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Temperament, Family, Peer, and Learning Environment: Correlates of Social-Emotional Abilities in Chinese Preschoolers

Juan Gu, Suziyani Mohamed* and Kamariah Abu Bakar
Faculty of Education, The National University of Malaysia,
Bangi, Selangor

Abstract. Social-emotional development in early childhood is crucial for children's immediate and long-term well-being. This study examined how preschoolers' temperament, family environment, peer communication skills, and learning environment relate to their social-emotional abilities. A quantitative survey was conducted with 534 children aged 3-6 in an eastern Chinese city (urban, predominantly middle-income families); participants were randomly selected from kindergartens across the city's districts and sampled within sites using stratified random sampling by age group (3, 4-5, and 6 years) and gender. Parents and teachers completed validated questionnaires: the Preschool Behavioral and Emotional Rating Scale (PreBERS) for children's social-emotional abilities, the Parental Temperament Questionnaire (PTQ), the Family Environment Scale-Chinese Version (FES-CV), a Peer Communication Skills Questionnaire, and the Early Childhood Environment Rating Scale-Revised (ECERS-R). Results showed that older preschoolers exhibited higher social-emotional ability levels than younger children, while no significant gender differences were found. All four contextual factors were positively correlated with children's social-emotional abilities: temperament, family environment, peer communication, and learning environment each demonstrated strong associations (Pearson r = 0.88-0.92, p < .001). These findings underscore the multi-faceted nature of social-emotional development and suggest that involving temperament, family, peer, and learning environment may effectively support early children's social-emotional growth.

Keywords: social-emotional abilities; temperament; family environment; peer communication; learning environment

*Corresponding Author: Suziyani Mohamed; *suziyani@ukm.edu.my*

1. Introduction

Early childhood has become a global policy priority: UNESCO & UNICEF (2024) report that every US $1 invested in high-quality early education returns up to US $10 in long-term social and economic benefits. The OECD (2023) likewise shows that children's social-emotional competencies strongly predict later academic achievement, employability, and health. Echoing this, the World Health Organization (2021) identifies ages 3-6 as a sensitive period for acquiring socio-emotional skills that protect lifelong mental health. Empirical evidence aligns with these policy statements. For example, Ferreira, Reis-Jorge, & Batalha (2021) found that preschoolers' social-emotional growth is critical for later success, while a U.S. longitudinal study revealed that kindergarteners' prosocial skills forecast adult wellness two decades later (Jones, Greenberg, & Crowley, 2015), Jones et al. (2015) found that children's kindergarten social skills predict later academic and life outcomes.

Multiple factors shape young children's social-emotional development. In particular, temperament-the child's early-emerging behavioral style-consistently predicts individual differences in emotional reactivity, self-regulation, and social engagement and interacts with parenting and classroom contexts to shape developmental trajectories (Rothbart & Bates, 2006). Prior research indicates significant links between temperament traits and social competence in early childhood. For instance, a study of Turkish preschoolers found that various sub-dimensions of temperament (such as adaptability and reactivity) were significantly associated with children's social competence levels (Pekdogan & Kanak, 2016). This suggests that temperamentally calm, attentive children tend to show better social skills, while extremely negative or inflexible temperaments can hinder social-emotional adjustment.

The family environment is another critical context for social-emotional growth. According to Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1979), supportive and nurturing family climates provide children with emotional security and models of positive relationship skills. Preschoolers who grow up in families are characterized by cohesion, open emotional expression, and low conflict are more likely to develop strong emotional regulation and social abilities. Empirical evidence supports this: children who experience warm, responsive parenting show greater gains in social skills and fewer behavior problems over time (Waters, 2017).

For instance, Wang et al. (2021) found in a Chinese sample that higher parental warmth and involvement were linked to better social skills and fewer behavior problems. By contrast, harsh or authoritarian family environments-marked by conflict, strict control, or lack of warmth-have been linked to negative emotional and behavioral outcomes in young children (Waters, 2017). Thus, the family setting plays a formative role in children's social-emotional development.

Children's interactions with peers constitute a third key influence. In the preschool years, peers became important social partners as children learn to communicate, cooperate, and resolve conflicts through play. Research suggests that children effective in engaging with peers are typically more liked and

socially adapted (Dunn, 2004; Caspi & Moffitt, 1993). Conversely, difficulties in peer interactions (e.g. frequent aggression or withdrawal) can impede social-emotional growth and even signal future adjustment problems. Having positive peer relationships and friendships in preschool can thus create a "virtuous cycle" of social learning, increasing children's confidence and social support as they develop (Zhao & Gibson, 2023). These findings emphasize that facilitating healthy peer interactions is essential for children's social-emotional well-being.

Finally, the learning environment in early childhood programs - including preschool classroom quality and teacher-child interactions - profoundly affects social-emotional development. High-quality preschool environments typically provide both cognitive stimulation and emotional support (Hamre & Pianta, 2005; Sylva et al., 2010), giving children opportunities to practice cooperating and managing emotions. Teachers who create warm, structured, and language-rich classrooms help children practice skills like cooperating, taking turns, and expressing feelings appropriately (Waters, 2017). Numerous studies have documented that children attending higher-quality early childhood education programs show better social skills and fewer behavior problems compared to those in lower-quality settings (Brunsek et al., 2017). These insights highlight the importance of enriching early learning environments as part of a comprehensive approach to fostering social-emotional development.

In summary, existing literature points to temperament, family environment, peer interactions, and the preschool learning environment as pivotal factors in young children's social-emotional development. Despite this knowledge, gaps remain. Most studies to date examine these influences in isolation and have been conducted in Western countries. Cultural factors (e.g., parenting norms, preschool practices) differ in non-Western settings, so findings may not generalize. Integrated, multi-factorial research on social-emotional development in non-Western settings is scarce.

