



Peer interaction in rural preschool classrooms: Contributions of children's learning-related behaviors, language and literacy skills, and problem behaviors[☆]

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ABSTRACT

Peer interaction contributes strongly to children's development and learning, but the processes by which peer interaction is shaped in preschool classrooms, particularly classrooms in rural communities, are largely unknown. This study aimed to examine the patterns of peer interaction in rural preschool classrooms as a way to extrapolate how children influence each other in their day-to-day social interaction. Included in this study were 270 preschoolers (Mean age = 53 months, $SD = 3.2$) from 61 preschool classrooms located in rural communities that primarily served children from low-income families. Results of actor-partner interdependence models demonstrate significant homophily effects of children's learning-related behaviors and language and literacy skills, after accounting for gender and problem behavior homophily. The similarity of learning-related behaviors between a dyad mediated the relationship between their problem behaviors and the frequency of peer interaction. Children's language and literacy skills were similar to the skills of their peers with whom they interacted more often toward the end of the academic year. These findings have implications for understanding and improving peer interaction in rural preschool classrooms.

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1. Introduction

Preschool classrooms are important social contexts for many young children, representing an early milieu in which they learn to establish social interaction and relationships with their peers. During this period, young children gradually transition from solitary to interactive behavior patterns (Rubin, Bukowski, & Parker, 1998). This change in social behaviors provides more opportunities for advancement of children's social, cognitive, and language skills through peer interaction (Piker & Rex, 2008). While several studies have documented the significant influences of peer interaction on preschoolers' learning and development (e.g., Bulotsky-Shearer & Fantuzzo, 2011; Henry & Rickman, 2007; Justice, Petscher,

Schatschneider, & Mashburn, 2011; Mashburn, Justice, Downer, & Pianta, 2009), how this dynamic social process emerges as a function of preschool children's learning and development is less understood. Furthermore, most of the studies on preschool children's peer interaction were conducted in Head Start programs serving low-income children in urban communities or schools serving middle-class families (e.g., Daniel, Santos, Peceguina, & Vaughn, 2013; Delay et al., 2016; Vaughn, Colvin, Azria, Caya, & Krzysik, 2001). Little attention has been directed towards children living in rural areas, where educational resources and facilities are limited and considerably small numbers of households are scattered across a broad region. The purpose of this study was to examine rural preschoolers' peer interaction in relation to their learning-related behaviors, language and literacy skills, and problem behaviors. In particular, we identified individual and dyadic factors contributing to the homophily phenomenon, defined as a preference for interacting with peers who share similar characteristics with them (Mcpherson, Smith-lovin, & Cook, 2001).

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1.1. Peer interaction and child development

According to the bio-ecological theory (Bronfenbrenner & Morris, 2006), peer interaction is a *proximal process*, defined as “progress of progressively more complex reciprocal interaction” that “takes place on a regular basis over extended periods of time” (pp. 797), that drives human development. The underlying mechanisms of peer interaction are heavily discussed in several prominent developmental theories. For example, Vygotsky (1978) sociocultural theory posits that children’s experiences with peers, as they co-construct various cognitively and socially stimulating learning experiences, afford them opportunities to deepen their knowledge and social understanding, and to appropriate cognitive and social skills for better adaptation to the learning environment. Bandura’s social learning theory (1971) proposes that a critical learning skill in young children is to learn by observing and imitating others. Piaget (1932) stresses that the symmetric knowledge status between peers allows children to engage in more reciprocal inquiry processes that assist them in constructing their knowledge of the world.

These theoretical assumptions have been supported by many studies from the early childhood literature conducted in urban or suburban preschool programs. For example, evidence shows that interactive peer play has positive influences on young children’s learning and development, such as spatial reasoning (Ramani, Zippert, Schweitzer, & Pan, 2014), self-regulation (Barnett et al., 2008), and social and learning competencies (Bulotsky-Shearer, Manz et al., 2012). Positive experiences with peers at preschool were also found to enhance children’s knowledge of emotion through more frequent opportunities to communicate their emotion with peers (Torres, Domitrovich, & Bierman, 2015). Recently, Mashburn et al. (2009), and Justice et al. (2011) found that children’s language growth was highly influenced by the language skills of their classmates; the peer effects are manifest more strongly in low-ability children than their high-ability counterparts.

1.2. Child attributes and peer interaction

A central focus of the current study was to explore how specific attributes of children may be associated with their interaction in preschool classrooms. Prior studies have suggested that the ways in which children interact with their peers can be influenced by the attributes of children as well as their peers. For example, preschool girls tend to demonstrate greater social skills than boys (Chen, 2010). Children with greater problem behaviors or poorer language skills tend to interact with peers less often (Cohen & Mendez, 2009; Hanish, Martin, Fabes, & Barcelo, 2008; Mendez, Fantuzzo, & Cicchetti, 2002).

The extent to which children differ from their peers in terms of these attributes may also play a role in peer interaction. It is commonly observed that children choose to interact with certain peers more frequently who share some common attributes than to interact with less-similar peers within a preschool classroom. This homophily phenomenon has received considerable attention from early childhood researchers in the past decades. Researchers speculate that the children with whom a child interacts most often can have significant effects on the child’s development (e.g., Delay et al., 2016; Martin et al., 2013; McPherson et al., 2001; Strayer & Santos, 1996; Vaughn et al., 2001).

The most commonly observed homophily phenomenon is that of gender segregation. The preference to interact with same-sex peers emerges in the toddler years, with girls showing stronger same-sex preferences than boys (Howes & Phillipsen, 1992). Data suggest that over one-half of preschool children interact with same-sex peers, and fewer than 10% involve only other-sex peers in their interaction (Fabes, Hanish, & Martin, 2003). Martin and her col-

leagues (Martin et al., 2013; Martin, Fabes, Hanish, & Hollenstein, 2005; Martin, Fabes, Hanish, Leonard, & Dinella, 2011) suggest that the origins of gender homophily may come from children’s beliefs that same-sex peers share more common attributes than other-sex peers, children’s perception of gender roles, or the types of social activities that draw children together.

Behavioral homophily, problem behaviors in particular, has also been extensively investigated in the past decade. Hanish et al. (2008) show that children with externalizing behavior problems (e.g., aggressive, disruptive, or defiance behaviors) tend to affiliate with peers sharing similar externalizing behaviors. Moreover, recent evidence from Stone et al. (2013) suggests that children with internalizing behavior problems, namely, directing distressing feeling toward the self and consequently experiencing “sorrow, guilt, fear, worry” (Zahn-Waxler, Klimes-Dougan, & Slattery, 2000), tend to befriend other internalizing peers, after controlling for externalizing behaviors and gender effects. One possible explanation for this finding is that children with these problem behaviors are often excluded or ignored by their typically developing peers. The experience of peer rejection then leads the children to befriend other rejected peers. The more they are exposed to problem behaviors in their peer networks, the more they are at risk for impaired social, emotional, and cognitive development.

