

Intimacy or Alienation: Revisiting Sibling Relationships from the Perspective of Preschoolers

Peiling Yao

School of psychology,
Nanjing Normal University, China

Yue Song*

School of psychology,
Nanjing Normal University, China

ABSTRACT

This study aims to revisit sibling relationships and trace the contours of current sibling interactions in Chinese preschoolers from children's perspective since sibling relationships have long been absent in traditional Chinese culture since the 1980s. Forty-one 3- to 6-year-olds ($mean_{age} = 48.12$ months, $sd_{age} = 0.50$ months, 17 boys) from two-child families participated in this study. Semi-structured interviews and thematic drawings were used to measure children's daily interactions with their siblings. Results found that there are different types of prosocial behaviors among siblings. Prosocial behaviors are affected by gender and gender combinations, not by age. There is a correlation between children's representations and drawings. These results indicate the positive prosocial behaviors among siblings in most Chinese preschoolers. These findings contribute to revisiting of the sibling relationships of Chinese preschoolers in the context of a new policy and also extend the knowledge of sibling prosocial interactions from children's perspectives.

Keywords: Sibling relationships, prosocial behavior, thematic drawing, semi-structured interview.

INTRODUCTION

The preschool age exerts a profound influence on an individual's life-long development [24, 38]. For instance, it marks the onset of early social interactions as children encounter a diverse array of individuals. With the recent three adjustments on national birth policies (China's Standing Committee of the National People's Congress amended the Law on Population and Family Planning on August 20, 2021, allowing couples to have up to three children), an increasing number of Chinese families are giving birth to second or even third children, thereby introducing Chinese children to long-neglected interpersonal relationships—sibling relationships. Sibling relationships refer to interactions between two or more individuals who share a common parent. These interactions include behavioral, verbal, and nonverbal communication. Chinese often employ the term “fraternal love” (手足之情) to describing the inseparability and mutual support among siblings. Unlike friendships or romantic partnerships, the sibling bond is characterized by its inherent and involuntary nature [13-14], rendering it

* Corresponding author: 94018@njnu.edu.cn

one of the most enduring and intimate relationships individuals encounter in their developmental journey [11-14].

The re-embracing of sibling relationships casts new challenges to Chinese families. Specifically, the one-child policy resulted in a chronic absence of sibling relationships between 1980 and 2011. Thus, the current shifts in policy made it necessary for Chinese children to adapt to new relationships as quickly as possible. For instance, for children who are used to be the only children in the family, it is difficult for them to accept and/or get along with siblings [43-44, 8]. The current dynamics of sibling relationships have become an urgent concern for parents and society [8, 47]. Indeed, following the adjustments of the birth policy, there is a growing body of localized research on sibling relationships. Researchers found that the emergence of siblings results in the need for first-born children to undergo a transitional period during which they undergo physical and psychological changes [8, 30, 40], including adjustments in the family system [8]. Some researchers also explored the factors and mechanisms that influence such relationships [8], such as sibling conflict [48]. Based on these studies, the current study further explores the current sibling relationship in Chinese culture.

Different cultures determine how people interact with each other, which is particularly evident in sibling interactions. Researchers identified two cultural orientations based on the closeness of an individual's relationship with the group, including individualistic tendencies and collectivistic tendencies [26-27]. Western cultures with an individualistic orientation prioritize personal well-being and development, self-reliance, and personal interests, with separation from the family being a hallmark of adulthood. Consequently, sibling relationships in Western cultures are more focused on independence and personal space, and siblings can still provide each other with necessary emotional support [5, 43]. Eastern cultures place more emphasis on the connection between the individual and the community, and Eastern families are more concerned with interpersonal harmony and family bonds, which strengthens the bond between siblings. Specifically, Chinese culture emphasizes "brotherhood and sisterhood" and society values the concept of family and sibling bonds. For instance, Chinese older siblings often take on the role of caring for their younger siblings [46], providing the necessary comfort and care for siblings younger than themselves and acting as spiritual support for younger children [8]. Therefore, positive social interactions (e.g., prosocial behaviors) have long been an important feature in Chinese sibling relationships.