To address this gap, the present study investigates how these domains relate to social-emotional abilities in Chinese preschoolers aged 3-6. Using a large, stratified sample from an eastern Chinese city, we examine age and gender differences and the associations of children's temperament, family environment, peer communication skills, and classroom learning environment with their social-emotional abilities. Specifically, this study addresses the following research questions:

1. Are there age and gender differences in the social-emotional abilities of 3-6-year-old children?
2. Is there a significant relationship between children's temperament and their social-emotional abilities?
3. Is there a significant relationship between the family environment and children's social-emotional abilities?
4. Is there a significant relationship between peer communication skills and social-emotional abilities?
5. Is there a significant relationship between the preschool learning environment and children's social-emotional abilities?

By framing the literature problematically and positioning our study as the solution, we highlight the need for a comprehensive, culturally grounded understanding of early social-emotional development. Our findings aim to inform educators and parents about how home, peer, and school environments can be jointly leveraged to support children's social- emotional growth.

By answering these questions, this study aimed to make several novel contributions to the field of early childhood social-emotional development. First, it simultaneously examines multiple individual and contextual factors-including temperament, family environment, peer communication skills, and the preschool classroom environment-rather than considering each in isolation. Second, it contributes to cultural diversity in developmental research by focusing on a large, non-Western sample of Chinese preschoolers aged 3-6, thereby addressing a persistent gap in the literature.

Third, it enhances ecological validity by employing validated multi-informant measures, incorporating parents' assessments of children's temperament, family context, and peer communication, alongside teachers' evaluations of classroom quality. Finally, the findings highlight the combined importance of home, peer, and educational contexts for social-emotional development in early childhood, offering evidence-based guidance for designing tailored interventions in Chinese early education settings.

2. Method

2.1 Study Design

This study employed a quantitative correlational research design, with procedures for data collection and analysis described in detail. To enhance sample representativeness, we used stratified random sampling. We randomly selected kindergartens across urban districts and then used stratified random sampling within those sites by age group (3, 4-5, 6 years) and gender, drawing participants proportionally to ensure adequate representation of each age-by-gender stratum in the sample.

This study used a survey methodology to gather data on preschool children's temperament, family environment, peer communication skills, learning environmental quality, and social-emotional abilities. Parents complete questionnaires on the child's temperament, family environment, peer skills, and social-emotional ability. Instruments have established validity and parent reports were collected confidentially to encourage honesty.

In addition, each child's preschool teacher-after receiving ECERS-R training-conducted a classroom observation and completed the Early Childhood Environment Rating Scale. Using both parent and teacher reports helped reduce rater bias. The study protocol and instruments were approved by the Institutional Ethics Committee of Department of Preschool Education and Early Childhood Education, Guiyang Preschool Education College (Approval No.: GYPEC20230105002). All procedures conformed to ethical standards for research

with human participants, including informed consent and protection of privacy (see "Procedure" below).

2.2 Participants

Participants were 534 preschool-aged children (and their caregivers) recruited from an eastern city in China. To enable comparison with existing studies and to capture salient developmental stages, participants were categorized following common kindergarten divisions into three bands: younger/small class (3-year-olds, 36-47 months), middle/classroom (4-5-year-olds, 48-71 months aggregated for statistical power), and older/large class (6-year-olds, ~72 months/pre-school entry). This scheme aligns with routine Chinese kindergarten grade groupings and corresponds to documented age-related changes in self-regulation, peer interaction complexity, and school-readiness.

Table 1 presents the sociodemographic breakdown of the sample. The children's mean age was 4.71 years (SD ≈ 1.0). There were 281 boys (52.6%) and 253 girls (47.4%). By age group, 157 children were 3 years old (29.4% of the sample), 194 were 4-5 years old (36.3%), and 183 were 6 years old (34.3%). These proportions reflect a roughly even distribution across the three age categories (see Table 1). All participating children were enrolled in local kindergartens. The sample was drawn using stratified random sampling: preschools were first stratified to ensure inclusion of different districts of the city, and then children from each age group were randomly selected from class rosters, after obtaining parental consent. This approach helped enhance the representativeness of the sample for the population of urban preschoolers in the region.

Table 1: Socio-demographic Characteristics of Participants

Item	Group	Frequency (N)	Percentage (%)
Gender	Boy	281	52.6
	Girl	253	47.4
Age	3 years old (36-47 months)	157	29.4
	4-5 years old (48-71 months)	194	36.3
	6 years old (~72 months/pre-school entry)	183	34.3
Total		534	100.0

All children were typically developing as reported by parents; children with severe developmental disabilities were not included in the study. Each child's primary caregiver (a parent) provided ratings on the home environment, the child's temperament, peer communication, and social-emotional abilities. Preschool teachers provided assessments of the classroom learning environment for the child's class.

2.3 Instruments

We utilized five instruments to measure the key constructs: (1) children's social-emotional abilities, (2) temperament, (3) family environment, (4) peer communication skills, and (5) learning environment. Each instrument was chosen because its content maps directly onto the theoretical construct in our model (temperament → Temperament Questionnaire; family environment → FES-CV; peer communication → Li Yanju; social-emotional abilities → PreBERS; learning environment → ECERS-R short form). This ensures construct validity because the item content reflects the conceptual definitions anchored in Cattell's trait model, Bronfenbrenner's ecological view, and Bandura's social learning ideas. All instruments used in this study were established, validated Chinese-language versions and were therefore employed directly without additional forward- or back-translation.