To date, the primary interests on homophily effects in young children focus on gender and behavior homophily. It is less understood whether homophily is influenced by other child attributes, such as children’s skill levels in early academic domains. One exception is a recent study by Delay et al. (2016), who found that the homophily phenomenon among young children was associated with their school competencies; specifically, teacher reports of children’s social and learning behaviors were predictive of their social networks. If homophily effects transcend gender and behavior, we might theorize that children with greater pre-academic competencies, for instance, are drawn to interact with children who approach learning similarly.

1.3. Pre-academic competencies and peer interaction

Important pre-academic competencies develop in the preschool years, and serve as a foundation to future academic achievement in reading, math, and other academic domains (Dickinson, 2011). One of the essential pre-academic competencies is learning-related behaviors (Hyson, 2008), referred to as the behaviors, skills, and attitudes that characterize how a child reacts and adapts to the learning environment. Examples of positive learning-related behaviors include paying attention to the teacher, being interested in exploring new activities, being willing to seek help or accept help, showing perseverance when facing challenges, and collaborating with others. Children who exhibit a high volume of positive learning-related behaviors are more able to profit from learning-related experiences within the classroom (Domínguez, Vitiello, Maier, & Greenfield, 2010). In turn, children’s learning-related behaviors predict early academic development, even when controlling for cognitive abilities (Yen, Konold, & McDermott, 2004).

In addition to the direct relationship between learning-related behaviors and children’s academic achievement, this pre-academic competence has been found to closely relate to children’s social interaction with peers. Coolahan, Fantuzzo, Mendez, and McDermott (2000) found that children who interacted more positively with peers also showed more positive learning-related behaviors and peer relationships. Recent studies further showed that both teacher ratings of learning-related behaviors and positive play behaviors mediate, or can buffer against, the relationships between problem behaviors and academic achievement in Head Start classrooms (Bulotsky-Shearer, Bell, Romero, & Carter, 2014; Bulotsky-Shearer, Bell, Romero, & Carter, 2012; McWayne &

Cheung, 2009). These findings suggest that developing positive learning-related behaviors and/or the ability to form interactive play interaction can lower the negative impacts of problem behaviors on academic achievement.

Another type of pre-academic competencies that might determine with whom children elect to interact is children's language and literacy skills. According to Vygotsky (1978), language is a psychological tool for higher-order thinking. Better language and literacy skills can help children to communicate their thoughts, desires, and feelings with others, have a better understanding of other children's perspectives, and resolve conflicts more effectively. This has been supported by Mendez et al.'s (2002) profile analysis, which shows that children with more advanced expressive and receptive language skills tend to engage in higher levels of social interaction with peers. Dionne, Tremblay, Boivin, Laplante, and Perusse (2003) found that children with better language and literacy skills are capable of initiating more effective communications with others and therefore reduce the likelihood of displaying aggressive behaviors. Similarly, Doctoroff, Greer, and Arnold (2006) showed a significant relationship between social behaviors and emergent literacy skills. In their findings, preschool boys' emergent literacy difficulties were associated with more aggressive and fewer prosocial behaviors, and both boys and girls' emergent literacy difficulties were associated with higher levels of solitary play and more displays of negative affect.

While these studies suggest that children with better learning-related behaviors or higher language and literacy skills would experience more frequent and positive interaction with their peers, children may also interact more often with peers who share the same levels of learning-related behaviors or language and literacy skills. To consider the extent to which this may be true, the homophily of these pre-academic competencies were investigated in this study, focused specifically on children participating in rural preschool programs.

1.4. Rural preschool environment

A number of studies have examined young children's peer interaction (e.g., Barbu, 2003; Schaefer, Light, Fabes, Hanish, & Martin, 2010), but the bulk of this work has focused specifically on young children residing in suburban and urban settings, as referenced in the previous sections. Prominent theories of child development assert the importance of viewing variability in children's ecosystems – including family, school, and community – as deeply influential to children's development, such that one cannot be understood in absence of the other (Bronfenbrenner & Morris, 2006). There is thus a need for broadening our understanding of preschool children's social experiences by investigating peer interaction outside suburban and urban contexts (Kainz, Willoughby, Vernon-Feagans, & Burchinal, 2012; Miller & Votruba-Drzal, 2013).

Considerable evidence shows that children's development within rural settings is distinguishable from non-rural settings. Miller and Votruba-Drzal (2013) reported significant disparities in the early achievement of rural children relative to urban children, with children in rural settings showing less-developed kindergarten readiness skills than children in small urban and suburban locales. Other studies support similar arguments. For instance, using a large, nationally representative data set, Sheridan and Koziol (2014) found that rural children tend to have poorer social skills than children in other geographical settings (city, suburban). There are numerous explanatory factors that help to understand these differences from a bioecological perspective. For instance, rural parents may have perspectives regarding their role in fostering their children's early academic development that are distinct from urban and suburban parents (Curenton & Justice, 2008). Rural children's poor social and academic development

may also be attributed to limited resources, staff, and technology to buffer against the negative impacts of poverty (Mitchem, Kossar, & Ludlow, 2006), as well as geographic isolation that prevents children from interacting with each other and accessing the already-insufficient resources.

Alternatively, peer interaction in preschool classrooms might reveal some universal patterns across distal contexts because of potentially strong and common proximal influences from peers with whom children interact daily in preschools. Given that research in this field has mainly been conducted in urban preschool settings, whether peer interaction in rural preschool classrooms would reveal unique patterns was tested as an exploratory hypothesis. By examining the nature of children's peer interaction in rural classrooms, specifically, this work helps to improve our understanding of the experiences of young, rural children and consider how these experiences may generalize beyond these settings.

1.5. Purpose and overview of the present study

The goal of this study was to understand how the degree to which rural children interact with other classmates was associated with their own attributes and that of their peers. In addressing this aim, we examined whether children's pre-academic competencies (individual-level) affected their interactions with peers, and the extent to which pre-academic competencies between dyad members (dyad-level) were predictive of peer interaction, homophily phenomenon in particular, above and beyond the homophily of gender and problem behaviors. Two types of pre-academic competencies were examined in this study: learning-related behaviors and language and literacy skills.

The children involved in this study were enrolled in preschools located in rural, Appalachian communities, and the schools targeted enrollment to children from socioeconomically disadvantaged backgrounds. Children and their peers were randomly selected from a large sample of classrooms to avoid selection biases. We assume that if peer influences are normative, they should be observable in these randomly selected children. The study employed a dyadic data analysis called actor-partner interdependence model (Kenny, Kashy, & Cook, 2006) to estimate the extent to which individual-level and dyad-level attributes, most of which were assessed at one point during an academic year, related to the frequency of peer interaction in rural preschool classrooms reported by teachers at the end of the year. The frequency of peer interaction refers to the quantity of interaction initiated by a child *actor* toward a specific child who received the interaction, called a *partner*.