Prosocial Behaviors Among Siblings

Prosocial behavior is a volunteer behavior intended to benefit another individual. It is an important part of sibling interaction [37], and prosocial interactions between siblings are primarily based on sharing, helping, cooperating, and comforting. Prosocial behaviors emerge in infancy, and influence social development throughout the lifespan. Siblings play an important role in the acquisition and development of prosocial behaviors. On the one hand, interactions between siblings play a key role in children's social understanding [13], and positive interactions are especially beneficial for the development of social skills. On the other hand, the presence of siblings extends children's social relationships. In the context of Chinese traditional culture, having siblings seems to be more favorable to the social development of Chinese children than being an only child [6].

Various structural characteristics, such as the children's age, gender, and gender combinations among siblings, are important in examine children's prosocial behaviors toward siblings. First, Children's age is positively correlated with sharing behavior among siblings, and positive feelings toward siblings in firstborn children [2]. Also, the frequency of sharing between children and siblings increased with age [2]. In addition, the effect of age difference on inter-sibling status diminishes as children get older, and inter-sibling friendships and positive affect gradually increase with age [42]. Second, children's gender influences their prosocial behaviors toward their siblings, with girls tending to be more prosocial with their sisters than with their brothers, and exhibiting higher levels of empathy in sibling interactions than boys [12]. Chinese girls are found to be closer to their siblings than boys. Third, as for the gender combinations between siblings, same-gender sibling combinations have comparable effects on delinquent behavior [11]. Same-gender siblings are more likely to have competitive relationships and are more likely to trigger anxiety and depression, but same-gender siblings are more likely to understand each other than different-gender siblings [4]. In addition, follow-up studies have shown that the level of closeness between siblings is affected by gender combinations. For instance, the level of closeness between sisters tends to plateau in development from childhood to adolescence, both at high levels, while the level of closeness between different-gender siblings shows an inverted U-shaped development [29]. In summary, sibling interactions are influenced by the three aforementioned factors, which will also be explored in the current study.

Explore Sibling's Prosocial Behaviors from the Children's Perspective

Adult perspective (including adult reports and adult observations) is one of the most important approaches to exploring children's sibling relationships [2, 30, 33]. Despite its merit, adults are usually at a higher level in the social power structure and may impose their views on children to the point of ignoring their wishes [35]. Also, adults are more inclined to use complex, abstract language, while children's language is characterized by simplicity, directness, and vividness. If guide words that do not conform to children's language are used in the experiment, it will lead to difficulties in comprehension for the child participants, thus affecting the accuracy and reliability of the results [22, 39]. Therefore, a child's perspective is also needed as a complimentary to the adult's perspective in exploring children's sibling relationships.

In order to explore sibling relationships and prosocial interactions between siblings from children's perspective, the current study used both semi-structured interviews and drawings as two ways of measurements. The semi-structured interview is a well-established method for gathering information about an individual's views and attitudes, such as marriage and parenthood, parent-child relationships and children's interpersonal relationships [46]. Specifically, this method can also be applied in the preschool age, as 3- to 6-year-olds have the language skills to support them in answering simple semi-structured interview questions. For instance, children as young as 3 years have basic narrative skills, 4-year-olds can tell a well-structured story. As they get older, they can describe more complex events. Therefore, qualitative semi-structured interviews are suitable and thus be chosen to explore the status of preschool children in their interactions with their siblings.

As a compliment to the semi-structured interview method, we also use drawing to interpret the thoughts and feelings of children's interaction with their siblings. Drawing is an integral part of childhood, and becomes a way for children to communicate with the outside world [32]. As

drawing can replace some of the thoughts and feelings that are not easily expressed verbally, it becomes a very practical measure of social relationships that can be used to supplement and replace spoken communication and diagnostic assessment [23]. Images composed of symbols and colors in artwork reflect children's spontaneous responses to real-life experiences [28]. Preschoolers try to convey messages to others through their drawings. Drawings by 3-year-olds are in the transition stage from the scribbling phase to the symbolizing phase when they begin to use some simple shapes and symbols to represent real objects. As growing, 4-year-olds can use colors symbolically [25]. Researchers used thematic drawings to investigate preschoolers' metaphorical representations of other social members and found that children had already established the metaphor of social size internally, and they would draw larger pictures of people with higher social status [46]. Overall, children aged 3-6 can participate in drawing tests, making drawing a preferred method for researching from a child's perspective.

