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Bridging the gap: the impact of parental education and child leisure activities on cognitive and socioemotional skills in preschoolers

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Family socioeconomic status is broadly acknowledged to be associated with child development and wellbeing. However, the extent of this association across various dimensions of child development remains a topic of ongoing debate. This study aims to investigate the relationship between parental education and child cognitive and socioemotional skills, as well as the mediating role of children's leisure time activities, including screen time and shared book reading. The study involved 1,288 preschool children ($M = 70.4$ months, $SD = 4.53$) and their parents. Children's executive functions, emotion comprehension, and peer acceptance were assessed. Parents provided information regarding their educational levels; their children screen time duration and frequency of shared book reading. The conducted assessment of direct and indirect effects through path analysis revealed following findings. First, parental education is related to children's verbal working memory, cognitive flexibility, and emotional comprehension. Second, it showed no significant relation to children's peer acceptance, visual working memory, or inhibitory control. Third, shared book reading and screen time can statistically significantly explain differences in verbal working memory between children, including those associated with differences in parental education. Therefore, low reading frequency and high screen time, often observed in families with lower parental educational attainment, may serve as potential sources of disparities in children achievement and psychological wellbeing throughout development.

KEYWORDS

family SES, parents, media use, screen time, reading, executive functions, emotion comprehension, preschool children

1 Introduction

Preschool age is a crucial period for the development of various key mental abilities, including cognitive, social, and emotional skills that are essential for a child's future academic and social success (Guhn et al., 2016). The level of cognitive and socioemotional skills in preschoolers may vary based on parental socioeconomic status (SES) (Letourneau et al., 2013). Social disparity is extensively documented to have a deleterious effect on the mental wellbeing of children. Those from disadvantaged backgrounds are 2–3 times more likely to experience mental health issues compared to their more advantaged peers (Kirkbride et al., 2024). There is evidence linking SES to various general preschool cognitive

(e.g., Christensen et al., 2014; González et al., 2024; Incognito et al., 2022; Larson et al., 2015; Norfadillah et al., 2017), social and emotional abilities (e.g., Hosokawa and Katsura, 2018; Liu et al., 2020; Lechner et al., 2021; Wu et al., 2020). However, much less attention has been paid to examining the relations between specific components of these abilities and specific dimensions of SES (Cuartas et al., 2022; Waters et al., 2021). This complicates the development of targeted interventions for specific skills in children from specific SES backgrounds. In the current study, we focus on parental education as one of the main indicators of SES and its association with specific cognitive, social, and emotional skills discussed below.

Firstly, one of the most significant cognitive emergences during preschool age is the development of executive functions (EF). EF is a group of cognitive skills that are required for the conscious, top-down control of action, thought, and emotions (Diamond, 2013). Core EF skills include working memory—visual and verbal, inhibitory control, and cognitive flexibility (Miyake et al., 2000; Diamond, 2013; Veraksa et al., 2021a). Visual and verbal working memory facilitates the storage and manipulation of information that is not currently being perceived. Inhibitory control suppresses impulsive responses in favor of task-relevant responses, while cognitive flexibility supports the ability to switch between competing responses, rules, or perspectives. At the same time, EF can be considered more broadly and also include other skills, such as attention, planning, reasoning, fluency, and problem-solving (Diamond, 2013; Welsh et al., 1991). Children with stronger EF show greater proficiency in pursuing long-term goals, processing information, and managing social behavior in classroom settings (Diamond, 2013). EF is critical predictors of development of cognition, successful adaptation and educational achievement both in school and later in life (Vygotsky, 1983; Willoughby et al., 2012). This explains the increased interest in their study.

Research indicates that children from lower SES backgrounds perform worse than their peers on a variety of EF tasks, including working memory, flexibility, attention, and planning (Cuartas et al., 2022; Lipina et al., 2005; Hackman et al., 2015). The meta-analysis by Lawson and colleagues demonstrated a small but statistically significant correlation between SES and EF across all studies they examined [r random = 0.16, 95% CI (0.12, 0.21)] (Lawson et al., 2018). Halse et al. (2019) reported that after adjusting for all time-invariant unmeasured confounders, higher parental education predicts superior EF development. However, this study used teachers' assessments of children's EF with the BRIEF questionnaire, instead of objectively measuring the specific EF skills in the children themselves. Significantly fewer studies have investigated the relationship between specific EF skills and parental education. Ardila et al. (2005) demonstrated that based on parental education, no significant differences were observed in core EF skills. Significant associations were found for semantic and phonemic verbal fluency scores as supplementary EF measures (Ardila et al., 2005). In the work of Hackman and colleagues, parental education significantly predicted planning abilities by first grade, but not working memory ($p > 0.05$) (Hackman et al., 2015). However, Conway et al.'s (2018) study showed that the greatest differences in children's EF skills due to differences in parental education were observed for working memory. Thus, further research is needed

due to the inconsistency of results and the lack of data on the relationship between specific, objectively measured EF skills and parental education.

Secondly, in addition to cognitive emergences during preschool age, social skills are also important for future academic and social success (Burt and Roisman, 2010; Moffitt et al., 2011). One of the most predictive social measures is the peer acceptance as the degree to which a child is socially accepted by his or her peers (Doll, 1996). Peer acceptance and rejection are commonly assessed through sociometric nominations, where children identify their schoolmates whom they "like most" and "like least" (McDonald and Asher, 2018). Peer acceptance is related to increased motivation for engaging in learning activities (e.g., Holmes et al., 2016), associated with improved academic performance (e.g., Ladd et al., 2017), and future psychological wellbeing (e.g., van der Wilt, 2024).