While prior research on peer interaction of preschool children has typically involved direct observations (Hanish et al., 2008; Schaefer et al., 2010), in this study we elected to use teacher report for four reasons. First, the number of classrooms involved in this study is substantially large and prohibited the intensive observations that would have been needed to identify the frequency of peer interaction among children. Second, research on older children suggests that direct observations and teacher reports yield convergent information about peer interaction (Gest, Farmer, Cairns, & Xie, 2003). Third, preschool teachers are reliable observers of children's skills (Cabell, Justice, Zucker, & Kilday, 2009) and teachers frequently use ongoing observations of children's participation in classroom activities as a way to monitor development over time (Meisels, Liaw, Dorfman, & Nelson, 1995). Fourth, previous studies using observational methods to measure children's frequency of interaction typically observed children in activities with high-frequency child–child interaction (e.g., free play), while overlooking peer interaction in other structured activities. Teacher report might provide a more comprehensive picture of peer interaction across various activities in the preschool classroom.

Three specific research questions were addressed in this study. First, which individual-level attributes, mainly children's gender, learning-related behaviors, language and literacy skills, and problem behaviors, predict the frequency of peer interaction between a dyad? Second, after controlling for individual-level attributes, what common attributes exist in dyads of children (i.e., dyadic similarity) who tend to interact with each other more frequently, as evidence of the homophily effect? Third, would learning-related behaviors mediate the relationship between children's problem behaviors and the frequency of peer interaction between a dyad?

2. Method

2.1. Participants

The data of this study are a subset of data from a randomized controlled trial study designed to examine the impacts of a 30-week whole-group language and literacy curriculum called *Read It Again-PreK* (RIA; Justice & McGinty, 2010).¹ The full-scaled study was implemented in 104 classrooms; all classrooms were located in rural Appalachian communities that targeted enrollment to children residing in low-income households; this included Head Start (57% of classrooms) and state-funded preschool programs (43%). The mean classroom size was 18 children ($SD = 4.4$). Study enrollment was made available to all children in the classrooms; 77% percent of children's caregivers returned consent to participate in this study, representing an average of 14 children per classroom. From the consents received per classroom, between three and five children were randomly selected to participate in the study from among those meeting three criteria: the child was expected to enroll in kindergarten the following year, had no known disability, and spoke English as the primary language.

Each classroom had a designated lead teacher, who provided data used in this study via completion of questionnaires and student assessments. Eighty-two percent of the lead teachers were certified to teach in early childhood education, and 98% had at least an associate's degree. About two-thirds of the teachers reported using a commercial curriculum in their classrooms (62%). Teachers were invited to participate in the larger study at the invitation of their organization's leadership, and provided consent only after receiving all relevant details of the study, including the use of randomization of conditions within a center to the various conditions.

The dataset used for the present work contained 270 children from 61 of the 104 classrooms. Classrooms not included were those in which children's peer interaction or problem behaviors were not assessed. Children's gender, ethnicity, age, and social economic status are reported in Table 1. As shown in the table, the gender distribution of this sample was nearly equal, and the majority of children were white (90%). The average age of the study children was 53 months ($SD = 3.2$). The average years of maternal education was 12.9 years ($SD = 1.5$), and almost one-half of the children resided in homes in which the total family income was less than \$20,000 per year.

2.2. Measures

Measures relevant to this study were fourfold, capturing four constructs of interest: (a) frequency of peer interaction, (b) chil-

dren's learning-related behaviors, (c) children's language and literacy skills, and (d) children's problem behaviors.

2.2.1. Frequency of peer interaction

The frequency of peer interaction for each dyad in the classroom was examined based on a teacher-completed peer interaction rating scale. For each child enrolled in the study, teachers reported the frequency of his/her interaction with all of the other children enrolled in the study by addressing a dyad-specific question (e.g., "How often does Child 1 interact with Child 2?") using a 4-point rating scale (1 = rarely, 2 = sometimes, 3 = often, 4 = always). This approach involved every dyad being rated twice, with the role of actor (Child 1) and partner (Child 2) swapped.

This measure was first developed and implemented in this randomized controlled trial study. To test the construct validity, we calculated the total number of peer interaction received by each individual child from all of his or her classmates participating in this study. This measure was positively correlated with children's social skills measured by the teacher rating form of SSRS questionnaire (Gresham & Elliott, 1990) ($p < 0.05$), and had a positive correlation with learning-related behaviors ($p < 0.001$) and a negative correlation with problem behaviors ($p < 0.05$). These correlations support previous studies that children with better social skills and learning-related behaviors engaged in more interactive play, while children with problem behaviors often struggle with positive peer interaction (e.g., Bulotsky-Shearer et al., 2014; Bulotsky-Shearer, Bell et al., 2012; Hanish et al., 2008). The consistent findings with the previous studies suggest that our teachers were good informants of children's social interaction in the classrooms.

2.2.2. Learning-related behaviors

The *Preschool Learning Behavior Scale* (PLBS; McDermott, Green, Francis, & Stott, 2000) contained three factors corresponding to three dimensions of learning-related behaviors: Competence Motivation, Attention/Persistence, and Attitude toward Learning. PLBS items are based on observable behaviors that occur during classroom learning activities. Thus, teachers are not required to make any causal inferences about children's behaviors. The Competence Motivation Scale measures the extent to which children are interested in approaching learning-related activities (e.g., Child X is reluctant to tackle a new activity). The Attention/Persistence Scale measures children's ability to maintain attention (e.g., Child X tries but concentration soon fades). The Attitude toward Learning Scale measures children's emotional control when facing challenges, and their willingness to cooperate and receive help (e.g., Child X is aggressive or hostile when frustrated). The internal consistency (α) of competence motivation, attention/persistence, and attitude toward learning was 0.85, 0.83, and 0.82, respectively. Considering the three subsets of learning-related behaviors are correlated at the moderate to high level (Table 2), the sum of these learning-related behavior outcomes was calculated and used for the actor-partner interdependence models.

2.2.3. Language and literacy skills

The *Test of Preschool Early Literacy* (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) was used to assess children's early language and literacy skills. All three subtests were administered, which included Definitional Vocabulary, Phonological Awareness, and Print Knowledge. In the Definitional Vocabulary task, the child was presented a picture and was asked to label it and provide a definition. In the Phonological Awareness task, the child was asked to complete a variety of tasks involving manipulation of sounds in syllables and words. In the Print Knowledge task, the child was asked to identify various print concepts, name letters, and say sounds associated with letters. Points for the subtests were summed up to yield raw scores, which were used for the present analyses. Accord-

¹ In this RCT study, classrooms were randomly assigned to one of three study conditions: a business-as-usual control condition and two experimental conditions varied in the nature of the professional development (PD) provided to teachers. The intervention effect did not affect the patterns of peer interaction, and was not included in the analyses.

Table 1
Characteristics of children and families (N = 270).