The Current Study

The current study aimed to revisit sibling relationships and explore prosocial behaviors between siblings in Chinese culture from children's perspective. For these aims, we used semi-structured interviews and thematic drawings. With the change of policy, children spend more time with their siblings. Prosocial behavior is one of the main forms of sibling interaction and an important aspect of early social development. Children's sibling relationships are influenced by multiple factors [8]. Previous studies have found a diversity of prosocial behaviors. Different prosocial behaviors appear early or late, but these behaviors increase gradually with age [2, 42]. Prosocial behaviors are also influenced by gender, with girls having more prosocial behaviors than boys [12]. Additionally, prosocial behaviors are influenced by gender combinations. The same-gender combinations are more prosocial [4]. However, these studies from adult perspective and different cultural contexts may not apply to sibling interactions in Chinese culture. Thus, in the current study, we focused on the effects of age, gender, and gender combination on preschoolers' prosocial behaviors in Chinese culture. We hypothesized that (1) prosocial behaviors between siblings were significantly influenced by age. Children of 60-72 months will show more prosocial behaviors. (2) Prosocial behaviors between siblings are significantly influenced by gender. Girls will show more prosocial behaviors. (3) Prosocial behaviors are significantly influenced by gender combinations, and sister-sister combinations will show more prosocial behaviors.

METHOD

Participants

The participants were 41 children ($mean_{age} = 48.12$ months, $sd_{age} = 0.50$ months, age range = 36-72 months, 17 boys) in Suzhou, Jiangsu province. These children were recruited from two-child families, where they were either older ($n = 17$) or younger ($n = 24$) siblings. Of these, 10 (24.4%) are brother-brother dyads, 15 (36.6%) are sister-sister dyads, 9 (22.0%) are brother-sister dyads, and 7 (17.1%) are sister-brother dyads. All children live with their parents and siblings, except for one child who lives away from the sibling. Another 15 families were initially invited but did not participate due to the mothers' unwillingness ($n = 14$) or children's illness ($n = 1$). All the participants were informed that they could withdraw from the study at any time if they wished, but none did so. Their parents' income levels are in the middle class and above. Parents of children in the area have a high school education or higher. This study is approved by (blinded for review). All the mothers of the participating children signed the consent form before the study.

Procedure

The study was conducted in Children's daycare and by a female researcher. There were two phases of the current study. In phase 1 (children semi-structured interview), the researcher opened the semi-structured interview by letting the children recall their most memorable moments with their siblings and let the children describe these moments freely. Next, in order to gather more information on the children's attitudes toward their siblings and the current status of children's social interactions with their siblings, we followed a predesigned outline (see the online materials for details of the semi-structured interview outline) to ask a series of questions, including child's experiences with their siblings in daily activities (e.g., "Do you help your siblings cover up when they wake up?"), child's motivation of being prosocial towards their sibling (e.g., "Did mom or dad teach you this, or were you willing to help/share/comfort the sibling yourself?"), problem-solving strategies (e.g., "Mom brought home a piece of cake today. Both you and your sibling want to eat it, what will you do?"). In phase 2 (thematic drawing), which was conducted one day after the semi-structured interviews, the children were asked to draw a picture in the quiet corner of the classroom on the theme of "A day with my siblings". The researcher gave the instructions ("Please use your drawing to show what you and your siblings are doing. There is no good or bad in your drawing. You can choose any of the 12 colors of crayons on the table."). Next, the researcher let the children draw freely and without any disturbance. Also, during the drawing phase, the researcher did not give any instructions to the children about the pictures or the colors, and the entire drawing process took about 10 minutes (ranging from 5 to 15 minutes). The process ended when the child put down the painting tools and left, raised his or her hand, or handed the painting to the teacher or researcher.