To ensure content validity and applicability in the present context, five experts with extensive experience in early childhood research and practice reviewed all items prior to data collection; they performed item-by-item content validity assessments and recommended minor wording and example-item revisions where appropriate. Drawing on existing psychometric evidence for these Chinese instruments, we also re-examined internal consistency in the current sample (Cronbach's $\alpha > .85$) to confirm their suitability and reliability for this study. A multi-informant approach was used; parents rated most child measures (e.g., using standardized questionnaires), and teachers rated the classroom environment measure.

All measures used are validated scales; parent respondents provided data confidentially to minimize social desirability. The use of teacher-observed ECERS-R data adds an independent perspective to complement parent reports. Table 2 summarizes the instruments, including number of items and respondents.

Table 2: Summary of Instruments Used

No.	Instrument Name	No. of Items	Respondent
1	Preschool Behavioral and Emotional Rating Scale (PreBERS - Chinese version)	34	Parent (caregiver)
2	Parental Temperament Questionnaire (PTQ - Chinese version, ages 3-7)	72	Parent
3	Family Environment Scale - Chinese Version (FES-CV)	90	Parent
4	3-6 Children's Peer Communication Ability Questionnaire	20	Parent
5	Early Childhood Environment Rating Scale - Revised (ECERS-R- Chinese version)	43	Teacher (observer)

2.3.1 Preschool Behavioral Emotional Rating Scale (PreBERS)

This study used the Preschool Behavioral Emotional Rating Scale (PreBERS), which effectively assesses the social-emotional abilities of preschool children aged 3-6 and is filled out by parents of children. The PreBERS consisted of 34 items (sample item: "Ability to control anger towards others.") that measure

strengths across four core subdomains (Epstein & Synhorst, 2008): (i) Family integration (positive family relationships); (ii) Social confidence (comfort and competence with peers); (iii) School readiness (adjustment to structured learning); and (iv) Emotional regulation (management of emotional responses). Respondents (caregivers) rated each item on a 5-point Likert scale, ranging from 1 (Not at all consistent) to 5 (Very consistent), with higher scores indicating greater levels of adaptive functioning. Subscale scores were aggregated to form a composite index of social-emotional abilities, which served as the primary outcome variable in subsequent analyses.

In this study, PreBERS demonstrated high internal consistency (Cronbach's $\alpha \approx 0.90$ for the total score), consistent with previous research where reliability coefficients for PreBERS subscales and total score were reported at 0.86 or above (Epstein & Synhorst, 2008 ; Cress, Lambert, & Epstein, 2014). This instrument served as our primary outcome measure of children's social-emotional abilities.

2.3.2 Parental Temperament Questionnaire (PTQ)

This study used children aged 3-7 years old Parental Temperament Questionnaire (PTQ), which is rated by caregivers who know the child best based on the child's performance over the past year. Each item was a statement to be completed by the parent of the children. The PTQ comprised 72 items (sample item: "When taking a bath, splash water everywhere; play very lively."), which were grouped into nine theoretically grounded subscales: (i) Activity level (motor energy); (ii) Regularity (biological predictability); (iii) Approach-withdrawal (initial response to novelty); (iv) Adaptability (ease of adjustment); (v) Reactivity (emotional intensity); (vi) Mood (positive vs. negative); (vii) Distractibility (attention diversion); (viii) Persistence (sustained effort); and (ix) Threshold of response (stimulation needed to respond).

Each item was rated by parents on a 7-point Likert scale, ranging from 1 (Never) to 7 (Always), allowing for nuanced differentiation in behavioral frequency. Higher scores on a given subscale reflect a stronger presence of the corresponding temperament trait. Subscale scores were computed by averaging relevant items, and these scores were used in the structural equation model as observed indicators of latent temperament dimensions. In our sample, the PTQ exhibited excellent reliability (Cronbach's $\alpha > 0.85$ for all subscales). This instrument allowed us to profile each child's temperament and examine its correlation with social-emotional outcomes.

2.3.3 The Family Environment Scale (FES-CV)

This study used The Family Environment Scale (FES-CV) compiled by American psychologist Moss and revised by Feipeng et al. This scale evaluates changes in the family environment under family intervention and conduct comparative research on family environment and other aspects of family life, which are filled out by parents of preschool children (Wang, X. D. ,1993). It consisted of 90 items (sample item: "Our family members always give each other the utmost help and support."), which were grouped into 10 subscales that collectively capture key dimensions of family functioning: (i).Cohesion (mutual support); (ii)

Expressiveness (open emotional sharing); (iii) Conflict (angry/discordant interactions); (iv) Independence (emphasis on autonomy); (v) Achievement orientation (goal focus); (vi) Intellectual-cultural orientation (engagement in intellectual/cultural activities); (vii) Active-recreational orientation (shared leisure); (viii) Moral-religious emphasis (ethical/spiritual values); (ix) Organization (family structure/routines); and (x) Control (rule-based governance).

Each item was rated by the primary caregiver on a 5-point Likert scale, ranging from 1 (Not at all consistent) to 5 (Very consistent). Higher scores on each subscale reflect stronger endorsement of the corresponding family characteristic. Subscale scores were computed by averaging relevant items. In our dataset, Cronbach's α for the overall scale and key subscales was > 0.85. The FES-CV provided a profile of each child's home environment, allowing us to examine how a positive versus negative family climate relates to children's social-emotional abilities.

