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# Peer Interaction Patterns in Mixed-Age and Same-Age Chinese Kindergarten Classrooms: An Observation-based Analysis

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## ABSTRACT

**Research Findings:** This study compared the peer interaction patterns in mixed-age and same-age Chinese preschool classrooms using videotaped behavioral observations. A total of 179 children (ages 3–6) from three mixed-age classes and three same-age classes were involved in this study. A total of 170 valid videos were obtained, including 85 videos from the mixed-age ( $M_{age} = 58.99$  months,  $SD = 10.09$ , 34% girls) classrooms and 85 from the same-age ( $M_{age} = 57.74$  months,  $SD = 10.84$ , 43% girls) classrooms. The results revealed that: (1) there was a significant age effect in the frequency and duration of peer interactions, with older children having more and longer interactions; (2) there was a significant between-group difference in the duration of peer interactions, with MA having a longer duration than SA; (3) there was a significant same-gender preference with children preferring interacting with the same gender peers; (4) the MA classrooms had significantly more positive interactions and significantly less neutral and negative interactions than the SA classrooms; and (5) the MA classrooms engaged in significantly more dominating and less neutral interactions than the SA ones. **Practice or Policy:** These findings have implications for early childhood teaching, classroom organization, and classroom management.

Peer interactions provide opportunities for young children to gain social practice and experience and to build healthy peer relationships; thus, they will eventually and profoundly impact their socio-emotional development (Blerta, 2019). Peer interactions include those interactions between same-age peers as well as between mixed-age peers. However, most preschool classrooms in the world are arranged by age, thus only having same-age peer interactions, which are an important part of the daily routine in early childhood programs. Consequently, young children in the same-age classrooms will be suffering from the lacking of mixed-age peer interactions. This problem is more serious in China, as it has implemented the only-child policy for 30 years and has made most Chinese children the only child in their families (Li et al., 2020). This means that these Chinese only children have been deprived of the opportunities of having mixed-age peer interactions at home and in preschool, which will unfortunately and negatively impact their social development (Zhang, 2004). Recently, some Chinese preschools are trying to promote mixed-age classrooms, thus providing mixed-age peer interactions (Wu, 2017). However, there might be significant differences in the peer interaction patterns between mixed-age (MA) and same-age (SA) preschool classrooms (Wu, 2017). Accordingly, there is an urgent need to explore the similarities and differences in the two types of peer interaction in the Chinese context, thus providing educational implications for implementing the mixed-age classroom policy in China. To fill this gap, this study videotaped and compared MA against SA classrooms in Chinese preschools, aiming to reveal the pattern differences and the associated factors subsequently.

### ***Peer Interactions in Preschool Classrooms***

Peer interaction in the preschool classroom refers to the process in which young children exercise action or influence on each other through verbal or non-verbal means (Li, 2011). Peer interactions and peer relationships in a preschool classroom can significantly facilitate young children's cognition, language, and social skills (Baker-Sperry, 2007; Rubin et al., 2011; Williford et al., 2013). Positive peer interactions can help children gain a sense of belonging and security, thus promoting their social communication skills (Ryan, 2012) and psychological adaptability (Boivin, 2005). The existing studies on peer interaction tend to focus on the value of peer interactions, the characteristics of peer interactions, factors that influence peer interaction, and peer interaction skills intervention training. It is believed that if educators are sufficiently equipped to support peer interactions within MA or SA classrooms, it would be possible to maximize the positive peer influence (DeLay et al., 2016; Foster et al., 2020).

The importance of peer interaction could be interpreted using Vygotsky's sociocultural theory (SCT), which views interaction as a necessary tool for creating a ZPD (zone of proximal development) of a particular learner (Tomas, 2019). According to SCT, young children could develop cognitively and socially through peer interactions (Vygotsky, 1978). As peer interactions can facilitate young children's learning and development in many domains, it is important, theoretically and practically, to understand how peer interactions differ in mixed-age (MA) and same-age (SA) preschool classrooms. Thus, this study reveals the differences in young children's peer interactions within MA and SA classrooms and the potential reasons for these differences and proposes pedagogical recommendations for supporting peer interactions among young children.

### ***Mixed-Age versus Same-Age Preschool Classrooms***

Preschool classrooms are normally same-aged (SA), very few are mixed-aged (MA). In MA preschool classrooms, young children of varying ages and developmental levels are placed together following a specific combination model (Katz, 1992). MA classroom promotes the development of self-esteem and self-confidence in older children by providing them with the opportunity to care for younger children. In contrast, younger children are empowered to identify their zone of proximal development and engage in activities beyond their cognitive levels. In addition, older children serve as role models for younger children, thereby inducing younger children to exhibit prosocial behaviors in future interactions with even younger children (Ansari & Purtell, 2018; Lillard, 2016; Winsler et al., 2002). Thus, MA preschool classrooms can help facilitate peer interaction, enhancing young children's social and personality development.