Variable	Missing	n	%	M (Percentile Rank%)	SD	Range
Gender	0					
Boy		133	49.26			
Girl		137	50.74			
Race/ethnicity	23					
White		225	91.09			
Other ^a		22	8.91			
Child's age (months)	0	270		52.97	3.23	44–62
Maternal education (Years)	25			12.89	1.53	10–20
Family income	31			\$28,400.00	\$22,648.00	2500–87,500
\$10,000 or less		45	18.83			
\$10,001–\$20,000		68	28.45			
\$20,001–\$30,000		42	17.57			
\$30,001–\$40,000		28	11.71			
\$40,001–\$50,000		17	7.12			
More than \$50,000		27	16.32			
Learning-related Behaviors (PLBS) ^b	11	259		43.89	8.76	10–54
Competence Motivation	7	263		17.85	3.80	6–22
Attention/Persistence	8	262		14.13	3.72	2–18
Attitude toward Learning	8	262		11.89	2.41	2–14
Language and Literacy Skills (TOPEL) (Fall) ^c	20	250		73.86	16.43	19–116
Definitional Vocabulary (Fall)	10	260		48.41 (51%)	9.00	12–65
Phonological Awareness (Fall)	19	251		13.62 (36%)	4.77	1–27
Print Knowledge (Fall)	8	262		10.47 (29%)	8.18	0–36
Language and Literacy skills (TOPEL) (Spring)	8	262		94.07	18.22	40–126
Definitional Vocabulary (Spring)	7	263		54.85 (54%)	7.48	25–68
Phonological Awareness (Spring)	7	263		16.84 (43%)	5.42	0–27
Print Knowledge (Spring)	6	264		22.26 (50%)	9.98	1–36
Problem Behaviors (SSRS) ^d	6	264		3.14 (40%)	3.25	0–15
Externalizing	6	264		2.37	2.68	0–12
Internalizing	6	264		0.77	1.30	0–6

^a Other race/ethnicity included Black, American Indian, Hispanic, Asian, and Mixed-ethnic groups.

^b The Preschool Learning Behavior Scale (McDermott et al., 2000).

^c Test of Early Preschool Literacy (Lonigan et al., 2007).

^d The Social Skills Rating System for Teachers (Gresham & Elliott, 1990).

Table 2
Zero-order correlations among individual-level attributes (N = 270).

	1	2	3	4	5	6	7	8
1. Competence Motivation	–							
2. Attention/Persistence	0.66	–						
3. Attitude	0.57	0.74	–					
4. Definitional Vocabulary	0.23	0.30	0.23	–				
5. Phonological Awareness	0.17	0.22	0.15	0.48	–			
6. Print Knowledge	0.17	0.23	(0.08)	0.40	0.46	–		
7. Externalizing Behaviors	–0.30	–0.66	–0.71	–0.15	–0.09	(–0.11)	–	
8. Internalizing Behaviors	–0.58	–0.37	–0.46	–0.17	–0.13	(–0.11)	0.25	–

Note. Non-significant coefficients at the level of $p < 0.05$ are in parentheses.

ing to the test manual (Lonigan et al., 2007), the internal consistency (α) of the subsets of scores and composites ranged from 0.86 to 0.96 for 3- to 5-year old children. The three subsets of language and learning skills are correlated at the moderate level (Table 2). The scores of these sub-scales were totaled to represent children's language and literacy skills in the actor-partner interdependence models.

2.2.4. Problem behaviors

The Problem Behavior Scale of the preschool version of the *Social Skills Rating System* for teachers (SSRS; Gresham & Elliott, 1990) was implemented to measure children's externalizing and internalizing behaviors. The problem behavior rating scale contains 10 items. The teacher rated each item on a 3-point rating scale (never, sometimes, very often). The externalizing factor measures children's aggressive, disruptive, and defiance behaviors. The internalizing factor measures children's loneliness, anxiety, and depression. The internal consistency (α) of the externalizing and internalizing behavior

scores for the current data set was 0.82 and 0.75, respectively. Considering externalizing and internalizing problems follow distinctive developmental trajectories in young children (Gilliom & Shaw, 2004) and were associated with children's learning-related behaviors (McWayne & Cheung, 2009) and language and literacy skills (Doctoroff et al., 2006), both of the behavioral indices were used in the current analyses.

2.3. Procedure

All of the measures except for language and literacy skills were assessed once during the academic year. The frequency of peer interaction measure was completed by teachers close to the end of the academic year, in the spring. Children's learning-related behaviors were assessed by teachers in the first two months of the spring semester. The standardized, norm-referenced measure of children's language and literacy skills was implemented in the fall and spring by trained research assistants. For our research pur-

poses, mainly the spring scores were used in the analyses, but a post-hoc supplementary analysis was conducted using both the fall and spring scores to examine whether language and literacy homophily was attributed to children's tendency to select playmates with similar language and literacy skills or was a result of complex reciprocal interaction with peers that occurred on a regular basis throughout the academic year. Children's problem behaviors were assessed midway through the fall of the academic year.

3. Results

3.1. Descriptive analysis

In this examination of children's frequency of peer interaction, the unit of analysis comprised the frequency of interaction between a child and each of his or her peers in the study (e.g., Child 1 → Child 2, Child 1 → Child 3, Child 1 → Child 4). The data set contained a total of 938 pairs of peer interaction: 107 pairs were rated by teachers as 'always interact,' 277 pairs were 'often interact,' 307 pairs were 'sometimes interact,' and 135 pairs 'rarely interact.' The average frequency by which children were rated to interact with their peers was 2.40 ($SD = 0.91$, range = 1–4). The mean scores for the other measures of interest in this study, namely children's learning-related behaviors, language and literacy skills, and problem behaviors are reported in Table 1, and correlations among these child-level attributes are reported in Table 2. The correlational data showed there to be moderate to high negative correlations between children's learning-related behaviors and problem behaviors, and low to moderate positive correlations between learning-related behaviors and language and literacy skills. Language and literacy skills were mildly and negatively associated with problem behaviors.

Fig. 1 contains examples of peer interaction patterns from four classrooms in the current data set. These network diagrams are visual representations of the relationships between the frequency of peer interaction and children's learning-related behaviors, language and literacy skills, and problem behaviors.

3.2. Dyadic data analysis

This section reports findings on the three research questions using Actor-partner interdependence models (APIM, Kenny et al., 2006). APIM is designed to examine mutual influences between dyad members, cross-sectionally or longitudinally, by accounting for the dependency between dyad members. It allows researchers to simultaneously examine individual-level effects (actor effects and partner effects) and dyad-level effects (e.g., absolute differences of child attributes, interactions between actors and partners). The APIM models applied in this study are two-level generalized mixed models in which actors and partners were nested within dyads. The dependent variable, the frequency of interaction initiated by a child toward one of her/his peers, was treated as an individual-level ordinal variable. We used SAS PROC GLIMMIX for multilevel modeling. To fit the ordinal data, the multinomial distribution and a cumulative logit link were specified. All of the continuous independent variables were grand-mean centered, and gender was a categorical variable with an effect coding (1 = boy, −1 = girl). Hence, the intercepts of the model could be interpreted as the frequency of peer interaction for children across boys and girls who scored at average on every independent variable. Homophily effects were mainly tested using the absolute values of the difference between each pair of children.