The relationship between family SES and peer acceptance has been studied to a much lesser extent than with cognitive skills. Higher parental education is associated with greater social interaction skills in children (Hoglund and Leadbeater, 2004). Kassim and Hutagalung (2020) showed that social interaction was higher in preschoolers whose parents had a higher level of education. In turn, children with poor social interaction skills become rejected more often (Ferris, 2019). Very few studies have directly examined the relationship between parental education and a child's peer acceptance. Uribe et al. (2014) found that parental education level contributes to the peer acceptance of children. As shown by Shehu (2019), the largest percentage of children accepted by their peers had at least one highly educated parent, while all children of parents with a lower level of education were categorized as rejected. However, parental education is not a strong predictor of peer acceptance in preschool (Shehu, 2019). This, along with the limited research on the connection between parental education and peer acceptance, highlights the necessity of addressing this gap.

Thirdly, the emotional skills developed during preschool age are also a significant predictor of a child's future successes (Guhn et al., 2016). Among the numerous emotional skills, understanding emotions holds particular value. Understanding emotions reflects the direct comprehension of one's own and others' emotions and the recognition and description of emotional states. It also includes cognitive aspects such as explaining the nature and causes of emotions, predicting emotions, and knowing and applying strategies for regulating them in everyday life (Pons et al., 2004). Emotional understanding is important for academic or developmental outcomes. Emotionally competent children build better relationships with teachers and peers, enhancing their engagement in learning and social activities (Guhn et al., 2016). Among all emotional competencies, emotion understanding generally shows a stronger association with overall cognitive functions (Brackett et al., 2011). Previous research has indicated that emotional understanding is related to academic performance in language and mathematics (da Silva, 2012; Rocha, 2016), positively impacts academic success (Blankson et al., 2013; Józsa and Barrett, 2018), and enhances the ability to decenter (Leerkes et al., 2008).

In research on the connection between SES and emotional skills, studies on the topic of negative socio-emotional development such as behavioral problems prevail (e.g., Japar, 2017; Kiernan

and Mensah, 2009). Regarding positive emotional skills as understanding emotions, studies show that children from a lower social class had a lower level of emotion understanding (Kårstad, 2016). Cutting and Dunn (1999) demonstrated that children's understanding of emotions is linked to certain aspects of family background, particularly the education of their mothers. However, parental education made a unique contribution to false belief understanding in this study, but not to emotion understanding. Merz et al. (2015) found that expressive, receptive, and situational understanding of emotions by preschoolers was significantly correlated with parental education, which was used as a control variable in the study. Most studies regard parental education as a control variable rather than an independent factor. This underscores the need to specifically examine its relationship with emotion understanding.

Thus, there is evidence linking parental education to EF, peer acceptance, and emotional understanding. However, these relationships often remain ambiguous and fundamental aspects of this relations remain unknown (Hackman et al., 2015). This highlights the need to explore mediators that may clarify the relationships between parental education and the child EF, peer acceptance, and emotional understanding, while addressing differences associated with family SES. Unlike previous studies that focused on material resources, we propose using Vygotsky's cultural-historical theory to identify these mediators (Vygotsky and Cole, 1978). This concept considers the social environment as a source of development of higher psychological functions in humans (Veresov, 2024). Here, parent-child interaction and the organization of the children's activities can be considered as one of the main factors associated with child development (Bergman et al., 2021; González-Moreno et al., 2014; Hedegaard, 2011; Roy-Charland et al., 2020).

Children's activity can be operationalized through the concept of children's leisure activity. According to the latest monitoring data, the leisure activities of modern Russian preschoolers are primarily represented by home games and digital activities, followed by reading books, attending cultural events, and playing sports Bulletin of the Russian Longitudinal Monitoring Survey (RLMS-HSE) (2024). This study examines two common types of leisure activities among preschoolers: using electronic devices (phones, tablets, game consoles, and televisions) and shared book reading.

Using electronic devices is traditionally assessed via screen time measures. Screen time for young children (Kwon et al., 2024) and age of first interaction with electronic devices (Roy et al., 2024) are rising globally. Moreover, among low SES families, children spend considerably more time in front of screens (Kwon et al., 2024). Parental education level, as one of the indicators of SES, is significantly inversely associated with screen time among preschool-aged children (Pons et al., 2020). This is likely attributable to the fact that parents with a higher level of education, attach greater importance to limiting children's screen time (Määttä et al., 2017).

Research on the associations between screen time and child skills indicates that different types of screen time may pose risks to various child skills, including EF, emotional skills, and peer acceptance (Sticca et al., 2025; Veraksa et al., 2021a). Although the rapidly increasing number of studies on the effects

of digitalization on child development, significant barriers and limitations still persist in this field. Firstly, parental compliance with recommended screen time limits for children remains low (Gago-Galvagno et al., 2024). Secondly, despite numerous studies on the association of screen time with various child competencies, most existing screen time recommendations are based on very little evidence (Sticca et al., 2025). Finally, most research on screen time and SES effects on it have focused on high-income Western countries. It emphasizes the necessity for studies addressing SES-dependent patterns across diverse sociocultural settings (Gago-Galvagno et al., 2024; Roy et al., 2024). These factors emphasize the importance of examining screen time and its mediating role between SES indicators and key cognitive and socio-emotional skills in preschool children.