SA preschool classrooms have the same-aged young children, who are very likely to have a similar level of knowledge, competencies, and relational power. This also provides a unique environment for children to resolve cognitive conflicts with peers, thereby stimulating their social cognitive, and moral developments (Azmitia, 1988; Piaget, 1932; Tudge, 1992). In contrast, MA preschool classrooms might increase the hierarchical structure and level of complexity in group interactions, while SA classrooms might have relatively equal and comparable young children around the same level. Therefore, peer interactions in MA classrooms can provide opportunities for older children to practice and develop prosocial, self-regulatory, and leadership skills, while younger children gain scaffolds for growth as they receive help from older children (Winsler et al., 2002). Compared to those in SA classrooms, young children in MA classrooms have more play styles, more prosocial behaviors, and tend to depend on peers rather than teachers in daily routine (Howes & Farver, 1987; Mounts & Roopnarine, 1987). Therefore, MA and SA preschool classrooms have different benefits for young children. Early childhood teachers need to capitalize on the benefits of peer interactions in different preschool classrooms to facilitate young children's early learning and development.

In the past decade, researchers have focused on exploring the frequency, features, and factors of peer interactions in MA preschool classrooms (Ansari & Purtell, 2018; Lillard, 2016). Recently, the

focus has gradually shifted to the impact of MA on young children's learning and development (Foster et al., 2020). The existing literature has collectively demonstrated that MA classrooms could enable peer support among children and facilitate early cognitive and social development (Ansari & Purtell, 2018; Lillard, 2016). However, few studies have explored the unique impact of MA on only children in the Chinese context. Unlike their counterparts in other countries, the young children in China are primarily only-child in their families thus have no experiences of peer interaction at home (Li et al., 2020). Chinese young children might have unique peer interaction patterns in MA preschool classrooms, as interacting with an elder or younger children might be rare. This study will fill this research gap.

### **This Study**

The above literature review has revealed two research gaps. First, no studies have examined the peer interactions in MA and SA preschool classrooms in China, where most young children have no siblings thus have no experience of peer interactions at home. Second, very few studies have revealed the differences and similarities in peer interactions between MA and SA classrooms, especially in Chinese preschoolers. Given that more and more preschools are implementing MA classroom policy in China, it is urgently needed to conduct a classroom observational study to compare MA and SA classrooms' peer interaction patterns. This will generate empirical evidence to showcase the nuanced differences between MA and SA classrooms and their impacts on peer interactions. Therefore, this study was dedicated to addressing the following questions with videotaped observations:

- (1) Will the children in MA classrooms outperform those in SA classrooms in peer interactions in frequency and duration?
- (2) Will the children in MA and SA classrooms differ in the peer interaction patterns in terms of peer relationship and group structure?

In particular, we proposed the following hypotheses:

H1: The children in MA classrooms will demonstrate longer duration and more frequency of peer interactions than their counterparts in SA classrooms;

H2: The children in MA classrooms will have better peer relationships and group structure than their counterparts in SA classrooms.

## **Method**

### **Participants**

A cluster sampling approach was adopted to recruit 179 children from three mixed-age (MA) and three same-age (SA) classes in a Chinese kindergarten located in Hangzhou, Zhejiang, China. Chinese kindergarten normally has three levels of class: (1) Lower Kindergarten Class (Xiaoban) for Aged 3–4 children; (2) Middle Kindergarten Class (Zhongban) for Aged 4–5 children; and (3) Upper Kindergarten Class (Daban) for Aged 5–6 children. The participating kindergarten has one MA and two SA classrooms for each level. We randomly sampled one SA classroom and the only MA classroom from each level. Each of the three MA classes was composed of children from the other two levels. A total of 170 valid videos were obtained, with 85 from the MA classes ( $M_{age} = 58.99$  months,  $SD = 10.09$ , 34% girls) and 85 from the SA classes ( $M_{age} = 57.74$  months,  $SD = 10.84$ , 43% girls).

## Measure

The Peer Interaction Observation Scale (PIOS) was developed based on the social withdraw and sociability measure (Rubin & Both, 1989). Chinese experts and kindergarten teachers were consulted about the content and items of PIOS. Culturally appropriate and contextually relevant items were included and piloted, and the necessary amendments were made accordingly. The final version has five constructs: (1) gender (same-gender, opposite-gender); (2) initiative (active, passive); (3) method (talk, action, and facial expression); (4) attitude (positive/neutral/negative); and (5) control (dominating, neutral, or following). For detailed operational definitions, please refer to [Appendix A](#). PIOS was employed to analyze all the videoclips using both time sampling and event sampling approach.

