.48	2.99	.61	1.09	.70	6.08*
State personal	.00	12.00	1.53	1.85	2.03	.50	1.28	1.78	7.55**
Antisocial	.00	39.00	7.61	5.89	1.10	.66	7.87	7.89	*ns*
Command	.00	33.00	3.94	3.91	1.71	.67	4.50	3.36	6.52*
Disagree	.00	5.00	.44	.79	2.47	.52	.51	.32	10.52***
Discourage	.00	18.00	2.89	2.87	1.65	.52	3.24	2.65	3.49†
Aggress	.00	8.00	.32	.91	4.03	.59	.44	.18	11.73***
	Planning tasks								
	Minimum	Maximum	*M*	*SD*	Skew	% Stable Variance	*M* Boys	*M* Girls	Gender Difference *F*
Prosocial	2.00	60.00	23.88	10.33	.53	.65	23.59	24.37	*ns*
Suggest	.00	38.00	10.31	6.38	.97	.61	9.24	11.94	15.04***
Agree	.00	36.00	4.66	4.85	2.04	.59	3.46	6.36	30.84***
Solicit input	.00	9.00	.88	1.40	2.37	.60	.68	1.10	7.09**
Ask	.00	31.00	4.73	4.31	1.76	.70	5.48	3.76	14.23***
Encourage	.00	5.00	.31	.68	3.25	.50	.26	.37	5.03*
State personal	.00	17.00	2.95	2.90	1.43	.57	2.96	3.11	*ns*
Antisocial	.00	28.00	3.08	3.39	2.03	.51	5.98	3.01	6.82**
Command	.00	13.00	1.54	2.01	2.04	.62	1.81	1.14	9.05**
Disagree	.00	13.00	.91	1.52	3.07	.55	1.25	.49	31.65***
Discourage	.00	6.00	.32	.75	2.74	.59	.40	.17	7.32**
Aggress	.00	9.00	.30	.93	4.78	.57	.44	.11	15.10***

Note: $N = 624$ for all variables (208 children x 3 partners); † $p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

stable construct variance, which ideally should be above 50% (Bonito & Kenny, 2010). Analyses were conducted using Kenny's SOREMO program available at davidakenny.net/srm/srmp.htm.

3.3.1 | Variance partitioning

The SRM partitions a variable's variance into Actor, Partner, and Relationship Variance. Using the variable Suggest as an example, Actor Variance measures the degree to which the frequency of suggesting is consistent across children's

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TABLE 3 Task differences for study variables

	M Frustration	*M* Planning	Task difference *F*
Prosocial	7.88	23.88	849.33***
Suggest	1.28	10.33	624.67***
Agree	.99	4.69	214.58***
Solicit input	.16	.86	99.17***
Ask	3.01	4.70	78.38***
Encourage	.91	.32	70.63***
State personal	1.52	2.98	104.66***
Antisocial	7.61	3.08	257.01***
Command	3.96	1.55	160.43***
Disagree	.42	.90	50.50***
Discourage	2.92	.34	295.49***
Aggress	.31	.29	.13

Note: $N = 624$ for all variables (208 children × 3 partners); ***$p < .001$.

partners (e.g., the similarity of Child A's suggestion frequency across interactions with Children B-D, assessed across all 208 children). Actor Variance was significant for 15 of the 24 variables (see Table 4).

Continuing with our Suggest example, Partner Variance assesses the degree to which the frequency of suggesting is consistent across children interacting with the same partner (e.g., the similarity of Children A's, C's, and D's suggestion frequency when they are with Child B, assessed across all 208 children). Partner Variance was significant for four of the 24 variables (see Table 4).

Relationship Variance indexes the degree to which a child's suggestion frequency is unique to a particular dyad (e.g., the extent to which Child A's suggestion frequency to Child B is unique to their interaction, after accounting for Child A's actor effect and Child B's partner effect, across all 624 dyads). Relationship Variance was significant for 18 of the 24 variables (see Table 4).

The remaining variance for each variable is attributable to error. Although SRM analyses do not provide a significance test for error variance, it is common for it to be substantial, suggesting either measurement error or uncaptured influences beyond individual differences and dyadic processes (Kenny et al., 2006; see Table 4).