Shared book reading is a highly effective early intervention for supporting children's development, as it fosters more interactive conversations than other activities (Read et al., 2022; Kamenewa-Lyubavskaya and Borzova, 2024). According to Vygotsky's cultural-historical theory (1978), parents can promote children's development of social and emotional skills through shared book reading (Bergman et al., 2021; Roy-Charland et al., 2020). Children's recollections or reflections on what they have read with their parents are rich sources of conversations about emotions across cultures and contribute to the development of emotional understanding (Carmioli and Schröder, 2019; Xie et al., 2018) and self-regulation competencies (Salmon and Reese, 2016). For example, children aged 3–6 years with less frequent shared reading had a higher risk of social-emotional problems (Martin et al., 2022). For EF, introducing the practice of reading books with built-in cognitive exercises to preschoolers led to significant improvements in their working memory and cognitive flexibility, but not in inhibition (Howard et al., 2017). Studies examining the relationship between the frequency of shared reading and parental education reveal a moderately positive correlation (e.g., Pfost and Heyne, 2023), while other research indicates no differences in family reading frequency based on parental education (e.g., Curenton and Justice, 2008).

Therefore, the organization of children's leisure activities (such as facilitating shared book reading and managing screen time during digital leisure) can be linked to various aspects of a child's cognitive, social, and emotional skills.

This study has formulated two research questions. Are preschool children's key cognitive (executive functions) and socio-emotional skills (emotional understanding and peer acceptance) related to parental education (RQ1)? Can the relations between parental education and child cognitive and social-emotional skills be explained through leisure activities, particularly shared reading and screen time (RQ2)? Based on the above literature review, we hypothesized affirmative answers to both research questions.

2 Materials and methods

2.1 Participants and procedure

A total of 1,288 preschool children (Age: $M = 70.4$ months, $SD = 4.53$; 49.5% girls) and their parents (Age: $M = 35$ years, $SD = 7$) participated in the study on a voluntary basis. Participants

were recruited from penultimate preschool groups before school of Russian kindergartens in Moscow (74.4%), Kazan (12.6%), and Sochi (13%). All participants were recruited from urban areas and spoke Russian as their first language. Parents provided written consent for their children's involvement in the research. All children were assessed as not having developmental delays or disabilities. The assessment tasks were administered individually within a quiet space in the kindergarten during the two morning sessions. Children had the option to decline participation if they felt uncomfortable. After completing the assessment, each child received a small, enjoyable sticker as a reward.

At the same time, the parents completed a parental survey that included questions about the parents' level of education and a block of questions about the child's leisure time activities: the child's screen time and the frequency with which books were read to the child.

2.2 Measures

2.2.1 Cognitive skills

Children's executive function (EF), encompassing visual and verbal working memory, inhibitory control, and cognitive flexibility, was assessed using the NEPSY-II neuropsychological test battery (Korkman et al., 2007). Visual working memory was measured through the "Memory for Design" subtest, requiring children to recall the correct arrangement of image components (max score: 150). Verbal working memory was evaluated using "Sentence Repetition" where participants listened to and repeated a series of increasingly complex sentences (max score: 34).

Inhibitory control was assessed with the "Inhibition" subtest, which involved two tasks: "Naming," where children quickly identified all figures, and "Inhibition," where they named figures in reverse (e.g., stating "square" for "circle") (max score: 20). Cognitive flexibility was measured using the "DCCS" tool, consisting of three tasks: sorting cards by color, sorting by shape, and sorting by a specific rule based on card framing (max score: 24) (Zelazo, 2006). These EF assessment tools were adapted for the Russian population, proving their reliability (Veraksa et al., 2020).

2.2.2 Socioemotional skills

The emotional comprehension of the child was assessed using the Test of Emotion Comprehension (TEC) (Pons and Harris, 2000), which was adapted for the Russian context, proving its reliability (Veraksa et al., 2021b). TEC evaluates three aspects of emotion comprehension: external components (recognizing emotions, understanding external causes, and desires), mental components (grasping hidden emotions and the role of beliefs), and meta-components (understanding mixed feelings and moral influence on emotional regulation). Scores from these scales are combined for a comprehensive emotion understanding score ranging from 0 to 9.

The child's peer acceptance was measured using Kolominsky's sociometric status tests (Kolominsky, 1984). Children were asked to answer questions regarding their relationships with peers from their kindergarten group by naming three classmates: "Who do you

like to play with? Choose three children from your group, please." The sociometric status was determined based on the number of play partner selections received. This procedure is a reliable measure of peer status (Wasik, 1987).

2.2.3 Children's leisure activities

Child screen time was evaluated through four questions in the caregiver survey. Parents reported the duration of child passive screen time (watching cartoons, films, and videos) on weekdays and weekends, as well as active screen time (using devices for non-viewing activities) during the same periods. The parent specified the number of hours and minutes as a number, for example the total time is: 1 (h) and 15 (min). Daily screen time was calculated as the sum of passive and active screen time on weekdays and weekends divided by the number of days in a week.

Book reading frequency was assessed by asking caregivers how often they read with their child. Parents selected one of the following response options: once or several times a day, almost every day, 2–3 times a week, several times a month, or not at all.

