frontiers | Frontiers in Education

TYPE Brief Research Report
PUBLISHED 26 March 2025
DOI 10.3389/feduc.2025.1512556

OPEN ACCESS

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RECEIVED 16 October 2024
ACCEPTED 03 March 2025
PUBLISHED 26 March 2025

CITATION
Chichinina E, Almazova O and Veraksa N (2025) Birth order or screen time: what strongly predicts executive function skills development in preschool children? *Front. Educ.* 10:1512556.
doi: 10.3389/feduc.2025.1512556

Birth order or screen time: what strongly predicts executive function skills development in preschool children?

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The majority of screen time recommendations differ among parents of toddlers, preschoolers, and schoolchildren. In families with more than one child, it becomes more difficult for parents to apply these recommendations to each child individually because of the age difference between siblings. Currently, how screen time is affected by the birth order has been poorly studied. Therefore, this study aims to investigate birth order and screen time as predictors of executive function skills development. Executive function skills were assessed in children at two different stages: when they were 5–6 years old and again 1 year later. The study sample consisted of 271 children (51% boys) from two-child families. Half of the participants were first-born children, while the other half were second-born children. The age difference between the siblings was not more than 5 years. Of all executive function skills, only the development of verbal working memory over a year was predicted by the birth order. Specifically, the development of verbal working memory over a year in 5–6-year-old second-born children was less than that in 5–6-year-old first-born children. Active screen time and passive screen time were not predictors of executive function skills development. In addition, it was found that second-born preschool children were exposed to more active screen time than first-born children. Based on the results obtained, in two-child families with children aged 5–6 years, being second-born may be less beneficial for the development of verbal working memory development than being first-born. Therefore, parents of second-born preschool children should be especially careful in adhering to screen time recommendations.

KEYWORDS

preschool children, executive function skills, birth order, first-born children, second-born children, active screen time, passive screen time

1 Introduction

Executive function (EF) skills are an interrelated set of cognitive skills involved in goal-directed problem-solving and adaptive responses to novel situations (Diamond, 2013; Zelazo et al., 2016; Altun, 2022). These skills include inhibitory control, working memory, and cognitive flexibility (Diamond, 2013; Zelazo et al., 2016). EF skills are significant predictors across various developmental domains, including school readiness, social-emotional competence, speech, and academic achievement (Blair and Razza, 2007; Zelazo et al., 2016; Fomina et al., 2022; Lavrova and Kharitonova, 2023; Oshchepkova and Shatskaya, 2023; Veraksa and Veraksa, 2023). EF skills develop most rapidly during the preschool years, highlighting this period as critical for exploring predictors of EF skills. Among these predictors, family context has emerged as one of the key predictors of EF skills in preschool-aged children (Fay-Stammbach et al., 2014). Recent research has begun to examine birth order in EF skills development in preschool children (McAlister and Peterson, 2006; McAlister and Peterson, 2013; Rolan et al., 2018). Understanding how birth order influences EF skills in preschool children can help parents foster appropriate relationships with their children based on birth order. However, there has been limited research on how EF skills vary among children with different birth orders (Rolan et al., 2018). This study aims to address this gap by investigating birth order as a predictor of EF skills development. Additionally, research on the predictors of EF skills in modern realities should consider screen time.

1.1 Association between screen time and EF skills in preschool children

EF skills at preschool age are influenced by the social situation of a child's development (Vygotsky, 1984), with screen time being an important factor (Nikolaeva et al., 2023; Veraksa et al., 2024). Numerous studies have shown that screen time is inversely associated with EF skills in preschool children. This finding applies primarily to children who do not meet the recommended guidelines for daily screen time (McNeill et al., 2019; Jusienė et al., 2020; Corkin et al., 2021; Nichols, 2022).

Screen time is divided into passive (watching video content that requires no interaction or no input from the user) and active (interactive engagement with media—videogaming, messaging, and using learning and creative applications) (Hu et al., 2020). Research has shown that passive screen time is negatively associated with EF skills in preschool children and active screen time is positively associated with EF skills (Hu et al., 2020). For instance, such types of active screen time spent playing video games and exergames can have a positive impact on EF skills in preschool children (Gashaj et al., 2021; Plotnikova et al., 2023). However, there is also research indicating a negative association between active screen time and EF skills in children (Xu et al., 2023). Thus, there is a gap in the understanding of the role of passive and active screen time in preschoolers' EF skills development. However, the negative effects of passive screen time on EF skills are more pronounced than the effects of active screen time. In this regard, when studying screen time, it is worth considering passive and active screen time separately.