The procedure used for the current analysis consisted of five steps. First, we checked the necessity of the random intercept

of dyads. Second, to answer the first research question, all relevant individual-level variables were included in the model. This model examined whether actor and/or partner attributes predict the degree with which actors interacted with their partners. Third, after accounting for individual-level effects, we identified dyadic attributes contributing to the homophily phenomenon using three types of dyadic similarity measures. Gender homophily was represented by a categorical variable in which 1 referred to a same-sex dyad and 0 was a mixed-sex dyad. Regarding the other homophily effects, we first included all of the absolute values of the difference between dyad members' scores on learning-related behaviors, language and literacy skills, and internalizing and externalizing behaviors. Next, nonsignificant difference variables were replaced by interaction terms between the actor and the partner on the specific child attribute. According to Kenny and Cook (1999), this multiplicative method and the absolute difference method may yield highly correlated results and therefore cannot be used simultaneously in the Actor-Partner Interdependence Model. Hence, only the multiplicative effects of the child attributes that did not show significant absolute difference effects were examined in the models. Lastly, to examine the mediating role of learning-related behaviors, we followed statistical procedures recommended by Baron and Kenny (1986) within the APIM framework.

Model 1 in Table 3 is an ordinal empty means model with a random intercept of dyads. This model served as the baseline model in testing the need to control for the variance attributable to the dyads and to compute the grand mean probabilities of different levels of peer interaction. A likelihood ratio test using the COVTEST function in SAS shows that the variance of the random intercept was significantly different from zero ($\chi^2_{(1)} = 498.89$, $p < 0.0001$), confirming the need of a two-level generalized mixed model. Based on the estimates of intercepts in the fixed effects table, we calculated the expected probabilities of different levels of peer interaction: the expected probability of 'rarely interact' was 0.01 ($= 1 - e^{-5.06}(1 - e^{-5.06})$); the probability of 'sometimes interact' was 0.64 ($= e^{5.06}(1 - e^{-5.06}) - e^{-0.62}(1 - e^{-0.62})$); the probability of 'often interact' was 0.35 ($= e^{-0.62}(1 - e^{-0.62}) - e^{-5.84}(1 - e^{-5.84})$); the probability of 'always interact' was 0.003 ($= e^{-5.84}(1 - e^{-5.84})$). Overall, the majority of children were observed to interact with their peers sometimes or often.

With regard to which individual-level attributes predict the strength of interaction between a dyad (Research Question 1), Model 2 examined both the actor and partner effects of gender, learning-related behaviors, language and literacy skills, and problem behaviors. Children's age and socioeconomic status were initially included in the model as control covariates, but were dropped from the current analyses because none of the effects was significant at the individual and dyadic level. Partner's learning-related behaviors significantly predicted the frequency of peer interaction initiated by the actor ($B = 0.07$, $SE = 0.03$, $p < 0.05$), suggesting that children preferred to interact with peers with better learning-related behaviors. Both actor's and partner's internalizing behaviors but not externalizing behaviors negatively predicted the frequency of peer interaction ($B = -0.46$, $SE = 0.18$, $p < 0.01$; $B = -0.39$, $SE = 0.18$, $p < 0.05$, respectively). Neither did actor's nor partner's gender predicted the frequency of peer interaction. As indicated by the goodness of fit measure (AIC) in Table 3, including actor and partner effects in the model significantly improved the model fit.

To examine whether dyads of children who showed certain common attributes interact with each other more frequently (Research Question 2), we first conducted one-way ANOVAs and Tukey's tests to explore the relationships between the frequency of peer interaction and the means and absolute values of difference between dyad members' learning-related behaviors, language and literacy skills, and problem behaviors. Results would indicate a

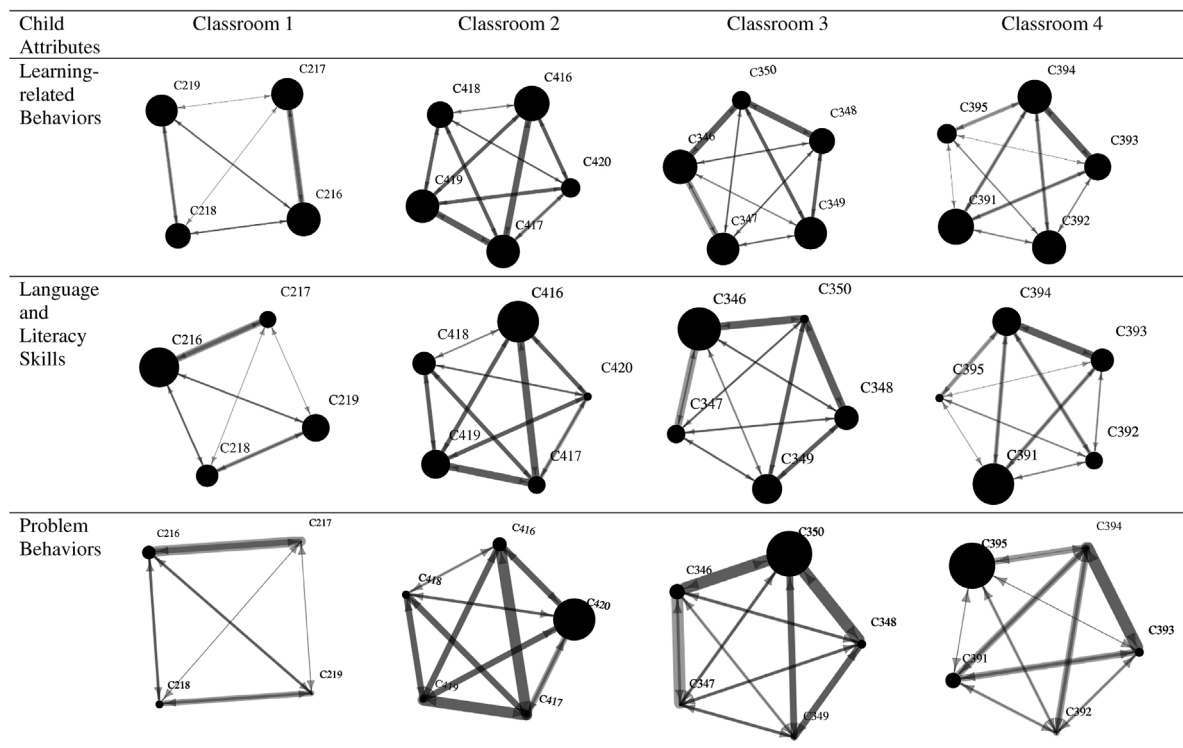


Fig. 1. Examples of peer interaction among participating children from four classrooms in the current data set. Edge width represents the frequency of peer interaction. Node size represents the level of children's learning-related behaviors, language and literacy skills, and problem behaviors.