2.2.4 Parental education

Parental education was measured by asking caregivers about their highest level of education attained, with options including: primary school, basic general school, secondary school, vocational secondary education, bachelor's degree, specialist degree, master's degree, and PhD.

2.3 Data analytical strategy

Preliminary analyses included simple correlation analyses corrected for age and sex at birth. Additional analyses were then conducted to assess the significance of differences in shared reading frequency and screen time between groups of children with different levels of parental education. Specifically, Chi-squared tests were used to compare shared reading frequencies. Kruskal-Wallis test as a non-parametric method for comparing medians across multiple independent groups (Cleophas and Zwinderman, 2016) was employed to evaluate differences in daily screen time.

In the main analysis, Path analyses with bootstrap sampling (1,000 samples) were estimated to assess the direct effects of parental education on children's cognitive and socioemotional skills and the indirect effects mediated by daily screen time and shared book reading. To answer the research questions, path analysis was chosen as the main method. It is more advantageous than linear regression analysis because it offers an understanding of the relationships and the relative significance of each factor, while also exploring the direct and indirect connections among the variables. The mediator variable transmits part of the effect of the causally prior variable to a third variable influenced by the mediator, as defined in traditional mediation analysis by Kline (2016). It assumes that the variables are ordered temporally (a condition necessary to establish causal relationships). This process serves to elucidate the nature of the relationship between the independent and dependent variables (MacKinnon, 2008). However, since the current data are exploratory and lack the temporal ordering required to establish

causality and properly test mediation, the resulting estimates may be biased (Maxwell and Cole, 2007). All analyses were conducted in R (version 4.4.0) and Jamovi (version 2.3.16).

3 Results

3.1 Descriptive statistics and preliminary analysis

Descriptive statistics for main continuous study variables (EF skills, sociometric status, emotion comprehension, screen time) are summarized in Table 1. The frequency distribution by parental education shows that 5% of parents have completed basic general school education, 17.3% have completed vocational secondary education, 12.4% have completed a bachelor's degree, 62.7% have completed a master's degree and 2.6% have a PhD. The frequency distribution of reading to children indicated that 34.7% of parents read books to their children once or several times a day; 20.8% read almost every day; 25.6% read 2–3 times a week; 17.7% read several times a month; 1.2% do not read at all.

Table 2 displays Pearson and Spearman correlations among study variables (controlling for age and sex). Correlations between the same variables without adjustment for sex and age are shown in Supplementary Table 2 (since the path models do not include these covariates). Parental education was significantly and positively correlated with verbal working memory, cognitive flexibility, and emotion comprehension, as well as significantly and negatively correlated with screen time. Reading frequency showed similar positive correlations with verbal working memory and negative correlations with screen time dimensions. In addition, the frequency of reading to the child is associated with the level of parents' education ($r = 0.18$; $p < 0.001$).

3.2 Parental education and children's leisure activities

Based on the results of the age-sex-corrected correlation analysis presented in Table 2, a higher parental education level was found to be associated with greater book reading to children and less daily screen time for children. Further Chi-square analyses confirmed significant disparities in book reading frequency between parents with different levels of education [$\chi^2(56) = 112$, $p < 0.001$]. Kruskal-Wallis analyses also confirmed significant differences in daily screen time for children: parents with a higher level of education had children with significantly lower daily screen time [$\chi^2(7) = 120$, $p < 0.001$, $\varepsilon^2 = 0.09$].

3.3 Children's leisure activities and their cognitive and socioemotional skills

3.3.1 Digital devices screen time

Correlation analysis showed that daily screen time was significantly negatively associated with verbal working memory and emotion comprehension (Table 2). More screen time is linked

to poorer verbal working memory and emotion comprehension in children.

3.3.2 Shared book reading

Correlation analysis demonstrated that book reading frequency was exclusively associated with verbal working memory (see Table 2). Greater frequency of shared reading was found to be associated with higher verbal working memory.

3.4 Direct and indirect effect of parental education on child cognitive and socioemotional skills through shared book reading and daily screen time mediation

First, six path analysis models were specified to assess both the direct effects of parental education on children's EF skills, sociometric status, and emotion comprehension, as well as the indirect effects operating through daily screen time (Figure 1). The analysis of direct effects showed that higher parental education was significantly associated with higher verbal working memory ($Z = 5.41$, $p < 0.001$), cognitive flexibility ($Z = 1.88$, $p = 0.049$), and emotion comprehension ($Z = 2.57$, $p = 0.01$) (Table 3). The analysis of indirect effects (through daily screen time) showed that daily screen time significantly mediated the relationship between parental education and verbal working memory ($Z = 3.95$, $p < 0.001$, 21.3% mediation) (Table 3).

Second, six models of the relationship between parental education and children's skills through shared book reading were conducted (see Figure 1). The analysis of direct effects showed similar results: higher parental education was significantly associated with higher verbal working memory ($Z = 6.49$, $p < 0.001$), cognitive flexibility ($Z = 1.79$, $p = 0.044$), and emotion comprehension ($Z = 3.1$, $p = 0.002$) (Table 3). The analysis of indirect effects (through shared book reading) showed that shared book reading also significantly mediated the relationship of parental education with verbal working memory only ($Z = 2.77$, $p = 0.006$, 7.86% of mediation) (Table 3). For all Direct Effects models and Partial Mediation models, the CFI and TLI indices were 1, RMSEA and SRMR were 0. Fit indices for each mediation model test (RMSEA, CFI, TLI, and SRMR) can be seen in Supplementary Table 1. Thus, child screen time and frequency of shared book reading can be considered as a potential factor explaining the relationship between parental education and verbal working memory.