3.3.2 | Dyadic reciprocity correlations

Continuing with our Suggest example, Dyadic Reciprocity Correlations measure the relation between Child A's suggesting to Child B and Child B's suggesting to Child A (across all 624 dyads). Dyadic Reciprocity Correlations were significant and positive for ten of the 24 variables (see Table 4).

3.3.3 | Multivariate correlations

The preceding analyses included a single verbalization variable. To examine relations between variables, we used three SRM multivariate correlations.

Actor-Actor Correlations and Intrapersonal Correlations both assess relations between variables within individuals and thus are akin to bivariate correlations. Using Suggest and Agree as an example, the Actor-Actor Correlation

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TABLE 4 Variance partitioning and dyadic reciprocity correlations

	Frustration tasks				
	Actor variance	Partner variance	Relationship variance	Error	Dyadic reciprocity correlations
Prosocial	.25***	.11*	.25***	.39	.74
Suggest	.16	.02	.30***	.52	.83**
Agree	.13†	.08†	.16†	.63	.59†
Solicit input	.00	.03	.60	.37	.36
Ask	.19***	.03	.20**	.58	.50*
Encourage	.04	.00	.42***	.54	.52**
State personal	.00	.00	.18*	.82	.70†
Antisocial	.34***	.02	.30***	.34	.47
Command	.27***	.03†	.31**	.39	.22
Disagree	.11*	.05	.04	.80	.27
Discourage	.29***	.00	.26***	.45	.59*
Aggress	.05	.11	.00	.84	.28
	Planning tasks				
	Actor variance	Partner variance	Relationship variance	Error	Dyadic reciprocity correlations
Prosocial	.33***	.08†	.24***	.35	.85
Suggest	.26**	.02	.32***	.40	.83***
Agree	.29**	.11†	.23***	.37	.56***
Solicit input	.07	.00	.40***	.53	.46*
Ask	.31***	.09*	.15*	.45	.06
Encourage	.09*	.00	.22*	.69	.68*
State personal	.19**	.14*	.15*	.52	.89**
Antisocial	.25**	.03	.24***	.48	.67
Command	.21**	.00	.25**	.54	.59†
Disagree	.10	.06	.06	.78	.24
Discourage	.16***	.14***	.21*	.49	.50*
Aggress	.28†	.07†	.09†	.56	−.16

Note: † $p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

indexes the extent to which Child A's suggesting to Children B-D is related to Child A's agreeing with Children B-D (assessed across all 208 children). In contrast, the Intrapersonal Correlation measures the extent to which Child A's suggesting to Child B is related to Child A's agreeing with Child B (across all 624 dyads). Between Prosocial and Antisocial Verbalizations, the Actor-Actor Correlation for the Frustration Tasks was .52, $p < .01$, and for the Planning Tasks was .19, *ns;* the Intrapersonal Correlation for the Frustration Tasks was .35, $p < .01$, and for the Planning Tasks was .00, *ns*. Among the ten fine-grained verbalization variables, across both Actor-Actor and Intrapersonal Correlations, some estimates suggested that children tend to be more broadly prosocial or antisocial in their verbalizations: (a) 11 of 60 correlations between two prosocial variables were positive; (b) seven of 24 correlations between two antisocial variables were positive; and (c) one of 96 correlations between one prosocial and one antisocial variable were negative. Other estimates suggested that some children were more involved in the interactions and tasks than other

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TABLE 5 Multivariate actor-actor correlations and intrapersonal correlations