Screen time effects on EF skills depend not only on activeness/passiveness but also on the quality of content, the digital mediation strategy (Ewin et al., 2020; Rudnova et al., 2023), and the participation of caregivers in children's screen time. Therefore, educational age-appropriate content is better for EF skills than age-inappropriate violent content (Conners-Burrow et al., 2011; Linebarger et al., 2014). Supportive caregivers' digital mediation strategy can contribute to EF skills development. The predominance of caregivers' intrusiveness and negative control in digital mediation strategy can lead to a slower increase in EF skills, especially inhibitory control (Geeraerts et al., 2021). Joint media engagement by children and their caregivers has been shown to be more beneficial for the development of EF skills than solo media use by children (Dore and Zimmermann, 2020; Wannapaschaiyong et al., 2023). Thus, many factors related to screen time can influence EF skills in preschool children. However, passive and active screen times are the most objective and widely used factors.

1.2 Association between birth order and EF skills in preschool children

According to Vygotsky, humans possess the capacity to learn via social interaction, with the home environment serving as the primary context for early social behavior and cognitive practice (Vygotsky, 1978). At early ages, children's social interactions predominantly involve parents and siblings (Hill and Palacios, 2019). Siblings can serve as a particularly significant sociocultural factor, often spending as much or even more time with children than their parents (Dunn, 2015). Evidence suggests that the presence of siblings influences EF skills in preschool children (McAlister and Peterson, 2006; McAlister and Peterson, 2013; Hill and Palacios, 2019; Luo et al., 2022).

There are several reasons why the presence of siblings may be related to the development of EF skills. First, sibling interactions, including conflict and play, provide an environment that is conducive to practicing and mastering social and emotional skills, which may also facilitate EF skills development (Rolan et al., 2018). Second, sharing resources, navigating conflicts, and cooperating with a sibling develop EF skills (Rolan et al., 2018). Third, siblings can impact parent–child interactions that can influence EF skills (Brody et al., 2003). The individual characteristics of one sibling affect the parenting quality received by the other sibling receives (Rolan et al., 2018). Thus, the conditions for EF skills development in an only child and in a child with siblings may differ.

The effect of having a sibling on EF skills is influenced by various factors: birth order, quality of sibling relationship, age difference between siblings, and gender combination of siblings (Buhrmester and Furman, 1990; McAlister and Peterson, 2006; Leaper and Friedman, 2007; McHale et al., 2012; Hill and Palacios, 2019). The effect of birth order on EF skills is the focus of the study because it is the most controversial factor. There may be advantages in cognitive development for first-born children (Luo et al., 2022). According to the classical resource dilution theory, first-born children have more exclusive access to parental attention and physical and financial resources than later-born children (Blake, 1981). Moreover, being first-born promotes EF skills development through collaborative interactions: the first-born sibling presents challenging tasks, adapts to younger siblings' levels of understanding, and engages with their developmental contributions (Hill and Palacios, 2019). There is research showing that first-born children performed working memory at a higher level than their later-born siblings (Holmgren et al., 2006). It can be assumed that verbal working memory is particularly influenced by birth order compared to other EF skills because caregivers may have more resources and time to engage in conversations and read to their first-born children (Lehmann et al., 2018; Liu et al., 2022). However, there may be advantages in cognitive development for second-born children (Hill and Palacios, 2019; Wang, 2023). First-born siblings can provide cognitive scaffolding to their younger siblings in developing EF skills during interactions (Vygotsky, 1978; Rolan et al., 2018). However, research on how EF skills vary among children with different birth orders is limited (Rolan et al., 2018).