Coding and Data Analysis

Semi-structured Interviews with Children:

All semi-structured interviews were recorded and translated into text through original software for phones and computers. Two coders (both master students majoring in developmental psychology) coded this part of the data in two steps. In the first step, they coded the texts into 3 categories, including (1) "the occasion of prosocial behavior", (2) "the type of referred prosocial behavior", and (3) "the motivation of prosocial behavior" (Table 1). In the second step, two coders further coded the data regarding the motivation of prosocial behavior (Table 1). Specifically, they screened the semi-structured interview texts for words that involved motivation, and coded them as "active" (coded as 1, such as "I wanted to help him/her because I like him/her") and "passive" (coded as 0, such as "My mom and dad taught me"), which were then converted into a total score in the data analysis. The inter-rater reliability was high between the two coders, ICC = 0.692.

Table 1: Semi-structured Interview Data Coding Framework

Dimension	Category	Coding	Textual base
Occasions for Prosocial Behavior	A. Life	<ol style="list-style-type: none"> Eating with siblings Waking up with siblings Having life entertainment with siblings (e.g. watching TV, drawing at home, etc.) 	<ol style="list-style-type: none"> "At mealtimes, my sister helps me with my food." "I tuck my brother in when it's time to get up." "When I watch TV, I let my sister watch."

	B. Game	<ol style="list-style-type: none"> 1. Playing parallel games with siblings 2. Playing pretend games with siblings 3. Playing rules games with siblings 	<ol style="list-style-type: none"> 1. "We were all playing with our toys and I realized I was missing some snowflakes and my sister shared hers with me." 2. "She humbles me during pretend play."
	C. Study	<ol style="list-style-type: none"> 1. Studying at home with siblings 2. School life 	<ol style="list-style-type: none"> 1. "At home, when my sister does her homework and I do my homework. I will help her." 2. "In school, I will help my younger siblings find their classrooms."
Types of Prosocial Behavior	A. Sharing	<ol style="list-style-type: none"> 1. Behavior 2. Tendency 	<ol style="list-style-type: none"> 1. "I'll eat with him." 2. "I want to share it with her."
	B. Helping	<ol style="list-style-type: none"> 1. Behavior 2. Tendency 	<ol style="list-style-type: none"> 1. "I helped my sister with her quilt." 2. "I should have helped him."
	C. Cooperation	<ol style="list-style-type: none"> 1. Behavior 2. Tendency 	<ol style="list-style-type: none"> 1. "I'll be building blocks with her and we'll divide up the work to build the castle together." 2. "I think I would have joined in the building."
	D. Comfort	<ol style="list-style-type: none"> 1. Behavior 2. Tendency 	<ol style="list-style-type: none"> 1. "I'll be there for my sister when she's sad. I will also give her a pat." 2. "I want to say to her: 'Don't cry.'"
	E. Teaching	<ol style="list-style-type: none"> 1. Taking on or imitating parenting 2. A kind reminder to siblings 	<ol style="list-style-type: none"> 1. "Mommy and Daddy usually do this, and I will take care of my brother." 2. "I will remind him to collate his toys."
Motivation of Prosocial Behavior	A. Initiative	<ol style="list-style-type: none"> 1. Positive attitude toward siblings 2. Direct expression of heartfelt emotions 3. Self-perceptions of kinship 	<ol style="list-style-type: none"> 1. "I want to help my sister because I like her." 2. "It was my own wish." 3. "Because we are blood sisters."
	B. Passive	<ol style="list-style-type: none"> 1. Triggering by parental teaching 2. Triggering by teacher instruction 	<ol style="list-style-type: none"> 1. "It's my mom and dad who taught me to always be humble to my younger brother because he's small." 2. "Teachers usually always tell us to be humble to our younger siblings."

Drawing Tasks:

In total, 71% ($n = 29$) of the children participated in a drawing task after the semi-structured interviews, and 24 pictures were collected for analyses (5 pictures were excluded because only one line ($n=2$), one person ($n=1$), or no person ($n=2$) appeared in the picture) [†].

[†] Because the child draws on a free choice of paper (A4 or half of A4), we standardized the size of the paper (210 mm*297 mm) before the data analyses. That is, we scanned the images and entered them into CAD to enlarge them at a ratio of 2:1, and the output was in cm².