## Procedure

First, rapport building and familiarization. One week before collecting data in the participating classroom, we videotaped and interacted with the participating children to eliminate the children's feelings of unfamiliarity with the camera and us. This scenario-based familiarization technique will help to ensure data authenticity and validity.

Second, we videotaped all the participating children when they played with peers during the free playtime. The participating kindergarten has blocked half-hour for indoor free play during the afternoon. We videotaped 10 minutes for each child, using the time sampling approach.

Third, we adopted the event-sampling approach to analyze the 10-minute videotape for each child. The first author trained one research assistant to do the video coding and analysis using PIOS. The research assistant did not know the purpose or hypothesis of this research to avoid observer bias. The 10-minute videotape for each participating child was analyzed, focusing on the five constructs: gender, initiative, method, attitude, and control. In addition, the frequency of peer interaction and the time duration of each interaction were also recorded for each child (See [Appendix B](#)). The first author sampled and examined 10% of the coding results and found them reliable and appropriate. The final coding results were adopted for the following data analysis.

## Results

All the data generated from the video-coding analysis were entered into SPSS software and analyzed, and the results are reported in this section.

### Testing Hypothesis 1

To confirm whether the children in MA classrooms demonstrated longer duration and more frequency of peer interactions than their counterparts in SA classrooms (hypothesis 1), we compared the frequency and duration of peer interactions between MA and SA classrooms.

First, to evaluate the effect of Class and Age level on frequency of peer interactions, a 2 (Class: MA vs. SA)  $\times$  3 (age level: lower, middle, upper) two-way ANOVA was conducted. As shown in [Table 1](#), results indicated a significant main effect of age level [ $F(2, 164) = 11.39, p < .01$ ], while the main effects of class [ $F$

**Table 1.** The frequency and duration of peer interactions in MA and SA classrooms.

	Total number of interactions				Total duration of interactions (minutes)			
	MA Classrooms		SA Classrooms		MA Classrooms		SA Classrooms	
	<i>M(SD)</i>	Range	<i>M(SD)</i>	Range	<i>M(SD)</i>	Range	<i>M(SD)</i>	Range
Lower Class	10.29 (5.06)	3–23	10.41 (7.09)	1–27	3.10 (2.04)	0.15–9.23	2.01 (1.83)	0.08–5.95
Middle Class	12.14 (7.24)	2–30	11.14 (5.37)	3–28	3.49 (0.28)	0.28–8.68	2.35 (1.32)	0.15–5.25
Upper Class	16.45 (9.12)	4–51	15.63 (4.47)	5–25	4.60 (0.55)	0.55–9.12	4.18 (1.55)	1.60–8.17
Overall	13.29 (7.91)	2–51	12.25 (6.17)	1–28	3.81 (0.15)	0.15–9.23	2.82 (1.83)	0.15–8.17

(1, 164) = 0.38,  $p = .54$ ) and the interaction between age level and class [ $F(1, 166) = 0.14, p = .87$ ] were not significant. In addition, one-way ANOVA was conducted to explore the age differences in the frequency of peer interactions for the MA and SA classrooms, respectively. Significant age effect was found for both MA [ $F(2, 84) = 5.12, p < .01$ ] and SA [ $F(2,84) = 6.83, p < .01$ ] classes.

Second, as to evaluate the effect of Class and Age level on duration of peer interactions, a 2 (class: MA vs. SA)  $\times$  3 (age level: lower, middle, upper) two-way ANOVA was conducted. Significant main effects of class [ $F(1, 164) = 11.08, p < .01$ ] and age level [ $F(2, 164) = 4.40, p < .05$ ] were found, while the effect of the interaction between class and age level [ $F(1, 166) = 0.22, p = .64$ ] was not significant. The average time duration of peer interactions was 3.81 minutes ( $SD = 2.33$ ) for the MA classrooms and 2.82 minutes ( $SD = 1.83$ ) for the SA classrooms. Independent samples  $t$ -tests revealed a significant difference between the MA and SA classrooms,  $t = 3.10, p < .01$ , indicating a significantly longer duration for the MA classrooms. In addition, one-way ANOVA was conducted to explore the age differences in time duration of interactions for the MA and SA classrooms, respectively. A significant age effect was also found,  $F(2, 84) = 3.48, p < .05$ . Post hoc analysis indicated that the Upper class had a significantly longer duration than the Middle Class, which had a significantly longer duration than the Lower Class. In addition, a significant difference in the duration between the MA and SA classrooms was observed for the Lower Class ( $t = 2.04, p < .05$ ) and Middle Class ( $t = 2.14, p < .05$ ), respectively. No significant between-group difference was found for the Upper Class,  $t = 0.87, p = .39$ .