4 Discussion

The extent to which a child's environment supports or limits their developmental potential is closely linked to various indicators of socioeconomic status, including parental education. Despite extensive research in SES field, not all studies identify significant associations between SES and various child skills. Furthermore, a meta-analysis by Letourneau et al. (2013) shows that SES association has effect sizes ranging from very small to

TABLE 1 Descriptive statistics for children EF skills, emotion comprehension, sociometric status, and screen time dimensions.

| Study variables | Mean | Median | SD | Minimum | Maximum | Skewness | SE Skewness | Kurtosis | SE Kurtosis |
|------------------------------|--------|--------|---------|---------|---------|----------|-------------|----------|-------------|
| Visual working memory | 88.41 | 88.00 | 21.812 | 17 | 130 | −0.183 | 0.045 | −1.031 | 0.0898 |
| Verbal working memory | 20.13 | 20.00 | 4.540 | 0 | 34 | −0.142 | 0.044 | 0.586 | 0.0886 |
| Inhibition | 11.37 | 11.00 | 3.212 | 1 | 19 | −0.140 | 0.046 | −0.237 | 0.0911 |
| Cognitive flexibility | 21.29 | 22.00 | 2.513 | 3 | 24 | −1.150 | 0.044 | 1.824 | 0.0877 |
| Sociometric status | 1.85 | 2.00 | 0.507 | 1 | 3 | −0.235 | 0.048 | 0.441 | 0.0968 |
| Emotion comprehension | 5.75 | 6.00 | 1.417 | 0 | 12 | −0.223 | 0.046 | 0.021 | 0.0913 |
| Passive weekdays screen time | 90.74 | 70 | 70.069 | 0 | 1,200 | 3.821 | 0.066 | 46.96 | 0.1323 |
| Passive weekends screen time | 154.23 | 120.00 | 103.758 | 0 | 1,215 | 2.733 | 0.066 | 18.31 | 0.1322 |
| Active weekdays screen time | 56.76 | 30.00 | 75.401 | 0 | 1,200 | 4.714 | 0.067 | 50.57 | 0.1344 |
| Active weekends screen time | 87.86 | 60 | 91.846 | 0 | 600 | 1.645 | 0.067 | 3.067 | 0.1343 |
| Daily screen time | 192.04 | 157.50 | 135.755 | 8.00 | 1,200 | 1.779 | 0.066 | 5.37 | 0.1321 |

SD, standard deviation; SE, standard error.

small. Given this, this study examines the association between parental education, one of the key SES indicators, and cognitive and socioemotional skills in preschoolers. Another key aim of this study was to examine if children’s leisure activities, such as screen time and shared book reading, mediate the relationship between parental education and children’s cognitive and socioemotional skills.

By estimating direct effects in path analysis, parental education was shown to be directly related to several child skills, including verbal working memory, cognitive flexibility, and emotion comprehension. In contrast, the peer acceptance, visual working memory, and inhibitory control showed no significant relationship with parental education. The link between child skills and parental education may be because parents with higher education invest more in their children’s development than those with lower education or economic resources (Bergen et al., 2017). Parents with higher education are better able to involve their children in educational activities that build a strong foundation for future success (Davis-Kean et al., 2021).

The lack of significant relations of parental education level with visual working memory and inhibitory control, in contrast to the small but significant association with verbal working memory and cognitive flexibility, may be explained. Parents with higher education levels create a more intellectually stimulating environment for their children, especially in terms of language, by using richer vocabulary and reading to them more often (Hoff and Laursen, 2019; Hoff-Ginsberg, 1991). Parents with higher education levels may create environments that boost language development in their children. This enhanced language development is linked to improved verbal working memory and cognitive flexibility, though not to visual working memory or inhibition. Several studies support this supposed explanation. For example, Filipe et al.

(2023) found that, after accounting for age, gender, and nonverbal intelligence, verbal working memory, and cognitive flexibility explained 16% and 19% of the differences in preschoolers’ language skills, respectively. Inhibition skills did not add to the explained variance in language outcomes (Filipe et al., 2023; Oshchepkova and Shatskaya, 2023). At the same time, meta-analysis data by Pickering et al. (2023) showed that language development in children aged 2–12 years has weak links with visuospatial memory.

Regarding socioemotional skills, the analysis found a significant association between parental education and emotional understanding but not peer acceptance. On the one hand, significant association of parental education with peer acceptance is expected. Research indicates that poorly educated parents tend to be more isolated, less involved in the school system, and provide fewer opportunities for continuous learning for their children outside the school environment (McLoyd, 1998). In such families, children may have limited opportunities to develop interpersonal skills, which can negatively affect peer acceptance and increase emotional-behavioral problems (Dodge et al., 1994). In this context, the lack of an association between parental education and peer acceptance in the current study might be due to insufficient diagnostic procedures for assessing peer acceptance. Future studies could expand assessment instruments by, for example, asking participants about the motives for choosing their peers. On the other hand, Bronfenbrenner’s bioecological theory suggests that parental education serves as only one contextual external factor in children’s development (Bronfenbrenner and Morris, 2006). Thus, the lack of connection between peer acceptance and parental education can also possibly be explained by the influence of some stronger factors that neutralize the connection with SES indicators (e.g., children’s individual characteristics or the nature of parent-child interactions).