We coded the following four variables (area size, distance, color of the figure representing the child and his or her siblings, and relative position). Specifically, (1) *area size* refers to the area of each of the child's figures and siblings in the figure. we coded this variable as an indicator of sibling social (family) status in the child's mind (Reznikoff & Reznikoff, 1956; [46]). To code this variable, we used CAD's area calculation function to select and calculate the child's entire body (hands and feet as line representations were also calculated). (2) *Physical distance* refers to the distance from the midpoint of one figure's head to the midpoint of the other figure's head in the figure. We coded this variable as an indicator of a child's psychological distance from his or her sibling. To code this variable, we used CAD's distance calculation function. (3) *Color* refers to the color used by the child in the drawing process. We coded this variable as an indicator of children's state of mind when they are with their siblings. To code this variable, we used a 3-step process. In step 1, colors were categorized as cool and warm. Specifically, red, yellow, orange, light pink, flesh, and rose belonged to warm colors, and sky blue, dark blue, cyan, grass green, dark green, and purple belonged to cool colors. In step 2, we calculated the total number of colors used by the children and the number of cool and warm colors they used, respectively. Most children used black or brown to outline the border, which was not counted in the total number of uses. Only when the child used large areas of black or brown to decorate the figure was it taken into account in the total. In step 3, we calculated the usage of cool and warm colors. The total number of colors used by the child as the denominator and the number of cool (warm) colors used as the numerator. (4) *Relative position* refers to the point of reference relative to where the child should be to himself or herself. We coded this variable as an indicator of the place of siblings in the minds of children [34]. Based on the above definitions and the egocentric nature of children's perceptions at this stage, we coded the relative position relative to the "self"-centered sibling in the picture. To code this variable, we used a 3-step process. In step 1, we found the child's own image in the painting. In step 2, we identified and labeled the positions of the child's siblings about the child's image. In step 3, we labeled 8 directions using numbers from 1-8: "up", "down", "left", "right", "top left", "bottom left", "top right" and "bottom right" (e.g., if the child's sibling is represented in the drawing on top of his/her image, it is labeled as "1."). We measured and defined children's relative distance from their siblings. In step 1, we oriented to the midpoint of the child's head. In step 2, we chose the maximum value of 25.7 cm for the most distant psychological distance and the minimum value of 2.3 cm for the most intimate psychological distance, from which we calculated 6.6 cm as the median value. In step 3, we categorized the measurements for each child. In the drawing measurements, the value of the line from the midpoint of the head of the child's image to the midpoint of the head of the sibling ranges from 2.3cm to 6.6cm, which we define as a very close, inseparable sibling relationship; 6.6cm-25.7cm or even greater is defined as a more distant sibling relationship (Figure 1).

RESULT

Semi-structured Interview Tasks

We ran a word frequency analysis for two-word words (in total 52 words), because of the overlap between the language of the semi-structured interviewer and the respondent (in other words, the document will be interspersed with words mentioned by the semi-structured interviewer, e.g., the semi-structured interviewer will ask the question, "What cartoons do you like to watch?" Such words are not in the target of our analysis), and further manually remove irrelevant, non-semi-structured interviewer-mentioned two-word words. After processing, the frequency of the top 10 words that were mentioned by children in semi-structured interviews

was presented in online materials, Table 1. The highest frequency word was "be fond of" (喜欢, 298 times), followed by "help" (帮助, frequency 234 times), "toy" (玩具, frequency 157 times), "share" (分享, frequency 133 times), and "games" (游戏, frequency 121 times) (online materials, Figure 1). Among the top 10 words, 30% related to attitudes, and 70% to prosocial behaviors, including types, situations of these behaviors, etc. All children mentioned interactions with siblings, with 88% mentioning daily life activities, 12% describing learning-related interactions, and 61% referring to play. In their narratives, 46% of children used explicit emotion words, while 54% used more subtle expressions (not involving direct emotion words such as like, fear, etc.). Most children (92.7%) directly mentioned "be fond of", indicating a generally positive attitudes toward their siblings.