## Testing Hypothesis 2

To confirm whether the children in MA classrooms have better peer relationships and group structure than their counterparts in SA classrooms (hypothesis 2), we compared the five constructs of peer interactions between MA and SA classrooms.

### Gender

To examine the effect of child gender and class on the child's on interaction, ANOVA was conducted to analyze the between-group differences in peer interaction gender. As shown in Table 2, the headcounts of peer interactions were calculated and analyzed for each participating class to see whether there were significant between-group differences. With male interaction target, a significant main effect of gender [ $F(1, 166) = 9.62, p < .01$ ] was found, while the effects of class [ $F(1, 166) = 2.46, p = .12$ ] and the interaction between gender and class [ $F(1, 166) = 2.73, p = .10$ ] were not significant. With female interaction target, a significant main effect of gender [ $F(1, 166) = 39.79, p < .01$ ] was found, while the effects of class [ $F(1, 166) = 0.18, p = .67$ ] and the interaction between gender and class [ $F(1, 166) = 1.86, p = .18$ ] were not significant. Those results indicated that, regardless of class type, the young children preferred to play with same gender peers.

### Initiative

Young children's initiative of peer interactions could be classified into active or passive. Independent sample  $t$  test was conducted to analyze the between-group differences in their initiative frequency. As

**Table 2.** Headcounts of peer interactions in MA and SA classrooms.

	Male target				Female target			
	Male focal child		Female focal child		Male focal child		Female focal child	
	MA	SA	MA	SA	MA	SA	MA	SA
Lower Class	5.80	4.27	5.67	4.64	4.27	4.13	8.00	9.36
Middle Class	7.00	8.15	6.36	5.87	4.71	4.62	8.27	7.13
Upper Class	11.83	4.62	8.60	2.57	5.33	2.83	11.60	17.93
Total	24.63	17.04	20.63	13.08	14.31	11.58	27.87	34.42

**Table 3.** Summary of active and passive peer interactions in MA and SA classrooms.

	Active		Passive	
	MA	SA	MA	SA
Lower Class	5.29 (3.79)	5.55 (3.94)	4.46 (3.21)	4.55 (4.77)
Middle Class	7.18 (4.71)	6.28 (3.54)	4.96 (3.87)	4.62 (3.20)
Upper Class	9.94 (7.77)	9.04 (4.28)	6.52 (3.01)	6.74 (3.03)
Overall	7.72 (6.15)	6.91 (4.16)	5.56 (3.42)	5.27 (3.86)

shown in Table 3, no differences were found between MA and SA classrooms in neither active initiation,  $t(168) = 1.01$ ,  $p = .81$ , nor passive initiation  $t(168) = 0.53$ ,  $p = .29$ .

### Method

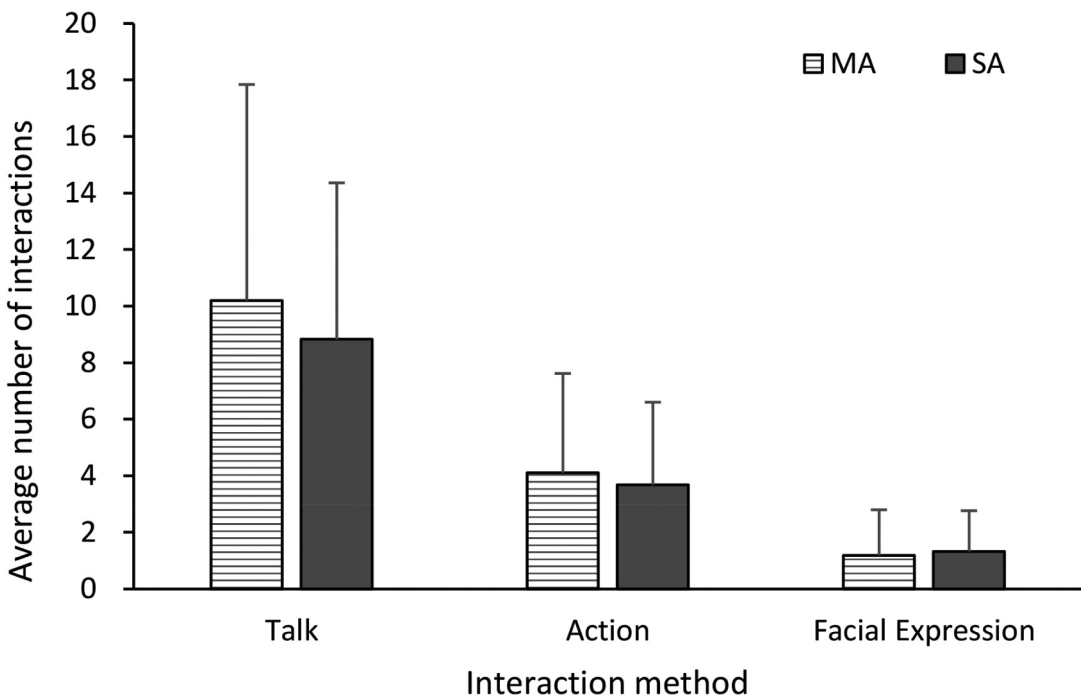
The young children could adopt three peer interaction methods: talk, action, and facial expression. Independent sample  $t$  test was conducted to analyze the between-group differences in their preference of method. As shown in Figure 1, no significant differences were found between MA and SA groups for talk,  $t(168) = 0.88$ ,  $p = .38$ , action,  $t(168) = 1.35$ ,  $p = .18$ , or facial expression,  $t(168) = -0.60$ ,  $p = .55$ .