Table 3
Actor-partner interdependence models predicting the frequency of peer interaction.

Fixed Effects	Model 1			Model 2			Model 3			Model 4		
	Est.	SE		Est.	SE		Est.	SE		Est.	SE	
Intercept (Always Interact)	−5.84	0.41	***	−6.12	0.46	***	−4.25	0.61	***	−5.35	0.53	***
Intercept (Often Interact)	−0.62	0.27	*	−0.59	0.29	*	1.30	0.56	*	0.19	0.44	
Intercept (Sometimes Interact)	5.06	0.39	***	5.26	0.43	***	7.22	0.70	***	6.10	0.57	***
Actor's Gender (1 = boy, −1 = girl)				−0.06	0.21		−0.08	0.19		−0.08	0.19	
Partner's Gender (1 = boy, −1 = girl)				−0.12	0.21		−0.15	0.19		−0.16	0.19	
Actor's Learning-related Behaviors				0.05	0.03		0.03	0.03		0.02	0.03	
Partner's Learning-related Behaviors				0.07	0.03	*	0.05	0.03		0.04	0.03	
Actor's Language and Literacy Skills				−0.01	0.01		−0.02	0.01		−0.02	0.01	
Partner's Language and Literacy Skills				0.0005	0.01		−0.005	0.01		−0.002	0.01	
Actor's Externalizing Behaviors				0.05	0.09		0.08	0.09		0.05	0.08	
Partner's Externalizing Behaviors				0.10	0.09		0.13	0.09		0.10	0.08	
Actor's Internalizing Behaviors				−0.46	0.18	**	−0.33	0.23		−0.61	0.17	***
Partner's Internalizing Behaviors				−0.39	0.18	*	−0.26	0.23		−0.55	0.17	**
Gender similarity							2.32	0.27	***	2.33	0.27	***
Learning-related Behaviors difference							−0.08	0.04	*	−0.09	0.04	*
Language and Literacy Skills difference							−0.03	0.02	<i>p</i> = 0.07			
Externalizing Behaviors difference							−0.05	0.12				
Internalizing Behaviors difference							−0.38	0.29				
Actor's × Partner's Language and Literacy Skills										0.0015	0.0007	*
Actor's × Partner's Externalizing Behaviors										0.01	0.03	
Actor's × Partner's Internalizing Behaviors										0.13	0.15	
Random Effects												
Intercepts of Dyads	24.12	3.20		24.43	3.49		18.45	2.73		18.27	2.70	
AIC	1942.01			1687.10			1591.64			1591.14		

* *p* < 0.05.

** *p* < 0.01.

*** *p* < 0.001.

homophily effect if the absolute difference was lower in dyads with greater frequency of peer interaction. As can be seen in Table 4, results of absolute difference scores showed that dyadic differences in learning-related behaviors, language and literacy skills, externalizing behaviors, and internalizing behaviors decreased as the frequency of peer interaction increased. Furthermore, the mean

scores between dyad members showed that dyads with a greater frequency of peer interaction tended to be those who showed better learning-related behaviors and fewer internalizing behaviors. This suggests that the homophily of learning-related behaviors and the homophily of internalizing behaviors were mainly contributed by

Table 4

Means and differences of age, learning-related behaviors, language and literacy skills, and problem behaviors between dyads grouped by the frequency of peer interaction.

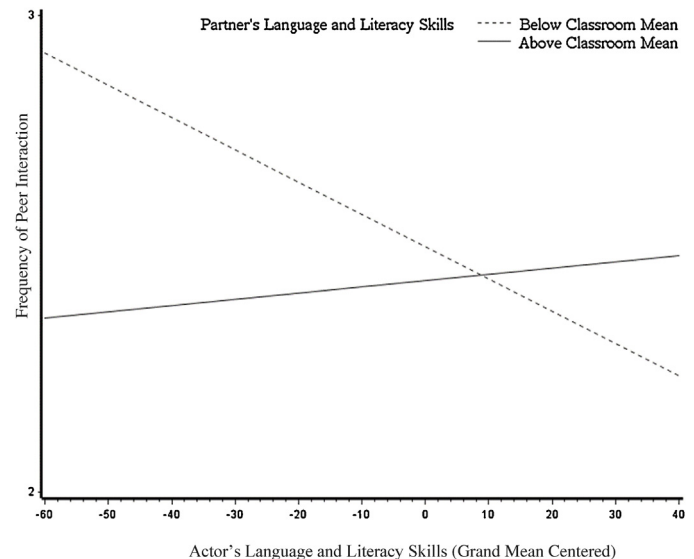
Dyadic Attributes	1 Rarely Interact M (SD) n = 157	2 Sometimes Interact M (SD) n = 352	3 Often Interact M (SD) n = 308	4 Always Interact M (SD) n = 121	F Test	Tukey's Test
Learning-related Behaviors						
Mean	41.88 (7.92)	43.50 (6.92)	44.72 (6.58)	46.03 (6.20)	$F_{(3,922)} = 9.90^{***}$	4 > 2 4 > 1 3 > 1
Difference	10.66 (9.24)	8.62 (7.40)	7.19 (6.52)	5.68 (5.83)	$F_{(3,866)} = 11.96^{***}$	1 > 2 1 > 3 1 > 4 2 > 4
Spring Language and Literacy Skills						
Mean	93.23 (13.00)	94.57 (13.31)	95.52 (14.11)	93.36 (14.48)	$F_{(3,930)} = 1.30$	
Difference	21.21 (15.49)	19.18 (15.06)	16.98 (13.42)	16.01 (11.72)	$F_{(3,882)} = 4.35^{**}$	1 > 3 1 > 4
Externalizing Behaviors						
Mean	2.59 (2.17)	2.48 (2.13)	2.34 (2.17)	2.19 (2.19)	$F_{(3,922)} = 0.96$	
Difference	2.61 (2.64)	2.57 (2.53)	2.01 (2.06)	1.90 (1.87)	$F_{(3,906)} = 5.13^{**}$	1 > 3 2 > 3 2 > 4
Internalizing Behaviors						
Mean	1.08 (1.09)	0.84 (1.01)	0.62 (0.84)	0.46 (0.86)	$F_{(3,922)} = 12.79^{***}$	1 > 2 1 > 3 1 > 4 2 > 3 2 > 4
Difference	1.59 (1.61)	1.08 (1.31)	0.85 (1.22)	0.55 (0.97)	$F_{(3,906)} = 16.31^{***}$	1 > 2 1 > 3 1 > 4 2 > 4

* $p < 0.05$.** $p < 0.01$.*** $p < 0.001$.

dyads of children whose behaviors were rated more positively in the classroom.