		Frustration tasks									
		1	2	3	4	5	6	7	8	9	10
1.	Suggest	–	.86	.05	.46*	.85**	.07	.04	.19	−.15	−.02
2.	Agree	.32	–	.11	.26	.61	.10	.17	.66**	.52*	.19
3.	Solicit input	.43*	.07	–	.04	.04	.00	.02	.00	.05	.02
4.	Ask	.03	.00	.07	–	.79**	.02	.35†	.14	.70**	.31
5.	Encourage	−.07	−.03	.23*	−.07	–	.04	.02	.43	.85*	.21
6.	State personal	−.08	.08	.07	.62**	.24	–	.02	.01	.10	.00
7.	Command	.16	.03	.18†	.21†	.22***	−.11	–	.62**	.21	.51
8.	Disagree	.41	−.22	−.18	.81*	−.44†	.35	−.05	–	.57**	.45
9.	Discourage	.19*	−.08	.24†	−.04	.46***	.05	.20*	−.14	–	.29
10.	Aggress	−.12	.21	−.19	.49	−.43	−.13	.55	.82*	.00	–
		Planning tasks									
		1	2	3	4	5	6	7	8	9	10
1.	Suggest	–	.37*	.11	−.04	−.05	−.16	−.05	.00	−.27	−.08
2.	Agree	.52***	–	.21	−.02	.23	−.05	−.14	−.20	.15	−.10†
3.	Solicit input	.28†	.35*	–	.27†	.42	.02	.32	.27	.41	−.08
4.	Ask	−.49**	−.44**	−.37*	–	.00	.57***	.45†	.09	.26	.52†
5.	Encourage	.08	.19	.06	−.21	–	.12	.31	.01	.14	.23†
6.	State personal	−.41**	−.34**	−.09	.49**	−.03	–	.31†	−.17	.44†	.00
7.	Command	−.08	−.12	.02	.18	.00	−.06	–	.39*	.38	.40
8.	Disagree	.24	−.05	−.39*	.16	−.45†	.12	.29	–	−.22	.31†
9.	Discourage	−.04	−.15	−.06	.23†	.18	−.31†	.12	−.13	–	.23*
10.	Aggress	−.15	−.14	−.07	.01	−.38	.29	.52*	.32	−.09	–

Note: Actor-Actor correlations are shown above the diagonals, and intrapersonal correlations are shown below the diagonals.
† $p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

children, across both prosocial and antisocial verbalizations; in particular, there were 8 positive correlations between one prosocial variable and one antisocial variable. Finally, there were five negative correlations between two prosocial variables in the Planning Tasks (see Table 5).

Interpersonal Correlations assess relations between variables across members of the dyad. Continuing with our Suggest and Agree example, Interpersonal Correlations measure the extent to which Child A's suggesting to Child B is related to Child B's agreeing with Child A (across all 624 dyads). Between Prosocial and Antisocial Verbalizations, the Interpersonal Correlation for the Frustration Tasks was .29, $p < .05$, and for the Planning Tasks was −.05, *ns*. Among the ten fine-grained verbalization variables, mirroring the effects for individual children reported above, some estimates suggested that dyads tended to be broadly prosocial or antisocial in their interactions with one another: (a) five of the 30 correlations between two prosocial variables were positive; (b) three of the 12 correlations between two antisocial variables were positive; and (c) four of the 48 correlations between one prosocial and one antisocial variable were negative. However, other estimates suggested that some dyads were more involved in the interactions and tasks, while other dyads were less so, across both prosocial and antisocial verbalizations; in particular, there were three positive correlations between one prosocial variable and one antisocial variable. Finally, there were five negative correlations between two prosocial variables in the Planning Tasks (see Table 6).

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TABLE 6 Multivariate interpersonal correlations

		1	2	3	4	5	6	7	8	9	10
1.	Suggest	–	.41	.15	.09	−.08	−.11	.23†	.44	.09	−.09
2.	Agree	.91***	–	.17	.05	.20	−.15	.10	.00	.07	−.19
3.	Solicit input	.37*	.08	–	.29	.13*	.07	.15†	−.31*	.19†	−.10
4.	Ask	−.36*	−.31*	−.39**	–	−.04	.74**	.04	.86*	−.32	.56
5.	Encourage	.18	.18	.16	−.25	–	.32	.24*	−.48*	.34**	−.23
6.	State personal	−.39**	−.44**	−.06	.80***	.12	–	.10	.43	.11	.20
7.	Command	−.18†	−.04	−.30*	.20	−.02	−.09	–	−.02	.23*	.76*
8.	Disagree	.29	.12	−.24	.24	−.30	.01	−.03	–	−.34	.42
9.	Discourage	−.04	−.16	−.14	.01	.13	−.21	.51*	.01	–	−.68
10.	Aggress	−.24†	.04	−.15	.00	−.34*	.25	.08	−.10	.21	–