TABLE 2 Age-sex-corrected correlations for children EF skills, emotion comprehension, sociometric status, screen time dimensions, frequency of shared book reading, and level of parental education.

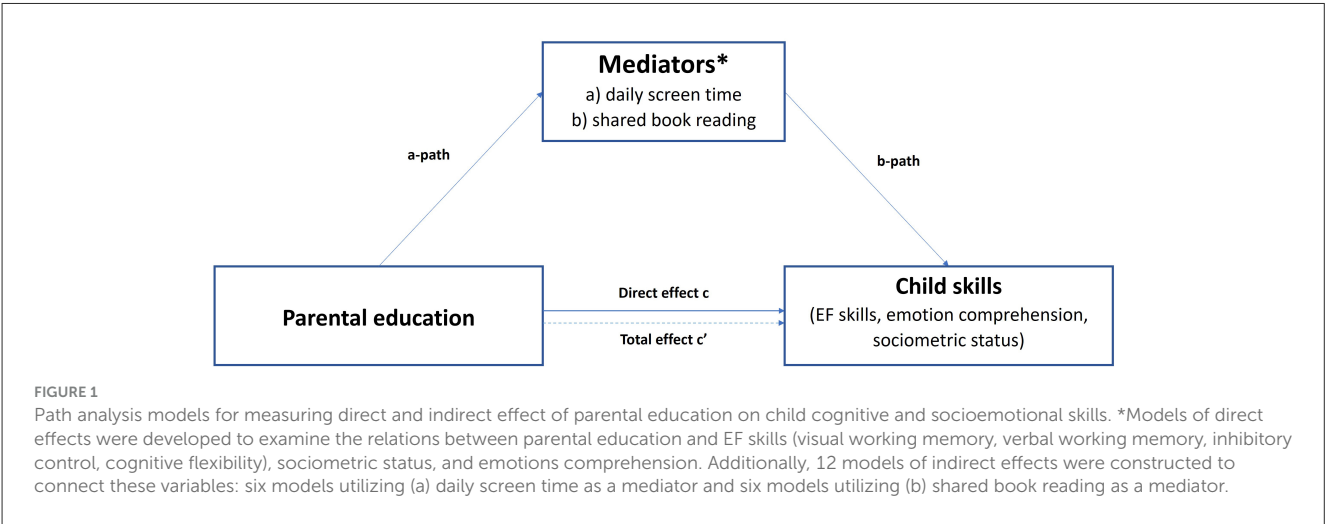
| Study variables | Values | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------------|----------------|------------------|------------------|------------------|--------|--------|--------|--------|---|---|
| Parental education (1) | Pearson's r | — | | | | | | | | |
| | <i>p-value</i> | — | | | | | | | | |
| | Spearman's rho | — | | | | | | | | |
| | <i>p-value</i> | — | | | | | | | | |
| | <i>N</i> | — | | | | | | | | |
| Shared book reading (2) | Pearson's r | 0.183 | — | | | | | | | |
| | <i>p-value</i> | <0.001 | — | | | | | | | |
| | Spearman's rho | 0.196 | — | | | | | | | |
| | <i>p-value</i> | <0.001 | — | | | | | | | |
| | <i>N</i> | 1,287 | — | | | | | | | |
| Daily screen time (3) | Pearson's r | −0.267 | −0.225 | | | | | | | |
| | <i>p-value</i> | <0.001 | <0.001 | — | | | | | | |
| | Spearman's rho | −0.271 | −0.211 | — | | | | | | |
| | <i>p-value</i> | <0.001 | <0.001 | — | | | | | | |
| | <i>N</i> | 1,279 | 1,356 | — | | | | | | |
| Visual working memory (4) | Pearson's r | 0.044 | 0 | −0.014 | — | | | | | |
| | <i>p-value</i> | 0.125 | 0.992 | 0.632 | — | | | | | |
| | Spearman's rho | 0.034 | −0.002 | −0.001 | — | | | | | |
| | <i>p-value</i> | 0.237 | 0.934 | 0.97 | — | | | | | |
| | <i>N</i> | 1,212 | 1,217 | 1,218 | — | | | | | |
| Verbal working memory (5) | Pearson's r | 0.213 | 0.112 | −0.207 | 0.298 | — | | | | |
| | <i>p-value</i> | <0.001 | <0.001 | <0.001 | <0.001 | — | | | | |
| | Spearman's rho | 0.182 | 0.103 | −0.22 | 0.295 | — | | | | |
| | <i>p-value</i> | <0.001 | <0.001 | <0.001 | <0.001 | — | | | | |
| | <i>N</i> | 1,245 | 1,250 | 1,250 | 2,928 | — | | | | |
| Inhibition (6) | Pearson's r | 0.035 | 0.037 | −0.039 | 0.279 | 0.219 | — | | | |
| | <i>p-value</i> | 0.23 | 0.203 | 0.175 | <0.001 | <0.001 | — | | | |
| | Spearman's rho | 0.028 | 0.028 | −0.006 | 0.274 | 0.203 | — | | | |
| | <i>p-value</i> | 0.34 | 0.323 | 0.831 | <0.001 | <0.001 | — | | | |
| | <i>N</i> | 1,201 | 1,207 | 1,209 | 2,706 | 2,733 | — | | | |
| Cognitive flexibility (7) | Pearson's r | 0.066 | 0.027 | 0.013 | 0.306 | 0.289 | 0.242 | — | | |
| | <i>p-value</i> | 0.019 | 0.343 | 0.646 | <0.001 | <0.001 | <0.001 | — | | |
| | Spearman's rho | 0.061 | 0.021 | 0.006 | 0.315 | 0.31 | 0.241 | — | | |
| | <i>p-value</i> | 0.03 | 0.457 | 0.827 | < .001 | < .001 | < .001 | — | | |
| | <i>N</i> | 1,272 | 1,282 | 1,284 | 2,945 | 2,975 | 2,828 | — | | |
| Sociometric status (8) | Pearson's r | 0.05 | −0.025 | 0.007 | 0.102 | 0.101 | 0.085 | 0.085 | — | |
| | <i>p-value</i> | 0.087 | 0.402 | 0.819 | <0.001 | <0.001 | <0.001 | <0.001 | — | |
| | Spearman's rho | 0.036 | −0.025 | −0.006 | 0.098 | 0.102 | 0.08 | 0.094 | — | |
| | <i>p-value</i> | 0.225 | 0.402 | 0.835 | <0.001 | <0.001 | <0.001 | <0.001 | — | |
| | <i>N</i> | 1,149 | 1,157 | 1,160 | 2,289 | 2,326 | 2,272 | 2,415 | — | |