### Attitude

Independent samples  $t$  tests revealed significant differences between the MA and SA classrooms in positive,  $t(168) = 5.57$ ,  $p < .01$ , neutral,  $t(168) = -3.88$ ,  $p < .01$ , and negative,  $t(168) = -2.42$ ,  $p < .05$ . As shown in Figure 2, these results indicated that MA classrooms had significantly more positive interactions and significantly less neutral and negative interactions than the SA classrooms.

### Control

In terms of control, interactions can be characterized as dominating, neutral, or following. Independent samples  $t$  test indicated significant differences between the MA and SA for both



**Figure 1.** Comparison of methods in peer interactions between the MA and SA classrooms.

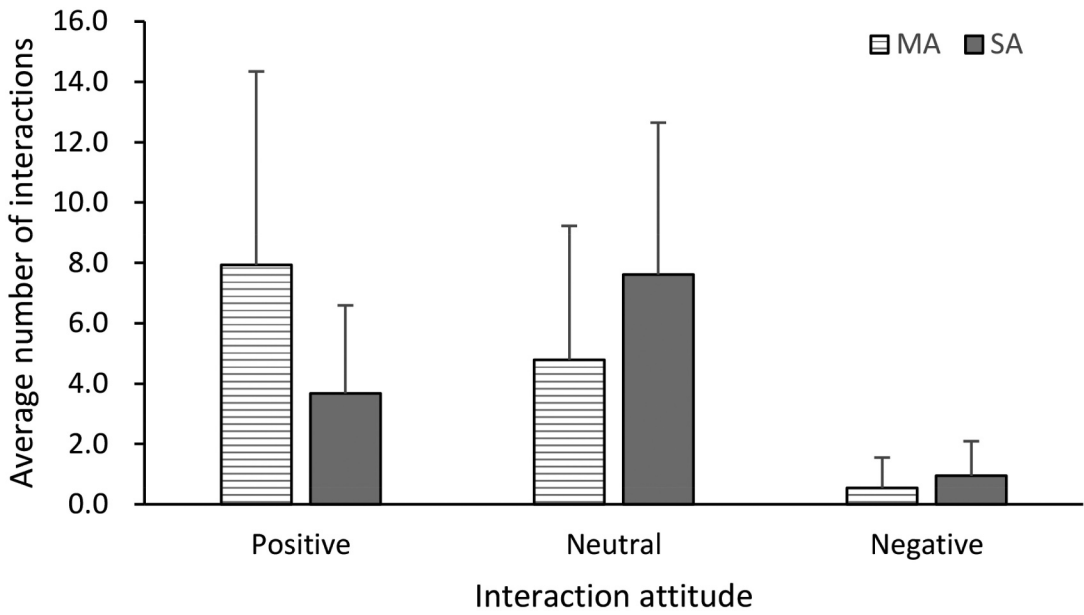


Figure 2. Comparison of attitude in peer interactions between the MA and SA classrooms.