Note: Correlations for the Frustration Tasks are shown above the diagonal, and correlations for the Planning Tasks are shown below the diagonal. † $p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

TABLE 7 Gender and task differences in SRM effects for prosocial and antisocial verbalizations

Effect	Var(s)	M_b	M_g	Gen *F*	η^2	M_f	M_p	Task *F*	η^2	M_{bf}	M_{gf}	M_{bp}	M_{gp}	G*T *F*	η^2
AV	Prosocial	5.36	5.73	41.06***	.45	2.38	8.72	13.81***	.22	2.62	2.13	8.11	9.33	.25	.01
	Antisocial	2.66	.71	5.39*	.10	2.73	.65	9.92**	.17	4.17	1.28	1.15	.15	5.39*	.10
PV	Prosocial	1.85	1.16	.37	.01	.95	2.06	.89	.02	.96	.94	2.74	1.38	.32	.01
	Antisocial	.42	−.28	4.45*	.08	.00	.15	.29	.01	.62	−.62	.22	.07	3.75	.07
RV	Prosocial	2.75	6.24	6.77*	.12	2.40	6.59	11.65***	.19	2.35	2.44	3.15	10.03	7.64**	.13
	Antisocial	1.51	1.69	.11	.00	2.56	.63	15.72***	.24	2.02	3.11	1.00	.27	3.52	.07
DRC	Prosocial	.31	.48	2.90	.06	.34	.45	.77	.02	.34	.34	.27	.63	1.84	.04
	Antisocial	.25	.24	.01	.00	.21	.27	.35	.01	.01	.41	.49	.06	13.84***	.22
AAC	Pro-Anti	.13	.16	.04	.00	.26	.02	6.66*	.12	.26	.26	−.01	.05	.10	.00
IntraC	Pro-Anti	.02	.27	5.97*	.11	.25	.04	4.50*	.08	.12	.39	−.07	.15	.06	.00
InterC	Pro-Anti	.00	.17	2.80	.05	.13	.03	.82	.02	−.02	.29	.02	.05	1.45	.03

Note: Var = Variable; Subscripts b = boys, g = girls, f = frustration tasks, p = planning tasks; Gen = Gender; $\eta^{2=}$ partial eta squared for *F*-value one column to the left; *$p < .05$; **$p < .01$; ***$p < .001$.
Abbreviations: G*T, Gender*Task; AV, Actor Variance; PV, Partner Variance; RV, Relationship Variance; DRC, Dyadic Reciprocity Correlation; AAC, Actor-Actor Correlation; IntraC, Intrapersonal Correlation; InterC, Interpersonal Correlation; Proocial, Pro, Prosocial Verbalization; Antisocial, Anti, Antisocial Verbalization.

3.3.4 | Gender and task differences

We examined between-groups Gender differences and within-groups Task differences, as well as their interaction, for the seven SRM effects described in Tables 4–6. We restricted these analyses to the aggregated variables Prosocial and Antisocial Verbalizations to avoid concerns with Type I error. We used the SOREMO program to output each unstandardized estimate for each of the 52 groups, and we conducted Gender x Task ANOVAs on the resulting data (see Table 7).

Interactions between Gender and Task emerged for three SRM effects, which we probed using simple effects. We first examined Gender differences per Task (refer to Table 7 for means). For Actor Variance for Antisocial Verbaliza-

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tions, boys had a higher estimate than girls for both the Frustration Tasks, $F(1,50) = 4.08$, $p < .05$, $\eta^2_{partial} = .08$, and the Planning Tasks, $F(1,50) = 4.52$, $p < .05$, $\eta^2_{partial} = .08$, but the difference was greater for the Frustration Tasks than the Planning Tasks. For Relationship Variance for Prosocial Verbalizations, girls had a higher estimate than boys for the Planning Tasks, $F(1,50) = 9.03$, $p < .01$, $\eta^2_{partial} = .15$, but not the Frustration Tasks, $F(1,50) = .01$, *ns*, $\eta^2_{partial} = .00$. For the Dyadic Reciprocity Correlation for Antisocial Verbalizations, girls had a higher estimate than boys for the Frustration Tasks, $F(1,50) = 5.25$, $p < .05$, $\eta^2_{partial} = .10$, but boys had a higher estimate than girls for the Planning Tasks, $F(1,50) = 8.73$, $p < .01$, $\eta^2_{partial} = .15$.