Next, we conducted APIM (Model 3 in Table 3) to examine all potential homophily effects after controlling for the actor and partner effects. The homophily hypothesis would be supported if the absolute difference scores between dyad members significantly predicted the frequency of interaction between a dyad. Results showed a significant gender homophily effect ($B = 2.32$, $SE = 0.27$, $p < 0.001$). Same-sex children tend to interact with each other more often than different-sex children. The absolute value of difference between each dyad's learning-related behaviors negatively predicted the frequency of peer interaction ($B = -0.08$, $SE = 0.04$, $p < 0.05$). Children who shared similar learning-related behaviors, measured by their competence motivation, attention and persistence, and attitude toward learning, tended to interact with each other more often. The other absolute difference variables did not show any significant effect and were removed from the model.

The nonsignificant effects of absolute difference of language and literacy skills and problem behaviors were replaced with multiplicative effects in Model 4. Results showed a significant interaction effect of actor's and partner's language and literacy skills ($B = 0.0015$, $SE = 0.0007$, $p < 0.05$). This cross interaction effect supports the homophily of language and literacy skills. As shown in Fig. 2, actors with higher language and literacy skills interacted more often with peers who had higher language and literacy skills, and interacted less often with peers who had lower skills. Interestingly, the negative slope of partner's language and literacy skills that were below classroom means was steeper than the positive slope of partner's language and literacy skills that were above classroom means. This indicates that as the actor's language and literacy skills increase, it is less likely for the actor to interact with low-ability partners than high-ability partners. The multiplicative effects of problem behaviors were not significant.

**Fig. 2.** Interaction between actor's and partner's language and literacy skills.

To examine whether learning-related behaviors mediated the effect of problem behaviors on the frequency of peer interaction between dyads (Research Question 3), we conducted an actor-partner interdependence model that only included individuals' externalizing and internalizing behaviors and the absolute difference of these problem behaviors between actors and partners. The model shows non-significant actor and partner effects, but the absolute difference of externalizing ($B = -0.25$, $SE = 0.12$, $p < 0.05$) and internalizing behaviors ($B = -0.63$, $SE = 0.29$, $p < 0.05$) significantly predicted the frequency of peer interaction. Next,

individual- and dyad-level learning-related behaviors were added to the model. The absolute difference of learning-related behaviors had a significant effect ($B = -0.09$, $SE = 0.04$, $p < 0.05$), but the absolute difference of externalizing and internalizing behaviors became non-significant. A two-level hierarchical linear model further showed that the absolute difference of learning-related behaviors was predicted by that of externalizing ($B = 1.15$, $SE = 0.09$, $p < 0.001$) and internalizing ($B = 1.47$, $SE = 0.17$, $p < 0.001$) behaviors.

3.3. Supplementary analyses

In this section, we further examined whether the homophily of language and literacy skills developed over time or was present at the beginning of the school year; as noted earlier, children's language and literacy skills were examined in both the fall and spring of the year. A paired *t*-test showed that the absolute difference of language and literacy skills between a pair of children was smaller in the spring than in the fall ($t(777) = -2.47$, $p = 0.01$). In the analyses presented thus far, we focused only on children's spring scores, collected concurrently with the frequency of peer interaction measure. In Model 4 (Table 3), the frequency of peer interaction was predicted by children's spring language and literacy skills, which demonstrated a significant interaction between actor's and partner's language and literacy skills. When the spring scores were replaced by children's fall scores, the interaction effect disappeared. The actor and partner effects remained non-significant.

4. Discussion

The purpose of this study was to examine the patterns of peer interaction in rural preschool classrooms as a way to extrapolate how peer effects manifest themselves in rural children's day-to-day social interaction with peers. The underlying assumption of the study is that preschool children form social interaction with peers based on a confluence of factors. Rather than focusing on child attributes that are less malleable, such as gender, the current study examined peer interaction as a function of pre-academic competencies that can be potentially improved by education. Rather than tackling a single characteristic, multiple individual and dyadic attributes were factored in the current study, allowing us to further examine the inter-relationships among these factors.

One of our major findings is that in the spring of the school year, rural children interacted more frequently with peers who demonstrated similar learning-related behaviors in their daily classroom learning activities (Table 3). In addition, dyads of children who interacted with each other most often, which occurred at the rate that is lower than 1%, tended to be those who possessed better learning-related behaviors (Table 4). One possible explanation is that rural preschool children can readily discern their peers' learning-related behaviors in relation to their own, and orient their social interaction accordingly. For example, a child who can work persistently on a puzzle appears to prefer to work with a peer who also shows such task persistency; a child who enjoys collaboration would find others who also value peer collaboration.

The homophily of learning-related behaviors might also be interpreted as the result of peer socialization. That is, children behave in more similar ways as their surrounding peers who are more motivated to learn, more attentive and persistent in tasks, or have better attitudes toward learning behave in more similar ways throughout school learning activities. On the contrary, children who are surrounded by peers who tend to have negative attitudes toward learning might become less active in classroom learning. Whether the homophily of learning-related behaviors is affected by peer selection, socialization, and/or other mechanisms is an issue that is beyond the scope of this study, but the current find-

ings to some extent indicate that learning-related behaviors can be learned and spread among peers within classrooms. This pinpoints a need for teachers to be more sensitive to individual differences in children's learning-related behaviors, and to incorporate peer-mediated activities that can maximize positive peer interaction. For instance, teachers might organize children into small groups for certain instructional activities, in which children's learning-related behaviors can be improved by interacting with model peers.

The current study not only showed that peers' learning-related behaviors were closely related to children's learning-related behaviors in rural preschool classrooms, a mediating effect of dyads' learning-related behaviors on the relationships between dyads' problem behaviors and their frequency of peer interaction was also suggested. This finding is consistent with Bulotsky-Shearer and Fantuzzo's (2011) finding that Head Start children's early problem behaviors matter for acquiring positive learning-related skills, as well as McWayne and Cheung (2009) work showing that learning-related behaviors are conduits of Head Start children's social and academic competencies. Although these analyses cannot rule out other possible mediators of problem behaviors, the findings provide some evidence for the causal relationship between rural children's problem behaviors in the fall and their learning behaviors in the spring, as well the mediating role of learning-related behaviors between problem behaviors and the frequency of peer interaction.

Moreover, the current study extends the existing findings from the individual-level developmental perspective to the dyad-level social learning perspective. That is, peers' learning-related behaviors might be as important as individuals' learning-related behaviors as to their mediation on the relationships between problem behaviors and academic competencies. This finding has a significant educational implication. As mentioned above, if classroom instructions can incorporate peer-mediated activities (e.g., small-group problem solving) (e.g., Ramani et al., 2014; Rohrbeck, Ginsburg-Block, Fantuzzo, & Miller, 2003) where children can enact better learning-related behaviors (e.g., collaboration), participating in these peer-mediated activities might buffer against any undesirable effects of problem behaviors on children's development.