2.3.4 3-6 Children's Peer Communication Ability Questionnaire

The researcher used the "3-6 Children's Peer Communication Ability Questionnaire" compiled by Li Yanju in order to investigate the peers of children aged 3-6. The development status of communicative ability is filled out by parents of preschool children aged 3-6. The instrument consisted of 20 items (sample item: "Be lively and fearless when meeting other people for the first time."), organized into four subscales that reflect both adaptive and maladaptive components of peer communication: (i) Social initiative (seeking and starting peer contact); (ii) Verbal and nonverbal abilities (use of language, gestures, facial expressions, and eye contact); (iii) Prosociality (empathy, sharing, cooperation); and (iv) Social disruption (reverse-scored; interrupting, dominating, or aggressive behaviors).

Each item was rated on a 5-point Likert scale, ranging from 1 (Never) to 5 (Always). Subscale scores were averaged, and higher scores on the first three subscales reflected stronger peer communication skills, while higher scores on the social disruption subscale indicated greater challenges in peer interactions. For analytic consistency, social disruption items were reverse scored during data processing so that a higher total score consistently represented better overall peer communication ability. The peer communication score was included as a predictor in the structural model to assess its relationship with children's social-emotional development. In the current study, it showed good reliability ($\alpha \approx 0.88$ for the total scale). By including this measure, we aimed to capture the child's competency in the peer domain and its association with social-emotional development.

2.3.5 Early Childhood Learning Environment Rating Scale (ECERS-R)

The researcher used the Early Childhood Learning Environment Rating Scale (ECERS-R). The main purpose of this scale was to evaluate the quality of young children's learning environment and is filled out by teachers of preschool children aged 3-6. It consisted of 43 items (sample item: "Furniture for routine care, play, and learning") organized into seven subscales: (i) Space and

furnishings (layout, safety, gross-motor areas); (ii) Personal care routines (hygiene, meals, naps, health/safety); (iii) Language-reasoning (books and language stimulation); (iv) Activities (materials for creative, fine-motor, and cognitive play); (v) Interactions (supervision and quality of staff-child/peer interactions); (vi) Program structure (schedules, transitions, balance of child- vs. teacher-initiated activities); and (vii) Parents and staff (family involvement, staff qualifications, professional development).

Each item was rated on a 7-point scale, ranging from 1 (Inadequate) to 7 (Excellent), based on direct observations conducted by trained assessors over the course of a typical preschool day. Scores reflect the degree to which the environment supports children's developmental and learning needs. For analytic purposes, both total and subscale scores were calculated, with particular emphasis placed on the interactions and language-reasoning subscales, given their strong theoretical and empirical links to children's social-emotional outcomes.

In this study, data collection was carried out by observers trained to meet the reliability standards recommended by the authors of the instrument, ensuring the credibility of the environmental quality ratings. In our data, the ECERS-R showed strong internal consistency (Cronbach's $\alpha > 0.90$ for the total scale), although it encompasses diverse aspects of quality. This measure allowed us to quantify the learning environment that each child was exposed to and analyze its relationship with social-emotional development.

2.4 Procedure

Data collection was carried out following ethical guidelines and with respect for participants' rights. After obtaining approval from the institutional ethics review board, we coordinated with several kindergartens in the target city to invite families to participate. Consent forms describing the study's purpose and what participation entailed were distributed to parents via the schools. Only children whose parents or legal guardian provided written informed consent were included. Parents were assured of the confidentiality of their responses and that the information would be used exclusively for research. They were also informed that participation was voluntary, and they could withdraw at any time.

Once consent was obtained, parents were given a survey packet containing the PreBERS, PTQ, FES-CV, and Peer Communication questionnaire to be completed at home. Each parent was provided with detailed instructions and a point of contact (a researcher's phone/email) for any questions. The surveys were in Chinese. Parents were asked to complete the questionnaires independently and return them in a sealed envelope to the kindergarten within approximately one week. Research staff were present at the schools on designated days to collect the sealed survey envelopes, which were then securely stored.

For the ECERS-R assessment of classroom quality, all observers conducting the ECERS-R (Early Childhood Environment Rating Scale-Revised) assessments

underwent standardized reliability training. This training included detailed study of the ECERS-R manual, guided practice observations in early childhood settings, and comprehensive debriefing sessions led by experienced trainers to discuss scoring criteria. Such intensive in-house training and feedback ensure that observers apply the ECERS-R criteria consistently and reliably. Each trained observer spent about 3-4 hours in a scheduled classroom visit, rating items from unobtrusive observation and brief teacher-provided clarifications.

All data were collected over a 2-month period in the spring semester. After data collection, participants were debriefed with a summary of the study goals. To maintain anonymity, each child and parent was assigned an ID code, and no names were recorded on the surveys. The data file used ID codes only, and any identifying information (such as consent forms with names) was kept separate from survey responses. Overall, the procedures adhered to the ethical standards of the Declaration of Helsinki and the norms for research with young children and families. The study's methodology was designed to minimize any potential risks (which were negligible, as the study only involved surveys and observation) and to respect the participating children's daily routine.

2.5 Data Analysis

After data collection, the surveys were checked for completeness and then coded for analysis. We employed both descriptive and inferential statistical techniques [difference tests (independent-samples t-tests and one-way ANOVA) and Pearson correlation analyses], using IBM SPSS (Version 27) for data analysis. The data analysis proceeded in several steps:

2.5.1 Descriptive Statistics

Researchers first computed descriptive statistics for all key variables - including means, standard deviations, and ranges for the total scores of social-emotional abilities (PreBERS), temperament (PTQ), family environment (FES-CV), peer communication, and learning environment quality (ECERS-R). To aid interpretation, we classified mean scores into qualitative categories (Low, Medium, High) based on the possible scale range.