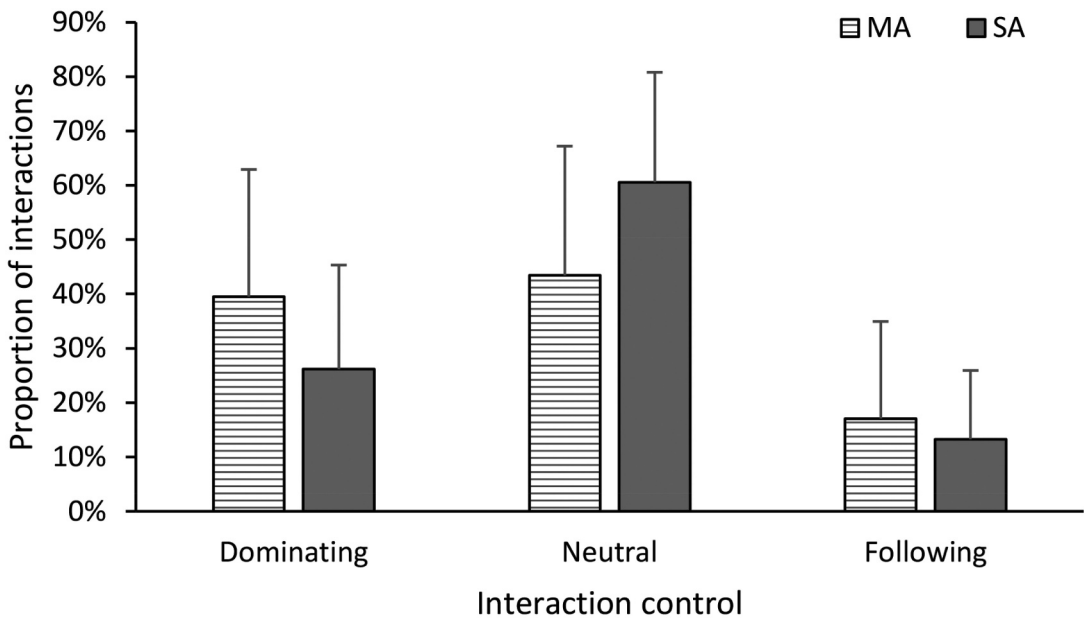


Figure 3. Comparison of control in peer interactions between the MA and SA classrooms.

classrooms dominating ( $t(168) = 3.21, p < .01$ ) and neutral interactions ( $t(168) = -3.28, p < .01$ ), and no significant difference was found in following interaction [ $t(168) = 0.73, p = .47$ ]. As shown in Figure 3, the MA classrooms tended to have more dominating and less neutral interactions than the SA classrooms.



## Discussion

As the first exploration of peer interaction patterns in Chinese preschoolers, this study found some similarities and differences between MA and SA classrooms. Significant age differences were found in the frequency and time duration of peer interactions. And the MA classrooms had a significantly longer duration, more active initiative, and dominating interactions than the SA classrooms, supporting both hypotheses proposed in this study. This section will discuss these findings and their implications for early childhood education.

### *The Age Effect in Peer Interactions*

This study found a significant age effect in the frequency and duration of peer interactions, with older children having more and longer interactions. This age effect could be caused by the interactions between social and cognitive development and learning experience.

First, the time between ages 3 and 6 might be the critical period for young children's social and cognitive development (Vygotsky, 1978). Young children will undergo the de-egocentric process to depart from their egocentric thought from age 4–5. According to Piaget, the Lower Class children are still egocentric thus cannot see situations from other's perspectives (Piaget, 2001). They tend to engage in solitary or parallel play and are not proactive in peer interactions. The de-egocentric processing, however, has gradually driven the young children to think about and from other's perspectives and to understand others' intentions and emotions, getting them ready for peer interactions. Accordingly, in the Upper Class (ages 5–6), young children tend to have de-egocentric thought, role-taking perspectives, theory of mind, and cooperative social skills (Ronald et al., 2005), the essentials for peer interactions.

Second, young children tend to have more chances and experiences interacting with peers when they have longer preschooling time. This preschooling experience will broaden their circles of interaction and facilitate their learning and development of social skills. Accordingly, they will learn more social strategies and have more opportunities for practising these strategies. This will transform their peer interactions from simple verbal ones or exchange materials to joint planning, negotiation, and cooperation. Consequently, older children would have more and longer peer interactions in the late preschool years (Göncü, 1993).

### *MA Classrooms with More and Longer Peer Interactions*

This study found a significant difference between the MA and SA classrooms in the duration of peer interactions, with MA classes having a longer duration. This group difference could be caused by the unique structure and strength of the mixed-age arrangement.