Another major finding of this study is that the rural children tended to form stronger dyadic relations based on their language and literacy skills. This was supported by the significant interaction effect between actors and partners, which explained unique variance of the frequency of peer interaction. Moreover, the supplementary analysis indicates that the homophily of language and literacy skills appeared later in the school year. This result is compatible with a peer socialization effect. Perhaps as children's language and literacy skills develop, their language and literacy skills become more like their peers' so that they are able to engage in better communication and interactive literacy activities with them. However, the peer socialization account is only one of the possible interpretations for the current finding. A longitudinal study is needed to further examine the underlying causal mechanism in the future.

Previous studies focusing on children's language and literacy skills suggest that such emergent language and literacy skills are closely related to individuals' social behaviors and relationships with peers (e.g., Doctoroff et al., 2006; Mendez et al., 2002). The current study extends previous findings in three ways. First, our study incorporated both individual-level and dyad-level factors in the models, which allowed us to compare the relative contributions of individual and dyadic attributes to peer interactions. Our findings suggest that peer interaction was more associated with actor's and partner's language and literacy skills rather than individuals' skill levels alone. Second, the supplementary analysis of the pre- and post-test language and literacy skills suggests that the developmental trajectory of children's language and literacy

skills can be shaped by socializing these skills with peers. Third, our findings are consistent with the peer effects literature that has predominantly focused on urban preschool children (e.g., [Delay et al., 2016](#)). This informs future studies to further examine the universal social mechanisms underlying children's interaction across urban and rural settings.

Surprisingly, the study did not find significant actor and partner effects of language and literacy skills. This finding seems to contradict with previous findings that better language and literacy skills are associated with more positive peer interaction ([Dionne et al., 2003](#); [Doctoroff et al., 2006](#)). One potential reason for the inconsistencies may be related to the fact that the language and literacy measure used in this study focused more on emergent literacy skills than oral language skills, whereas it was the latter skills that received more empirical support for their association with children's social behaviors ([Dionne et al., 2003](#); [Mendez et al., 2002](#)). Future research is needed to further examine the potential influences of expressive and receptive language skills on peer interaction.

Consistent with the gender literature, this study reported a robust gender homophily phenomenon in rural preschool children. Despite this significant dyad-level effect, the actor and partner effects of gender did not predict the frequency of peer interaction. The result suggests that rural preschool girls do not differ from boys with respect to the frequency at which they interact with peers in the classroom. Previous studies also report mixed findings regarding whether preschool girls had greater connections to their peers than boys (e.g., [Hanish et al., 2008](#)). Perhaps gender differences were more significant if the quality of peer interaction had been considered. It is also likely that gender may play a more important role in moderating the relationship between peer interaction and other factors (e.g., [Bulotsky-Shearer et al., 2014](#)). Future research can further investigate the qualitative differences of peer interaction between boys and girls and gender moderation effects.

Several limitations of this work should be noted. First, most of the measures were implemented at one time point during the preschool year, which did not allow us to test further mechanisms underlying the homophily phenomenon, such as selection and socialization. We acknowledge that a social phenomenon does not stop with children seeking out other children who are similar to them; instead, an additional process known as reciprocal socialization ([Cairns, Leung, Buchanan, & Cairns, 1995](#)) sustains the continuity of the pattern that has been started with selection of peers on the basis of mutual similarity. In addition, certain child attributes may change over time, whereas others tend to be stable across the year. Assessing child attributes at one time point did not allow us to consider the stability effect. A longitudinal design with repeated measures is needed for future research to separate peer selection from peer socialization processes, and to examine the dynamic relationships between peer interactions and child development.

While peer interaction, measured by the frequency of peer interaction between dyads, was theoretically distinctive from learning-related behaviors and problem behaviors, all of these measures were based on teacher observations in the same social setting. The three indirect child measures may have shared certain degree of variance that was attributable to the measurement method rather than to the constructs that the study intended to represent. This shared method variance issue might have affected the validity of our hypotheses, because the study could not rule out the possibility that children tend to reveal more positive learning-related behaviors and fewer problem behaviors when the teacher was present in the classroom. This might potentially bias teachers' observation and cause the homophily of learning-related behaviors to override the homophily of problem behaviors.

Despite this limitation, the relationships among the frequency of peer interaction, learning-related behaviors, and problem behaviors are consistent with previous findings showing that children with better learning-related behaviors engage in more interactive play; conversely, children with problem behaviors have greater problems interacting with others and therefore tend to experience negative peer interaction at school (e.g., [Bulotsky-Shearer et al., 2014](#); [Bulotsky-Shearer, Bell et al., 2012](#); [Hanish et al., 2008](#)). The successful replication of previous findings suggests that the frequency of peer interaction reported by our teachers was a valid measure of peer interaction. However, we are aware that teacher report is one of many ways to measure peer interaction. Future research can further compare teacher rating with other informant reports (e.g., sociometric methods) on young children's peer interaction and behavioral patterns.

Using a subset of children from each preschool classroom allowed us to generalize findings to dyadic interactions occurred in a wider range of classroom contexts in rural communities. However, this randomized design restricts the current study from exploring classroom networks as a whole. Therefore, other levels of peer interaction cannot be examined, such as peer group formation or classroom networks. We conjecture that the homophily effects found in the current study would also operate at the group-level or classroom-level, but the generalizability of our findings need more warrants in the future.

We must point out that the study did not fully take into account possible influences of distal social contexts, such as poverty and rurality. The study was conducted in rural Appalachian communities where the majority of children came from low-income families. Given our sample did not provide sufficient variability along the urban-rural continuum ([Miller & Votruba-Drzal, 2013](#)), we were not able to systematically examine the influence or rurality on preschool children's peer interaction. In addition, the study could not fully test the effect of poverty because of the incomplete information on family income level. However, we conjecture that certain patterns of peer interaction, such as homophily, may be universal across social contexts; that is, some common patterns seen in the current study on rural children are coherent with results in prior literature conducted in Head Start programs serving low-income children in urban communities (e.g., [Daniel et al., 2013](#); [Delay et al., 2016](#); [Vaughn et al., 2001](#)). For example, consistent with the literature on Head Start children, rural preschool children's learning-related behaviors had a mediating effect on the relationship between problem behaviors and positive peer interaction. In addition to comparing the patterns of peer interaction between rural and urban preschool classrooms, future studies can further examine whether attending center-based preschools provide more peer-learning benefits to rural children than children who mainly go to home-based childcare facilities, the latter of which have been shown to have an increased use in rural communities ([Miller & Votruba-Drzal, 2013](#)).

In sum, the current study provided evidence that rural preschool children are similar to their peers in terms of their learning-related behaviors, language and literacy skills, and problem behaviors. This conclusion was drawn on findings from preschool classrooms located in resource-limited rural communities. Our findings with regard to homophily effects suggest that educators and researchers should seek more effective ways to establish more socially dynamic preschool environments for children to expand their social networks to more diverse peer groups.

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