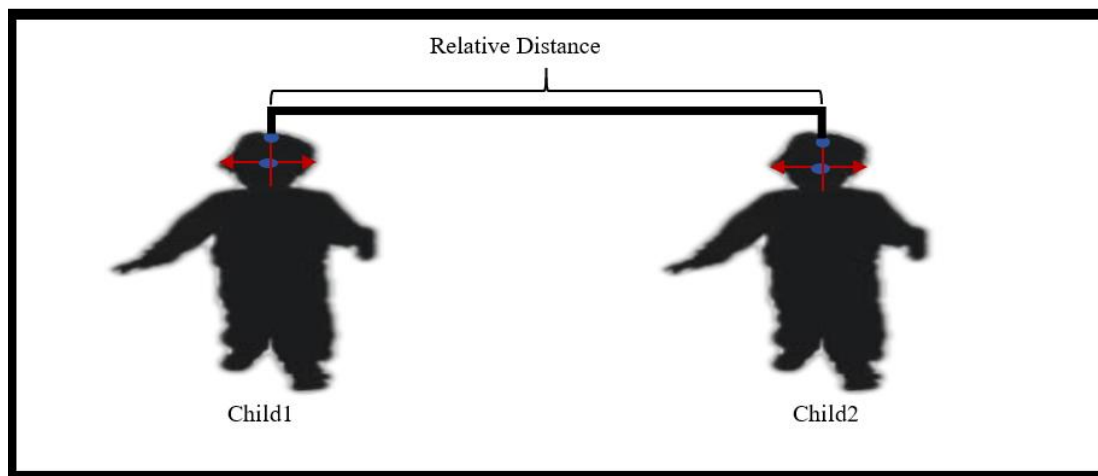


Figure 1: Relative Distance Measurement Diagram

Note: Due to the irregularity of the figure's head in the child's drawing, we used a line connecting the two midpoints (left ear - right ear, top of the head - neck) to position it.

We transformed the outcome variables into the frequency with which children mentioned each type of prosocial behavior and the total type of prosocial behavior mentioned. Then we used matrix analysis to examine the points of intersection of the cases with the codes for different attributes (online materials, Table 2).

In order to examine whether there are age differences in the frequency and types of prosocial behaviors mentioned by children, we used a one-way ANOVA. The results showed that there were no significant age differences in the frequency with which children mentioned each type of prosocial behavior ($F(2, 38) = .581, p = .564$; $F(2, 38) = 1.401, p = .259$; $F(2, 38) = 2.074, p = .140$; $F(2, 38) = .193, p = .826$; $F(2, 38) = .327, p = .723$; $F(2, 38) = 1.417, p = .255$; $F(2, 38) = 1.107, p = .341$; $F(3, 38) = .458, p = .636$, nor were there significant age differences in the types of prosocial behavior ($F(2, 38) = .741, p = .483$).

In order to examine whether there are gender differences in the frequency and types of mentions of prosocial behaviors, we used an independent samples t-test. The results showed a significant gender difference in the frequency of cooperation ($t(41) = 1.009, p = .047$), but no significant gender difference in the frequency of other prosocial behaviors ($p > .050$) or different kinds of prosocial behaviors ($p = .402$).

We used a one-way ANOVA to examine whether there were gender combination differences in the frequency and types of prosocial behaviors. The results showed a significant difference in the frequency of cooperation among different gender combinations ($F(3, 37) = 3.253, p = .032$), but no significant differences for other prosocial behaviors ($p > 0.050$). Brother-sister combinations mentioned cooperation significantly more often than sister-brother combinations and sister-sister combinations ($p = .057$; $p = .004$). There were no significant differences in the types of prosocial behaviors ($p = .892$).

In summary, the types of prosocial behaviors were not affected by age, gender, or gender combination. Only the frequency of cooperation was affected by these factors, with brother-sister combinations showing greater cooperation.

Drawing Tasks

In order to investigate siblings' prosocial interactions, a series of analyses were conducted to examine the effect of age on the four variables of area size, distance, relative position, and color on the way children represented siblings in their drawings.

Relative Area:

In order to examine whether there were age differences in the relative area of the character images in the picture, we used a one-way ANOVA. The results showed no significant differences in the relative area of the characters in different age groups ($F(2, 22) = .858, p = .438$). To examine gender differences, we used an independent samples *t*-test. The results showed no gender differences in the relative area of the characters ($t(23) = 1.172, p = .253$). A one-way ANOVA on gender combinations also showed no significant differences ($F(3, 21) = 1.469, p = .252$). In summary, age, gender, and gender combinations did not significantly affect the treatment of relative area in children's drawings. These results indicate that elder children are generally perceived to have a higher status in the family (online materials, Figure 2).