First, the structure of MA classrooms is the mixture of children from Lower (ages 3–4), Middle (ages 4–5), and Upper (ages 5–6) levels. The peer interactions will normally involve a pair of mixed-age children. In the dyad peer interactions, the older child will naturally take responsibility for taking care of their younger peer, who tends to imitate the older one's speech and behavior. In most cases, the younger child is very eager to play with the older peer and wishes to interact with the latter as long as possible. All these structural features have jointly increased the frequency and duration of peer interactions in the MA classrooms.

Second, MA classrooms' strength is that the elder one is usually more experienced or skillful in peer interactions, possesses a more advanced theory of mind, and tends to utilize appropriate strategies for social interactions (Ansari & Purtell, 2018). In contrast, the younger one in MA classrooms, especially those only children who have no siblings at home, have been longing for social interactions with elder ones. Accordingly, the MA classrooms are more beneficial to peer interactions thus tend to have more and longer peer interactions than the SA classrooms.

### ***Between-Group Differences in the Five Constructs of Peer Interactions***

First, this study found that the young children preferred to play with same gender peers in both MA and SA classrooms. This finding indicated that the Chinese young children were more likely to choose and interact with the same-gender peers, regardless of age and class type. This same-gender preference has been explored by Strough and Covatto (2002), who examined the age and gender preference for peer interactions in primary and middle school students. They found that this same-gender preference varied by context: students demonstrated same-gender preference when working on a project at school but not when interacting casually at home. Especially, those primary students indicated greater same-gender preference. However, their study did not involve preschoolers. This study has extended their finding about the same-gender preference to Chinese preschoolers. Nevertheless, future studies are needed to verify this phenomenon with large-scale and representative data.

Second, this study found that the MA classrooms had significantly more positive interactions and significantly less neutral and negative interactions than the SA classrooms. This might be caused by the mixed-age arrangement, in which elder ones tend to be more supportive and considerate, thus give more positive interactions. With more and more preschooling experiences, elder children have been nurtured with a sense of collectivism thus tend to consider more from others, especially those younger than them. This is consistent with the existing finding that elder children tend to be de-egocentric (Vygotsky, 1978) and more collective, cooperative, and collaborative (Rubin, 2009). Therefore, young children in the MA classrooms would have more positive and less negative interactions than their counterparts in SA classrooms.

Third, this study found that the MA classrooms engaged in significantly more dominating and less neutral interactions than the SA ones. This might be because the elder children in MA classrooms possess advanced cognitive and social abilities and skills than their younger peers, thus playing a dominating role in peer interactions. The dyad of elder girl and younger boy is a typical “big sister little brother” group, in which the “big sister” would take for granted to play the leading and even dominating role, directing and controlling the course and direction of peer interactions. In contrast, the paired children in SA classrooms have no age differences thus possess similar abilities and skills. In the peer interactions, the initiator has no age-related advantages thus has to adopt more peer equally strategies, such as the rock-paper-scissors game, to solve the conflicts and problems.

However, this study found no significant differences between the MA and SA classrooms in the constructs of “initiative” and “method”. This might be because the mixed-age arrangement might not cause any significant differences in the frequency and duration of peer interactions. Nevertheless, further studies are needed to follow up with these two constructs.

### **Conclusions, Limitations, and Implications**

In summary, this study found that: (1) there was a significant age effect in the frequency and duration of peer interactions, with older children having more and longer interactions; (2) there was a significant difference between the MA and SA classrooms in the duration of peer interactions, with MA classes having a longer duration; (3) there was a significant same-gender preference with children in both MA and SA classrooms preferring interacting with the same gender peers; (4) the MA classrooms had significantly more positive interactions and significantly less neutral and negative interactions than the SA classrooms; and (5) the MA classrooms engaged in significantly more dominating and less neutral interactions than the SA ones.

However, this study has some major limitations. First, this study was only based on 10-minute videotaped classroom observation for each participating child, which might not be adequate in quantity and quality. To thoroughly understand the real situation of peer interactions, longer time observation over varying scenarios such as group learning, outdoor activities should be conducted in the future. Second, this study was conducted in only one Chinese kindergarten; thus, the results could not be generalized to represent all the Chinese children. Future studies would benefit from a larger

sample from more cities in the country. Third, this is a typical observational study; thus, its findings have not been verified by other measures. In the future, data triangulation (including parents, teachers, and children) and method triangulation (observation, interview, and survey) should be established to consolidate the reliability and validity of the findings.