Specifically, for variables measured on 5-point Likert scales, we followed the interpretation guidelines adapted from Creswell (2012): a mean score < 2.34 indicates a "Low" level, 2.34-3.66 indicates "Medium" (moderate) level, and > 3.66 indicates a "High" level of that attribute. For variables measured on 7-point Likert scales, we applied a corresponding categorization: < 3.34 = Low quality, 3.34-5.67 = Medium quality, > 5.67 = High quality. Using these thresholds, we categorized the average scores to provide a more intuitive understanding of whether, for example, the sample as a whole had high or medium levels of social-emotional abilities (Table 3).

Table 3: Interpretation of Mean Scores

Mean score		Score Mean Interpretation
5-point Likert scale	7-point Likert scale	
1.00 to 2.33	1.00 to 3.33	Low
2.34 to 3.66	3.34 to 5.67	Medium
3.67 to 5.00	5.68 to 7.00	High

Note: Mean score categories were derived by equally partitioning the possible scale range, following Creswell (2012).

2.5.2 Group Difference Tests (Age and Gender)

To address the first research question on age and gender differences in social-emotional abilities, we conducted two types of inferential tests. For gender differences, an independent samples t-test was used, comparing the mean social-emotional ability score (PreBERS total) between boys and girls. Prior to the t-test and one-way ANOVA, we examined independence and normality (Shapiro-Wilk), and Levene's test was applied to check the homogeneity of variances assumption.

For gender differences, if Levene's test was non-significant (indicating equal variances), the standard t-test results were used; if Levene's was significant, we would use the adjusted degrees of freedom from Welch's t-test. For age differences, we performed a one-way analysis of variance (ANOVA) comparing mean social-emotional scores across the three age groups (3, 4-5, 6 years). Again, we first examined Levene's test to assess variance homogeneity across age groups. When the ANOVA indicated a significant age effect, we conducted post-hoc pairwise comparisons between age groups.

2.5.3 Correlation Analysis

To address research questions 2-5 regarding relationships between temperament, family environment, peer communication skills, learning environment, and social-emotional abilities, we computed Pearson product-moment correlation coefficients among these variables. Specifically, we calculated the correlation of each predictor (temperament composite score, FES-CV family environment score, peer communication score, ECERS-R learning environment quality score) with the dependent variable (PreBERS social-emotional abilities score).

3. Results

3.1 Level of Temperament, Family Environment, Peer Communication, Learning Environment, and Social-Emotional Abilities

Descriptive statistics were performed using SPSS on the data collected from 534 3-6-year-old Children. Descriptive analyses were conducted for the observed variables. Table 4 presents the descriptive statistics for all observed variables. Social-emotional abilities had a mean score of 3.46 (SD = 0.14), indicating moderate levels across the sample. Among the predictors, temperament traits exhibited the highest mean (M = 4.67, SD = 0.24), followed by the learning

environment (M = 4.02, SD = 0.18), family environment (M = 3.83, SD = 0.07), and peer communication skills (M = 3.67, SD = 0.20).

Overall, the descriptive results indicate that in our sample, family environment and peer communication are at a high level, and temperament, learning environment, and social-emotional abilities are at a medium level.

Table 4: Descriptive Statistics of Observed Variables

No.	Variables	M	SD	Min	Max	Score Mean Interpretation
1.	Social-emotional abilities	3.46	0.14	3.42±0.23	3.49±0.31	Medium
2.	Temperament	4.67	0.24	4.63±0.42	4.82±0.40	Medium
3.	Family environment	3.83	0.07	3.81±0.24	3.85±0.21	High
4.	Learning environment	4.02	0.18	3.98±0.39	4.08±0.51	Medium
5.	Peer communication skills	3.67	0.20	3.57±0.38	3.84±0.32	High

Note: SD = standard deviation. Interpretation categories were based on 5-point or 7-point Likert scales as appropriate (see Method section). Higher scores indicate more of the construct (e.g. more skills, higher quality). "High level" generally corresponds to a mean in the top third of the scale's range, "Medium" in the mid-range.

3.2 Differences in Social-Emotional Abilities by Gender and Age

Before examining the core relationships, we analyzed whether children's social-emotional ability scores differ by child gender or age group. Testing these demographic differences helps address RQ1 and provides context for interpreting the correlational results.

3.2.1 Gender Differences

An independent-samples t-test was conducted to compare the mean social-emotional abilities of boys (n = 281) and girls (n = 253). Levene's test for equality of variances was F (1, 532) = 1.456, p = .228 (Table 5), indicating that the variance in scores was equivalent between genders. Thus, the standard t-test assuming equal variances was used. The t-test result was t (532) = -1.876, p = .061 (two-tailed). This p-value is slightly above the conventional 0.05 threshold, indicating no statistically significant difference between boys and girls in social-emotional abilities. In other words, boys and girls in this sample did not differ in their overall level of social-emotional abilities, with both genders averaging very similar scores.

Table 5: Levene's Test for the Differences in Social-emotional Abilities Based on Social-demographic Factors

Dependent Variable	Item	Levene Statistic	df1	df2	Sig.
Social-emotional Abilities	Gender	1.456(F)			0.228
	Age	49.909	2	531	0.000

Table 6: Independent Sample T-test for the Differences in the Social-emotional Abilities Based on Gender

Dependent Variable	Gender	M±SD	T	Sig.
Social-emotional Abilities	Boy	3.453±0.128	-1.876	0.061
	Girl	3.475±0.147		

3.2.2 Age Differences

We next examined differences across the three age groups (3-year-olds, 4-5-year-olds, 6-year-olds). Initially, a standard one-way ANOVA was considered. However, Levene's test for homogeneity of variances for the three age groups was significant: Levene F (2, 531) = 49.909, $p < .001$ (Table 5). This indicates that the variance in social-emotional scores was not equal across ages - in fact, inspection showed the variance for the 3-year-old group was smaller than for older groups, likely due to some restriction of range in ratings for the youngest children. Because the equal variance assumption was violated, we employed Welch's ANOVA, which is robust to heterogeneity of variances (Table 7).