Relative Position:

There was a significant age difference in the relative position of siblings in children's drawings ($F(2, 22) = 5.114, p = .015$). Specifically, children aged 60-72 months were more likely to draw their siblings above themselves than those aged 48-60 ($p = .043$), indicating a higher status of elderly children in social relationships. A significant gender difference was also found in the relative position of siblings ($t(23) = -2.991, p = .007$). Specifically, boys preferred to draw their siblings to the left of themselves, while girls drew their siblings to their right. This indicates significant differences in how boys and girls represent and perceive sibling positions (online materials, Figure 3). Drawing siblings on the left is not just a physical choice of position, it also symbolizes boys' influence or agreement with their siblings, reflecting their importance [19-20,31]. The right side is seen as more positive, indicating the closeness and emotional connection the child feels in the family [19, 31]. There were no significant gender combination differences in relative position ($F(3, 21) = 2.226, p = .115$).

In summary, only age and gender influenced the relative position of siblings in children's drawings. Children of different ages and genders perceived sibling status differently, but there were no gender combination differences. This may reflect that the relative position of siblings is not affected by gender combinations.

Relative Distance:

There were no significant differences in the relative distance between children and their siblings by age ($F(2, 22) = 1.115, p = .346$, gender ($t(23) = .624, p = .539$ and gender combinations ($F(2, 22) = .972, p = .425$). In summary, the psychological distance between children and their siblings was not affected by age, gender, or gender combinations.

There were no significant differences in the usage of cool and warm colors by age ($F(2, 22) = 2.405, p = .114$; $F(2, 22) = 1.210, p = .317$, gender ($t(23) = -1.345, p = .192$; $t(23) = -.154, p = .879$) or gender combinations ($F(3, 21) = 2.067, p = .135$; $F(3, 21) = 0.463, p = .711$). This indicates that boys and girls, as well as different gender combinations, do not significantly affect color preferences in drawings. Their color schemes in thematic drawings follow a similar pattern. In conclusion, children's use of warm and cool colors in their paintings was not affected by age, gender, or gender combination.

Drawing and Prosocial Behavior:

We conducted correlation tests to examine the associations between relative area, relative position, relative distance, color usage in drawings, and the frequency of prosocial behaviors. We found a larger relative area was associated with more frequent teaching behaviors ($r = .520, p = .008$). Helping behaviors were negatively correlated with the rate of warm color use ($r = -.493, p = .012$), and positively correlated with the rate of cold color use ($r = .486, p = .014$), indicating the greater frequency of helping was linked to less use of warm colors and more use of cool colors. Additionally, there was a significant positive correlation between the type of prosocial behaviors and relative position ($r = .441, p = .027$).

In summary, the frequency of prosocial behaviors was linked to the color and the relative area of the drawing, while the type of prosocial behaviors was related to the relative positions.

DISCUSSION

Our study took children's perspective and aimed to examine the effects of age, gender, and gender combination on Chinese children's prosocial behaviors by using drawings and semi-structured interviews. We found that (1) preschoolers exhibited diverse types of prosocial behaviors between siblings. (2) Age had no significant effect on prosocial behaviors while gender and gender combination had a significant effect on the frequency of prosocial behaviors. (3) Results drawn from semi-structured interviews and drawings are consistent, though some differences are also exhibited and will be discussed later.

We found no significant effect of age on prosocial behaviors among siblings across the six dependent variables that were examined. These findings are consistent with the previous studies that also took children's perspective [49]. However, studies from adult perspective show that age differences between siblings on their prosocial behaviors [4], as elderly children are more cognitively and emotionally developed than younger children, and thus exhibit more prosocial behaviors. The inconsistency between the two perspectives indicates that children may not perceive the age effects, and also warrants future research attention on how to explain and combine findings from these perspectives in understanding prosocial behavioral development.