Next, we examined Task differences per Gender. For Actor Variance for Antisocial Verbalizations, boys had a higher estimate for the Frustration Tasks than the Planning Tasks, $F(1,28) = 8.34$, $p < .01$, $\eta^2_{partial} = .23$, but a Task difference did not emerge for girls, $F(1,22) = 2.86$, *ns*, $\eta^2_{partial} = .12$. For Relationship Variance for Prosocial Verbalizations, girls had a higher estimate for the Planning Tasks than the Frustration Tasks, $F(1,22) = 14.63$, $p < .001$, $\eta^2_{partial} = .40$, but a Task difference did not emerge for boys, $F(1,28) = .28$, *ns*, $\eta^2_{partial} = .00$. For the Dyadic Reciprocity Correlation for Antisocial Verbalizations, girls had a higher estimate for the Frustration Tasks than the Planning Tasks, $F(1,22) = 7.11$, $p < .05$, $\eta^2_{partial} = .24$, but boys had a higher estimate for the Planning Tasks than the Frustration Tasks, $F(1,28) = 8.08$, $p < .01$, $\eta^2_{partial} = .22$.

4 | DISCUSSION

The goal of the current paper was to investigate both individual differences and dyadic processes in children's conversations. Groups of same-sex unfamiliar children interacted in a round-robin format, with each dyad completing both frustration and planning tasks. We coded children's verbalizations into 10 fine-grained categories, and we analyzed data both at this level and at the level of aggregated prosocial and antisocial verbalizations. Our hypothesis was that support would emerge for the importance of both trait-like differences and dyadic processes in children's conversations with peers.

4.1 | Trait-like contributions to children's conversations

Strong support for individual differences in children's verbalizations emerged. Actor variance accounted for a significant proportion of 15 of the 24 variables (range 12–34%). Across partners, some children were more likely than others to make particular types of remarks, with trait-like differences emerging most strongly for antisocial comments in the frustration tasks.

Significant actor-actor and intrapersonal correlations add to the evidence that children display trait-like differences when they speak to one another. Close inspection of Table 4 reveals that some children tended to be prosocial across types of comments; the codes suggest, solicit input, and ask were especially likely to co-occur within children, indicating that collaborative problem-solving is strongly driven by individual differences. At the same time, some children were particularly antisocial across their remarks, with most combinations of the four antisocial codes co-occurring within children at significant levels. Finally, significant positive correlations between fine-grained prosocial and antisocial verbalizations seem best explained by the greater enthusiasm and investment that some children displayed for the tasks than others.

More difficult to explain are the five negative intrapersonal correlations between two fine-grained prosocial variables that emerged for the planning tasks, which all involved either the ask or state personal codes. In this context, these comments may have been less helpful than the more targeted suggest, agree, solicit input, or encourage.

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4.2 | Dyadic processes in children's conversations

At the same time, our findings support the importance of dyadic processes in children's conversations. Although partner variance was significant for only four of 24 variables, relationship variance was significant for 18 variables (range 14–39%). Children conversed differently depending upon their partner, and children elicited different comments from their peers. Indeed, relationship variance exceeded actor variance for 10 of the 19 variables with a significant finding for at least one of these effects. Clearly, in children's conversations, what you say depends upon the person to whom you are speaking.

Findings for dyadic reciprocity correlations further strengthen this argument. These correlations were significant for ten of the 24 variables, suggesting that dyad partners were similar in the frequency with which they made specific remarks. For example, the more one child was discouraging during the frustration task or made personal comments during the planning task, the more the other child did as well, suggesting conversational synchrony.