(Continued)

TABLE 2 (Continued)

| Study variables | Values | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------------|-----------------|--------------|--------|---------------|--------|--------|--------|--------|-------|---|
| Emotion comprehension (9) | Pearson's r | 0.078 | 0.006 | −0.073 | 0.193 | 0.18 | 0.118 | 0.184 | 0.029 | — |
| | <i>p</i> -value | 0.007 | 0.843 | 0.012 | <0.001 | <0.001 | <0.001 | <0.001 | 0.174 | — |
| | Spearman's rho | 0.056 | −0.001 | −0.064 | 0.186 | 0.178 | 0.103 | 0.199 | 0.028 | — |
| | <i>p</i> -value | 0.056 | 0.97 | 0.028 | <0.001 | <0.001 | <0.001 | <0.001 | 0.185 | — |
| | <i>N</i> | 1,184 | 1,187 | 1,188 | 2,769 | 2,812 | 2,740 | 2,819 | 2,219 | — |

Bold indicates significant values ($p < 0.05$).



Thus, the current analysis confirmed the association of parental education with some skills of children in the Russian sample. The long-term nature of this association is also confirmed in longitudinal studies. For example, early family income-to-needs and maternal education predicted EF by first grade (Hackman et al., 2015). At the same time, the relationship between parental education and EF emerges in early childhood and remains stable later in life (Hackman et al., 2014).

Although research over several decades has clearly documented differences in children's skills due to SES, there is a noticeable lack of policies or interventions that reliably reduce these disparities (Davis-Kean et al., 2021). This highlights the importance of analyzing factors that mediate the relationships between SES indicators and children's skills. The second research question was directed at mediators of the relationship between parental education and child cognitive and socioemotional skills. Parents were asked a few brief questions about the duration of their children's screen time and the frequency of shared book reading. The evaluation of indirect effects in path analysis indicated that the connection between parental education and verbal working memory is partially explained by child screen time and shared book reading frequency (21% and 8%, respectively). Children of more educated parents experience higher frequency of shared reading and lower screen time. This is positively linked to children's verbal working memory. It is important to acknowledge one limitation of the mediation models conducted. The mediation models were analyzed without including covariates such as sex and age, which might have affected the results to some extent. However,

comparing simple correlations between parental education and children's EF skills, emotional comprehension, sociometric status, and screen time (see Supplementary Table 2) with age- and sex-corrected correlations (see Table 2) shows only slight differences. This suggests that age and sex have a small impact on these relationships. Therefore, mediation models can be used without including these covariates. Nevertheless, it is advisable for future studies to include sex and age in mediation models to strengthen the conclusions.

We assume that the presence of the most significant mediation for verbal working memory is explained by the following. Verbal working memory is associated with the language environment (Schwering and MacDonald, 2020). When listening to reading, the child's language input increases (Noble et al., 2018). On the contrary, passive viewing of video content, as the most common type of digital activity, reduces children's speech and communicative activity (Massaroni et al., 2024).

However, using questions only about screen time duration and frequency of shared reading has limitations. This method does not capture the qualitative aspects of children's leisure activities (the content of the reading sessions, who initiates them, or details about screen time like the types of media accessed and children's preferences). Previous studies have highlighted the importance of these qualitative features. For example, the average level of EF skills varied depending on the purpose behind the child's use of digital devices (Shatskaya et al., 2023) or the type of reading, such as traditional reading, dialogic reading, or reading that involves embedded cognitive activities (Howard et al., 2017). Controlling

TABLE 3 Direct and indirect [through (a) daily screen time as mediator and (b) shared book reading as mediator] association between parental education and child skills (EF skills, emotion comprehension, sociometric status).