Across all dependent measures, we found gender differences only in relative position in siblings' prosocial interactions. Few studies have explored this point from children's perspective. The available evidence is primarily from adult perspective. Before the 1990s, researchers concluded that preschoolers had gender differences in prosocial behaviors and that girls were more prosocial than boys from an adult perspective [45]. Recent studies have not found significant gender differences in children's prosocial behaviors [48-49]. This is consistent with our findings. The inconsistency in results may be due to the different cultural contexts in which the studies were conducted. There are differences between boys and girls in prosocial behavior in traditional cultural contexts [15]. Boys' prosocial behaviors were more related to protection and leadership, while girls were expected to exhibit prosocial behaviors such as caregiving and empathy [18]. The present culture breaks the traditional cultural constraints of gender roles and encourages boys and girls to display diverse prosocial behaviors [3]. Our study was conducted in a modern cultural context and found no gender differences in prosocial behaviors. This finding extends research from adult perspective and suggests that preschoolers may have already understood and adapted to the current culture in their interactions with siblings. Previous research has found that preschoolers understand social rules initially [16, 36, 41]. Preschoolers may display an attitude of non-conformity to rules when they see or hear behaviors and events that violate social rules. This reaction also demonstrates the ability of young children at this stage to recognize and understand social rules. Therefore, when children exhibit prosocial behaviors or behavioral tendencies that are compatible with the current culture, they may realize that the current social rules break away from tradition and encourage a diversity of prosocial behaviors among boys and girls.

There are gender combination differences in children's prosocial behavior, as more cooperation was observed in the brother-sister combination than in the other gender combinations. We found that the cooperation of brother and sister was described as doing something together, playing together, or dividing up the labor to complete a piece of work. Little previous research from children's perspectives has explored the effects of gender combination on prosocial behaviors. Studies from adult perspective have found heterosexual sibling gender combinations to be the most prosocial [17]. This is consistent with our findings. Cooperation centers on the achievement of the same goal, which also requires participants to coordinate resources and efforts (Johnson & Johnson, 1994). Children as young as 3 years old begin to understand the basic concepts of resource sharing and initially demonstrate resource management skills in cooperation, such as taking turns or sharing resources, as mentioned by the children in our semi-structured interviews [21]. Boys may adopt more protective strategies when they realize that their partner is a younger sister and more competitive strategies when working with a younger brother.

Across semi-structured interviews and drawings, children's positive attitudes toward their siblings were demonstrated in each method. However, we found inconsistent results in the interpretation of prosocial behaviors. Unlike semi-structured interviews, prosocial behavior in the drawings was not influenced by age, gender, or gender combination. The semi-structured interviews included more open questions and discussions that allowed children to use language to describe their thoughts and experiences in detail, thus revealing specific patterns of prosocial interactions and influences. Drawings focused primarily on the relationships between variables, and thus cannot exhibit specific interaction details. Nevertheless, drawing is effective for 3-to 4-year-old children who are just beginning to acquire basic language skills. It may be

difficult for them to express complex patterns of thoughts and behaviors through language. Therefore, drawing can be used as a supplement when conditions permit and is more helpful in our understanding of children's attitudes and behaviors. Based on the current study, we suggest that drawing may be the primary research method for this age group, and semi-structured interviews may be used after the age of 4 as children's language and social skills are relatively better.

There are some limitations in the current study. First, the sample size of this study was small. This may have led to a more focused semi-structured interview perspective and limited the venerability of the results. Therefore, future studies should use a larger sample size and include children from different regions and backgrounds to increase the external validity of the results. Second, although we explored preschoolers' views and perspectives on siblings, we did not explicitly differentiate between participant's identities (e.g., whether the subject was a first-born child or a second-born child). Future research should differentiate between first-born and non-first-born children in detail to explore individual differences in sibling relationships and their impact on the quality of interactions in greater depth.

Overall, the current study explored prosocial behaviors between preschoolers and their siblings, enhancing the understanding of sibling relationships within the Chinese cultural context. In addition, children's prosocial behaviors are reflected in their drawings and associated with drawing elements. These correlations deserve to be noted in future analyses of children's thematic drawings. Based on these findings and implications, we are more confident about the future of sibling relationships among preschoolers in modern Chinese culture.

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