Finally, significant positive multivariate interpersonal correlations suggested that dyads tended to be more or less prosocial (positive correlation between two fine-grained prosocial verbalizations), antisocial (positive correlation between two fine-grained antisocial verbalizations), or invested in the tasks (positive correlation between one fine-grained prosocial and one fine-grained antisocial verbalization), mirroring findings at the individual level. However, many fewer of these correlations were significant than the correlations discussed above, and so caution is warranted in this interpretation. Finally, and interestingly, the same five negative correlations between two prosocial variables in the planning tasks emerged for interpersonal correlations as intrapersonal correlations.

4.3 | Non-significant variance components

Neither actor variance nor partner/relationship variance contributed significantly to five of the 24 verbalization variables. These verbalizations were not substantially driven by either individual differences or dyadic processes. A likely reason for this pattern of findings is low frequency (these verbalizations did not occur often in these tasks).

4.4 | Gender and task differences

When gender differences emerged for study variables (see Table 2), with some exceptions, they followed a pattern in which girls made more prosocial remarks than boys, whereas boys made more antisocial remarks than girls. This pattern was reinforced by our analysis of gender differences in SRM effects. With one exception, when gender differences emerged, SRM estimates were stronger for girls than boys for prosocial verbalizations (actor variance across tasks, relationship variance for the planning tasks), but stronger for boys than girls for antisocial verbalizations (actor and partner variance across tasks, dyadic reciprocity correlation for the planning tasks). These findings suggest that both trait-like and dyadic processes influenced girls' prosocial remarks more than boys' prosocial remarks, but boys' antisocial statements to a greater extent than girls' antisocial statements.

Differences across tasks (see Table 3) indicated that children made more prosocial remarks in the planning tasks and more antisocial remarks in the frustration tasks (encourage and disagree statements did not follow this pattern). Again, task differences in SRM estimates reinforced this pattern. With one exception, SRM estimates were stronger for prosocial verbalizations in the planning tasks than the frustration tasks (actor variance across genders, relationship variance for girls), but stronger for antisocial verbalizations in the frustration tasks than the planning tasks (actor variance for boys, relationship variance across genders, dyadic reciprocity correlation for girls). Thus, both individual and dyadic processes affected children's prosocial remarks more strongly than their antisocial remarks in the planning tasks, but children's antisocial remarks more strongly than their prosocial remarks in the frustration tasks.

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Finally, positive correlations between prosocial and antisocial verbalizations within individuals appeared stronger for boys than girls (intraclass correlation across tasks) and in the frustration tasks than the planning tasks (actor-actor and intrapersonal correlations across genders). This pattern may have emerged simply because boys made more antisocial remarks than girls and children made more antisocial remarks in the frustration tasks than the planning tasks, providing sufficient variability in the frequency of antisocial statements for relations with prosocial statements to emerge.

4.5 | Strengths, limitations, and future directions

Beyond the rigor that the SRM brought to our primary research question, the study was marked by additional strengths. These advances included the inclusion of both challenging and cooperative contexts, fine-grained observational coding of a wide variety of verbalizations, the analysis of SRM correlations, and the study of gender and task differences.

At the same time, like all investigations, our study was marked by limitations. First, our groups consisted of 9-year-old children; we cannot know how our findings would compare to similar work at earlier or later developmental periods. Future investigators should include samples from different developmental stages in investigations of the role of the individual versus the dyad in children's conversations and assess change in these influences across development.

Second, our sample was composed of unfamiliar children, and so we cannot know how our findings would compare to similar work with familiar peers. We focused on unfamiliar peers to strengthen the argument in favor of dyadic influences on children's conversations, in that our findings suggest that dyadic influences do not require longstanding relationships to emerge. An exciting direction for future research would be to compare individual-versus-dyadic processes in children's conversations in familiar versus unfamiliar dyads or to assess change in these processes as friendships develop.

Finally, as Tables 2–7 show, we conducted many tests across preliminary and primary analyses. Although the significant findings that emerged were well-grounded theoretically and far exceeded chance occurrence, readers should exercise caution given the familywise error rate. Even with these limitations, we hope that this study contributes to our understanding of both individual differences and dyadic processes on children's conversations with peers.

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CONFLICT OF INTEREST

No authors have any conflicts of interest to report.

DATA AVAILABILITY STATEMENT

All data sets and analyses are available at https://osf.io/a3c4p/?view_only=34a9770b1e114f388cf3eb0e9c4b0faa.

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