| Child skills | Direct effect (c) | | | | Indirect effect (a×b) | | | |
|---------------------------------|-------------------------------------|------|-------------------------------------|----------------|-------------------------------------|-------|-------------------------------------|----------------|
| | Estimate (95% low, high C.I.) | SE | Z (p) | % mediation | Estimate (95% low, high C.I.) | SE | Z (p) | % mediation |
| Daily screen time as mediator | | | | | | | | |
| Visual working memory | 0.89 (−0.08, 1.88) | 0.49 | 1.81 (0.07) | 97.52 | −0.02 (−0.27, 0.29) | 0.13 | −0.17 (0.863) | 2.48 |
| Verbal working memory | 0.59 (0.38, 0.81) | 0.11 | 5.41 (<0.001) | 78.7 | 0.16 (0.08, 0.25) | 0.04 | 3.95 (<0.001) | 21.3 |
| Inhibition | 0.07 (−0.08, 0.22) | 0.07 | 1.0 (0.317) | 75.9 | 0.02 (−0.01, 0.06) | 0.01 | 1.32 (0.186) | 24.1 |
| Cognitive flexibility | 0.10 (0.01, 0.21) | 0.05 | 1.88 (0.049) | 95.4 | −0.01 (−0.03, 0.03) | 0.02 | −0.33 (0.744) | 4.42 |
| Sociometric status | 0.02 (−0.01, 0.05) | 0.01 | 1.69 (0.092) | 92.6 | −0.01 (−0.01, 0.1) | 0.01 | −0.55 (0.585) | 7.37 |
| Emotion comprehension | 0.07 (0.01, 0.13) | 0.03 | 2.57 (0.01) | 83.1 | 0.02 (0.0, 0.03) | 0.01 | 1.98 (0.057) | 16.9 |
| Shared book reading as mediator | | | | | | | | |
| Visual working memory | 0.82 (−0.18, 1.80) | 0.50 | 1.64 (0.099) | 99.9 | 0.00 (−0.18, 0.17) | 0.08 | −0.01 (0.995) | 0.1 |
| Verbal working memory | 0.68 (0.48, 0.89) | 0.1 | 6.49 (<0.001) | 92.14 | 0.06 (0.02, 0.11) | 0.02 | 2.77 (0.006) | 7.86 |
| Inhibition | 0.08 (−0.05, 0.22) | 0.07 | 1.18 (0.248) | 83.6 | 0.01 (−0.007, 0.03) | 0.01 | 1.38 (0.167) | 16.4 |
| Cognitive flexibility | 0.95 (−0.005, 0.19) | 0.05 | 1.79 (0.044) | 92.53 | 0.007 (−0.01, 0.02) | 0.008 | 0.87 (0.383) | 7.47 |
| Sociometric status | 0.02 (−0.001, 0.04) | 0.01 | 1.87 (0.061) | 88.0 | −0.002 (−0.01, 0.01) | 0.02 | −1.22 (0.223) | 11.1 |
| Emotion comprehension | 0.08 (0.03, 0.14) | 0.02 | 3.1 (0.002) | 99.6 | 0.001 (−0.01, 0.01) | 0.005 | 0.06 (0.948) | 0.397 |

CI, confidential interval; SE, standard error; c, direct effect (Figure 1), a×b, indirect effect (Figure 1). Bold indicates significant values ($p < 0.05$).

for content (educational or entertainment), the negative effects of screen time on children’s skills can be reduced (Linebarger et al., 2014; Yang et al., 2017). The content of books for shared reading also matters. Noble et al. (2018) showed that books with richer grammar lead to more complex adult speech to children, which benefits their development. A deeper understanding of the content and context of media use and shared reading could help identify different connections to developmental outcomes.

Although this study is correlational, its results may guide future longitudinal research. Such studies could examine how adjusting reading frequency and screen time might reduce the negative impact of low parental education on children’s cognitive and socio-emotional skills.

4.1 Strengths and limitations

The most valuable advantage of the current study is its focus on non-Western countries, while most studies of SES effects have been conducted on samples from Western countries. At the same time, the study has several limitations. Firstly, the design is cross-sectional, limiting our ability to establish causal relationships and allowing only for descriptions of associations among the factors

studied. Additionally, this cross-sectional nature reinforces the exploratory character of the mediation analysis, as it does not provide the temporal ordering necessary to definitively test for mediation effects. Secondly, we utilized a short questionnaire for parents that quantitatively assess the frequency of shared book reading and the duration of screen time. This approach lacks depth, as it does not explore qualitative aspects of children’s leisure activities, such as the specific content being read, who initiates the reading, or details regarding screen time, including the types of media consumed and children’s preferences. A more nuanced understanding of the content and context of media use and shared reading could reveal differential relationships with developmental outcomes. Third, social desirability of parents’ responses to the questionnaire may also bias the results. Future research could address these limitations by using in-depth interviews with parents to gain a more comprehensive understanding of these practices.

5 Conclusions

Parental education, as a crucial indicator of family socioeconomic status, is associated with verbal working

memory, cognitive flexibility, and emotion comprehension. However, was found to lack a statistically significant association with peer acceptance, as well as visual working memory and inhibitory control. Meanwhile, shared book reading and screen time control seem to be able to statistically significantly explain differences in verbal working memory between children, including those associated with differences in parental education. It is highly recommended to provide health education for parents on effectively organizing children's leisure time, which includes setting reasonable limits on screen time for preschoolers and increasing the frequency of shared book reading.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ethics Committee of the Faculty of Psychology, at Lomonosov Moscow State University (the approval no: 2023/77). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

AS: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. KT: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. IS: Conceptualization, Formal analysis, Methodology, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2025.1568020/full#supplementary-material>

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