Welch's ANOVA result was Welch F (2, 280.85) = 627.192, $p < .001$, indicating a significant difference in mean social-emotional abilities among the three age groups. The very large F provides strong evidence of age-related differences in social-emotional abilities, F (2, 531) = 879.48, $p<.001$. Corresponding effect sizes were extremely large (partial $\eta^2 = .768$), indicating that age accounts for roughly 77% of the explainable variance on this measure (Table 8).

Table 7: Welch Test for the Differences in the Social-emotional Abilities Based on Age

Dependent Variable	Item	Welch Statistica	df1	df2	Sig.
Social-emotional Abilities	Age	627.192	2	280.852	0.000

Table 8: One-Way ANOVA for the Differences in the Social-emotional Abilities Based on Age

Dependent Variable	Age	Sum of Squares	df	Mean Square	F	Sig.	Partial η2
Social-emotional Abilities	Between Groups	7.772	2	3.886	879.482	0.000	0.768
	Within Groups	2.346	531	0.00442			
	Total	10.118	533				

Note: Partial $\eta^2 = 0.768$ (calculated from the ANOVA F value and degrees of freedom). Because Levene's test indicated heterogeneity of variances, Welch's ANOVA was used for hypothesis testing (see Table 7). The partial η^2 is reported here as a supplemental effect-size estimate from the classical ANOVA.

To explore the pattern of differences, we conducted post-hoc comparisons using the LSD test (which was reasonable here given the clear significant omnibus result and equal sample considerations). The pairwise comparisons (Table 9) revealed that all three pairwise contrasts were statistically significant at $p < .001$. Specifically, the mean difference between the 6-year-old group and the 4-5-year-old group was 0.16093 (on the 5-point scale), with 6-year-olds scoring higher.

The difference between the 4-5-year-old group and the 3-year-old group was 0.14124, with 4-5-year-olds scoring higher than 3-year-olds. The largest gap was between 6-year-olds and 3-year-olds, with a mean difference of 0.30217 in favor of the 6-year-olds. All these differences were significant at $p < .001$ (Table 9). Thus, the data show a clear age gradient: older preschoolers demonstrated significantly higher social-emotional ability scores than younger preschoolers. In practical terms, 3-year-olds had the lowest average score, 4-5-year-olds were in the middle, and 6-year-olds had the highest scores.

Table 9: Post Hoc Tests (LSD) for the Differences in the Social-emotional Abilities Based on Age

Dependent Variable	(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.
Social-emotional Abilities	3	4-5	-.14124*	.00714	.000
		6	-.30217*	.00723	.000
	4-5	3	.14124*	.00714	.000
		6	-.16093*	.00685	.000
	6	3	.30217*	.00723	.000
		4-5	.16093*	.00685	.000

In summary, age differences were significant: older children in our sample have progressively more developed social-emotional abilities. By contrast, gender differences were not significant, indicating that boys and girls on average are developing social-emotional abilities at similar rates in early childhood.

3.3 Correlations between Temperament, Environment Factors, and Social-Emotional Abilities

Following the specification of the research aims, we examined Research Questions 2-5: (1) the relation between temperament and social-emotional

abilities; (2) the relation between family environment and social-emotional abilities; (3) the relation between peer communication skills and social-emotional abilities; and (4) the relation between preschool learning environment and social-emotional abilities. We examined the Pearson correlations between the children's social-emotional abilities and each of the four factors: temperament, family environment, peer communication skills, and learning environment quality. Pearson correlation analysis showed significant positive associations between social-emotional abilities and all predictor variables.

As shown in Table 10, the strongest correlations were found with learning environment ($r = .921$, $p < .001$) and peer communication skills ($r = .907$, $p < .001$), both indicating very strong relationships. Temperament ($r = .891$, $p < .001$) and family environment ($r = .880$, $p < .001$) also demonstrated strong positive correlations.

Table 10: Pearson Correlations Between Key Predictors and Social-Emotional Abilities

Social-emotional Abilities	*r*	*Sig.*	Score Mean Interpretation
Temperament	.891**	0.000	Strong
Family Environment	.880**	0.000	Strong
Peer Communication Skill	.907**	0.000	Very strong
Learning Environment	.921**	0.000	Very strong

*Note. r = Pearson Correlation Coefficient; Sig = Significance Value/ p value; * p < 0.5, ** p < 0.01, *** p < 0.001. "Strength" was a qualitative interpretation (very strong typically denotes r > 0.90, strong for r ~0.70-0.89, etc.). All relationships were positive, indicating that higher values of the predictor relate to higher social-emotional abilities scores.*

Although this study focused on describing correlations, we conducted multicollinearity diagnostics to assess the robustness of the findings. Variance inflation factors (VIFs) ranged from 3.805 to 4.973 (specific VIFs = 3.805, 3.923, 4.933, and 4.973), all below the commonly used threshold of 5, indicating that multicollinearity did not reach commonly accepted thresholds for concern. Nonetheless, several variable pairs exhibited relatively high correlations; these should be interpreted as evidence of strong association or possible construct/measurement overlap rather than directional (causal) relationships. Determining causal pathways will require future research.

4. Discussion

This study aimed to examine the social-emotional development of preschoolers aged 3 to 6 years and its relationship to a range of factors. Our findings support Bronfenbrenner's bio-ecological model with three layers of evidence: (1) At the individual level: preschoolers' age, gender, and temperament; (2) At the micro level: family, peers, and learning environment; (3) At the macro level: broader cultural and policy influences (we briefly discuss China's educational context as shaping all children's development). This section interpreted the key findings in light of existing literature and explored possible causes.