Nevertheless, these findings have meaningful implications for early childhood education. First, young children should be given adequate time for peer interactions, which will help them understand other's perspectives and learn to solve conflicts. Second, teachers should consider adopting the mixed-age approach to engage young children in more and longer peer interactions. In particular, teachers could encourage the elder ones to play the "big sister" or "big brother" roles to lead and even teach their "litter brother" or "littler sister" in the peer interactions. Meanwhile, teachers could also encourage younger ones to seek help from their older peers who are more capable and experienced. This will make both the elder one feeling more productive while the younger one feeling more comfortable. Accordingly, peer interactions could become a pleasant social learning journey. Third, teachers should learn how to establish and manage mixed-age classrooms to maximize their strengths and benefits. At least, they should acquire the teaching skills relevant to environmental support, interactional catalyst, and interactional guidance (Zhang, 2009). Finally, teachers could use interaction scenarios in group teaching to engage young children in collective role-play, which will let young children experience different interactive behaviors and the corresponding outcomes. In the following conversational and reflection activities, teachers could invite more recollection of events related to the peer interactions and facilitate their understanding of peer and social relationships.

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## Disclosure Statement

No potential conflict of interest was reported by the author(s).

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## Appendix A. The peer interaction observation scale (PIOS).

When coding the peer interaction of the focal child, the child with whom focal child interacting can be called as engaged child. The operational definitions for each observation dimension are as follows:

### Construct I: Gender (same-gender, opposite gender)

Interaction gender refers to whether the engaged child is or not the same gender with focal child. It includes same-gender and opposite gender.

It can be distinguished by the gender of focal and engaged children.

### Construct II: Initiative (active, passive)

Interaction initiative refers to whether the interaction is initiated by the focal child or not. It includes active initiation and passive initiation.

Active initiation means focal child start the interaction first. For instance, focal child invited engaged child to the interaction by means of oral invitation, patting or laughing to the engaged child, etc. During the interaction, the reactions of focal child are positive and active. Passive initiation means that engaged child starts the interaction with focal child. For example, when focal child is play toy bricks alone, engaged child come and say “let us build a train” or grab focal child’s bricks, whereas focal child generally keep silent and sometimes passively onlooking during the process of the interaction.

### Construct III: Method (talk, action, or facial expression)

Interaction method refers to the means of interaction, which includes talk, action, and facial expression interaction.

Talk interaction means that focal child use verbal language to interact, e.g., tell the engaged child that “I like toy car very much”. It should be noted that self-talk without any engaged child should not be categorized as talk interaction, for example, focal child with a feeder talk to toy baby that “come, Mom will feed you some milk”, or focal child yelling to him-/herself in free play. Both action and facial expression interactions are nonverbal. Action interaction refers to interact with action, e.g., pat or touch engaged child. Facial expression interaction refers to interact with expressions, e.g., smile or stare with interest to engaged child.

### Construct IV: Attitude (positive, neutral, or negative)

Interaction attitude refer to the nature of interaction, regardless of the initiator. It can be classified as positive, neutral, and negative.

Positive interaction refers to the interaction with praise, appreciation, acknowledgment, encouragement, support or cooperation. For example, focal child reassuring the crying child actively. Negative interaction refers to interaction contains conflict, criticism, blaming, deny or punishment, e.g., bullying or insulting another child. Neutral interaction refers to interaction without significant positive or negative nature. For example, focal child go to play toy bricks with others.

### Construct IV: Control (dominating, neutral, or following)

Interaction control refers to the extent of dominance of focal child. It includes dominating, neutral, and following interactions.

Dominating interaction refer to the interaction during which focal child take the dominating or leading role. They assign roles or command others, e.g., focal child leading the group, command or impel other children such as “you must put it here” and other children obey his/her order. Following interaction refer to the interaction that focal child obey engaged child’s command, they almost do whatever others commands, merely express objection. For instance, engaged child asked that “Let’s stop this game and play role-play”, and focal child follow the command. The neutral interaction refers to the interaction during which focal child express neither obeying nor oppose intention to others.

Appendix B. The peer interaction observation scale (PIOS) [coding sheet]

Name \_\_\_\_\_ ; Gender: F M ; Age group: U Mi L ; Class type: MA SA ; Observer: \_\_\_\_\_ ; Date: \_\_\_\_\_

Minute Numb.	Dimentions		Engaged child		Initiative		Method		Attitude			Control			Duration (s)	Note		
	Numb.		Gende	Number	Age group		Active	Passive	Talk	Nonverbal	Positive	Neutral	Negative	Dominating			Neutral	Following
					M	F												
1'																		
2'																		
.....																		
10'																		
Sum																		

For child in same-age class, the age group of engaged child is identical with focal child.  
F = female, M = male; U = Upper Kindergarten Class, Mi = Middle Kindergarten Class, L = Lower Kindergarten Class; MA = mixed age, SA = same age.