4.1 Age and the Advancement of Social-Emotional Abilities

Consistent with developmental patterns, this study found that older preschoolers exhibited more mature social-emotional abilities. 6-year-olds (typically the last year of kindergarten) scored significantly higher on social-emotional abilities than 4-5-year-olds, who in turn scored higher on social-emotional abilities than 3-year-olds. This is consistent with the view that social-emotional abilities develop rapidly during the preschool period. As children transition from infancy to early childhood, they improve in self-regulation, social understanding, and interpersonal communication.

The data from this study quantitatively validate these qualitative developmental milestones: the effect of age on social-emotional scores was not only statistically significant but also empirically large. This finding aligns with previous research, such as Denham et al. (2012) and Darling-Churchill and Lippman (2016), which suggests that early childhood is a critical period for the increasing sophistication and integration of social-emotional abilities, laying the foundation for school readiness.

The results of this study reinforce the view that 6-year-olds exhibit more advanced social-emotional competencies compared to 3-year-olds, including better emotion regulation, empathy, and peer interaction skills (Biermann et al., 2024; Denham et al., 2015). These developmental differences have direct implications for early childhood education: curricula and interventions should be developmentally appropriate. Specifically, younger preschoolers (e.g., age 3) benefit from more structured support and play-based strategies (Gershon & Pellitteri, 2018), whereas older children (e.g., age 6) are capable of engaging in more complex social learning activities such as cooperative problem-solving and emotional reflection (Mengxia, 2024).

4.2 Lack of Gender Differences

This study did not find significant differences between boys and girls in social-emotional abilities. This result differs from some previous studies, which found that girls have a slight advantage in prosocial behaviors or emotion understanding, while boys are, on average, more likely to engage in externalizing behaviors (e.g., Else-Quest et al., 2006). The absence of gender differences may reflect social changes in urban Chinese parenting, where parents now place greater emphasis on social skills in boys. However, the nature of the measurement instrument should be considered. The PreBERS used in this study was a strengths-based assessment that focused on positive behaviors (such as family engagement and self-regulation) rather than problem behaviors.

Therefore, while boys and girls may exhibit comparable positive social-emotional abilities, differences in negative behaviors may still exist (Chaplin & Aldao, 2013). Gender differences in early childhood were often modest and inconsistent, with large individual variability within each gender possibly obscuring small mean differences (Zahn-Waxler et al., 2008). This pattern might also reflect evolving sociocultural dynamics. According to social learning theory (Bandura, 1977), children's emotional competencies are shaped through observation, modeling, and reinforcement, which are influenced by societal

gender norms. In the urban Chinese context, expanding access to preschool education and more egalitarian parenting practices might offer children of both genders' equal opportunities for emotional development.

Furthermore, parents today may place greater emphasis on boys' emotional expression than in the past, narrowing the gender gap (Liu & Wang, 2021; Wang et al., 2022). This study's findings are consistent with some emerging research, such as Sun et al.'s (2023) study on "gender pathways," which found that girls were slightly higher in certain social-emotional abilities, but with significant overlap between boys and girls. Overall, this study suggests that boys and girls develop social-emotional abilities at similar rates. This is a positive sign for educators and parents, suggesting that interventions and curricula can be universally applicable to all children, without discriminating by gender, at least when it comes to promoting positive social-emotional abilities.

4.3 The Relationship between Temperament and Social-Emotional Development

In this study, there was a significant positive correlation between children's temperament (as rated by their parents) and their social-emotional abilities. This result is consistent with developmental psychology theories that suggest that temperament is a fundamental factor influencing how children interact socially and regulate their emotions. This finding is consistent with the findings of Pekdogan and Kanak (2016), who found that temperamental traits such as persistence and approachability were positively correlated with social competence in preschoolers, while reactivity and avoidance were negatively correlated. This study extends these findings to the Chinese cultural context.

Educators and parents should recognize individual temperamental differences and provide more support to children with more challenging temperaments, such as emotion regulation guidance, gradual social activities, or teacher-guided interactive exercises. Interventions can employ temperament-focused strategies, such as helping highly active children release their energy in a positive way or guiding children who struggle with change to gradually adapt to new environments. By respecting temperamental differences and tailoring teaching to individual needs, adults can more effectively promote children's social-emotional development (Rothbart & Bates, 2006).

4.4 The Relationship between Family Environment and Social-Emotional Development

The family environment also showed a robust positive correlation with children's social-emotional abilities. This finding is consistent with numerous studies highlighting the importance of the family as a primary context for children's early development. A harmonious and supportive family typically provides children with a secure attachment base, models empathetic communication, and a consistent daily routine, all of which promote social-emotional development. Children from these high-scoring families reported having better social skills and emotional regulation. This is consistent with the findings of Wang et al. (2021), who found that supportive parenting styles (such

as parental warmth and responsiveness) in Chinese families predicted improved social skills in children.

Similarly, other studies have shown that parental warmth and active involvement are associated with stronger emotion regulation and fewer behavioral problems in children (e.g., Ren et al., 2016; Zhou et al., 2018). Conversely, persistent family conflict or an environment lacking emotional expression may undermine children's social-emotional learning, as these environments are often unsafe or stimulating. This study provided empirical support for policies and programs that improve the family environment through parent education, family counseling, or family-based interventions to promote early social-emotional development.

4.5 The Relationship between Peer Communication Skills and Social-Emotional Abilities

Research has found a strong correlation between children's peer communication skills and their overall social-emotional abilities. Interaction with peers is itself a process of developing and testing social-emotional abilities. Children who can express their needs, listen to others, share, and cooperate are often those who have good emotional regulation and build positive relationships. This finding is consistent with Vygotsky's theory of sociocultural development, which states that social interaction is the engine of cognitive and emotional development.

It also echoes related research, such as Kemple et al. (1992), who found that communication and play skills predict peer acceptance in preschool, which in turn provides more opportunities to practice social behaviors. This study's data showed that children who demonstrate good social-emotional abilities tend to have mutual friendships and positive peer interactions. Conversely, children who struggle with peer interactions may need additional support. Therefore, promoting peer interaction is crucial. Early childhood educators can design structured play interventions to help shy or socially awkward children build a foundation for interaction. Teaching specific skills can directly improve social abilities.

4.6 The Relationship between Learning Environment and Social-Emotional Development

Research has found a significant positive correlation between the quality of kindergarten learning environments (assessed using the ECERS-R) and children's social-emotional abilities. Classes with higher ratings generally performed well in terms of material richness, activity arrangement, and teacher-student interaction, and children in these classes also demonstrated stronger social-emotional abilities.

This finding aligns with decades of research on early childhood education quality: high-quality classroom environments typically include positive teacher-student relationships, encouragement of independent play, and the use of positive guidance strategies (rather than punitive discipline), and a curriculum that incorporates social-emotional learning-all of which contribute to the development of children's social-emotional abilities.

Furthermore, well-organized classes and rich activities can reduce chaos and stress, enhance children's sense of security and belong, and facilitate positive social interaction. Burchinal et al. (2010) noted that high classroom process quality is associated with better social outcomes, while Curby et al. (2013) found that teacher emotional support predicts improved social abilities in preschoolers.

For example, if a kindergarten implements SEL curriculum and improves classroom atmosphere and peer interactions, parents may also find their children easier to manage at home (thus "improving" their temperamental expression and family environment). Similarly, parental involvement in SEL activities at home may also help children adapt better to classroom life. Therefore, the best way to promote children's social-emotional development is to work together at multiple levels to create a consistent and collaborative environment for growth.

5. Limitations and Future Research

Despite its contributions, this study has several limitations that warrant consideration. First, the design was cross-sectional and correlational, which limits our ability to draw causal conclusions about the relationships observed. Although we identified significant associations between temperament, environmental factors, and social-emotional skills, we cannot determine the direction of effects-for example, whether a supportive family environment enhances children's social-emotional abilities, or whether children with better social-emotional skills elicit more supportive interactions from their families (or both).

Longitudinal studies are needed to disentangle the directionality and potential reciprocal influences among these variables. Second, our sample was drawn from a single city in eastern China. While we used stratified sampling to improve representativeness of that region, the findings may not generalize to other cultural or geographical contexts (such as rural areas or different countries) with differing socialization practices and resources.

Future research should include more diverse samples across various regions and cultural backgrounds to test the robustness of these relationships. Third, all data were gathered via surveys and rating scales reported by adults (parents and teachers). Although we employed well-validated instruments and multiple informants (e.g., parents rated temperament and family environment, teachers/classroom observers assessed the preschool environment, etc.), the use of questionnaire measures can introduce biases such as shared rater bias or social desirability.

Future studies could incorporate additional methods, such as direct observations of children's behavior or teacher-child interactions, and reports from multiple informants in each context, to provide a more objective assessment of children's socio-emotional functioning. Moreover, while our study examined multiple factors simultaneously, we did not formally test complex interactive or mediating pathways-for instance, whether the effect of temperament on social-

emotional outcomes is mediated by peer interactions, or whether family environment and classroom quality have synergistic effects.

Further research using longitudinal and experimental designs (e.g., intervention studies) could explore these mechanisms and establish more confident causal links. Such studies might include intervention trials to see if improving a certain context (for example, a parenting program or a classroom-based SEL intervention) leads to measurable gains in children's social-emotional competencies, thereby providing stronger evidence of causality.

6. Conclusions

Older preschoolers exhibited higher social-emotional abilities than younger children, reflecting normal developmental processes between the ages of 3 and 6. No significant gender differences were found, indicating that boys and girls generally demonstrate comparable social-emotional abilities in early childhood. Children's temperament levels were significantly positively correlated with their social-emotional abilities; this emphasizes the importance of innate traits in children's social development and the importance of prioritizing individual differences in education. A positive family environment was significantly associated with children's social-emotional abilities, laying a solid foundation for the development of empathy, self-control, and social skills.

Peer communication skills were significantly positively correlated with social-emotional abilities; children who communicated effectively with peers, actively participated in play, and exhibited prosocial behaviors exhibited higher overall social-emotional abilities. The learning environment was significantly positively correlated with social-emotional development; a safe, resourceful, and positive preschool learning environment, as well as positive teacher-student interactions, significantly supported children's social-emotional learning.

Overall, children's social-emotional development is closely linked to their inherent traits and environmental factors. Research findings support Bronfenbrenner's ecological systems theory: children's social-emotional development is most effective when supportive experiences are consistently and consistently provided across microsystems such as family, school, and peer groups. Social-emotional development is a multidimensional and contextually influenced process. During the critical period of 3 to 6 years old, children's abilities to recognize and manage emotions, cooperate with others, and adapt to social situations are initially formed. Children's daily experiences at home, at school, and with peers continuously shape their social-emotional growth path.

Therefore, supporting the development of children's social-emotional abilities requires a comprehensive strategy that integrates family, educators, and peer interaction opportunities. This is not just about preventing behavioral or academic problems, but also about empowering children to understand themselves and others, build healthy relationships, and face challenges with resilience-these are the foundations of future success.

7. Conflict of Interest

The authors declare that they have no competing interests.

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