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1.3 Current research

The limited understanding of how birth order predicts EF skills development highlights the need for research on this topic (Almazova and Mostinets, 2023). The role of screen time cannot currently be ignored, as it is an integral context for children's development (Hu et al., 2020; Chakravarty et al., 2023). Thus, this longitudinal study aims to investigate birth order, active screen time, and passive screen time as predictors of EF skills development over a year among preschool children. The present study addressed two research questions: (1) Do active screen time and passive screen time differ by birth order in preschool children? (2) What strongly predicts EF skills development over a year in preschool children—active screen time, passive screen time, or birth order?

The current study included children aged 5–7 years from two-child families with an age difference between siblings of less than 6 years. At the age before entering school, the development of EF skills is especially important because adaptation to school and further academic performance depend on EF skills (Blair and Razza, 2007; Zelazo et al., 2016). Therefore, children aged 5–7 years participated in the study. This study included children from only two-child families, as this is the most common number of siblings in families with more than one child in Russia (Sukneva et al., 2020). Since the children were 5–6 years old, the age difference with the second-born younger siblings could not exceed 5 years. Therefore, it was decided that the age difference with the first-born older siblings should not exceed 5 years. Therefore, only siblings with an age difference of not more than 5 years were included in the sample.

2 Methods

2.1 Participants

A total of 271 children (49.4% of them were girls) from municipal kindergartens in three regions of Russia participated in this longitudinal study. During the first stage of the study, the children were in the penultimate year of kindergarten [their age ranged from 65 to 77 months (M = 70.3, SD = 4.18)]. The second stage was carried out a year later, when the children were in the last year of kindergarten [their age ranged from 76 to 88 months (M = 81.2, SD = 3.98)], which is the last stage of kindergarten education before the children go to school. All children were from families that had two children. Of the total participants, 46.9% were first-born children and 53.1% were second-born. The age difference between the siblings was not greater than 60 months (M = 35.0, SD = 14.28). The majority of the children were from families with middle socioeconomic status: 89% of mothers had higher education, and 78% of the families had a middle income.

2.2 Procedure

The assessment procedure during both stages of the study was identical. The EF skill assessment occurred individually with each child in the morning between 8 and 11 am. The EF skill assessment was divided into two 20-min sessions with a break of a few days in between. The children were tested in a quiet room in their kindergarten. Tasks were administered by a specially trained examiner to all children in the same order and with the same instructions.

Before the EF skill assessment at both stages, all caregivers provided written informed consent for their child's participation in the study. After the first stage of the study, the caregivers received an email containing the questionnaire. This study and its consent procedures were approved by the Ethics Committee of the Faculty of Psychology of Lomonosov Moscow State University (Approval No. 2022/15).

2.3 Measures

The NEPSY-II "Sentences Repetition" subtest (Korkman et al., 2007) was used to assess verbal working memory. The child must remember 17 sentences one by one that progressively grew in length and became more grammatically difficult. A total of 2 points are awarded for each correctly repeated sentence, 1 point is awarded for a sentence with no more than 2 errors, and 0 points are awarded for more errors (maximum total score = 34).

The NEPSY-II subtest "Memory for Designs" was used (Korkman et al., 2007) to assess visual working memory. There are four trials (with 4, 6, 6, and 8 images) in which the child must select the appropriate cards and place them on a grid at the same location as previously shown (maximum total score = 120).

The NEPSY-II subtest "Inhibition" (Korkman et al., 2007) was used to assess cognitive inhibition. The child is required to name figures (squares, circles, and arrows) that are opposite to those actually pictured. Time devoted to each task and the number of errors (both corrected by a child and uncorrected) were recorded. Time and number of errors were converted into a combined scaled score (from 1 to 20 points).

"Dimensional Change Card Sort" (Zelazo, 2006) was used to assess cognitive flexibility. The initial task is to separate cards by color (put red cards on one side, blue ones on the other side). The following task is to separate cards by shape (put cards with boats on one side and cards with rabbits on the other side). The final task was to switch from sorting cards by color to sorting them by shape. The child gets 1 point for each correctly sorted card (maximum total score = 24).

A questionnaire was used for caregivers to collect sociodemographic data on children (date of birth and gender), age of their siblings if present, data on the level of family income, and education of the mother. Data on the level of family income were collected using the question "What is your family income?" with the answer options "below average," "average," "above average," and "other." Data on mother's education was collected using the question "What is the education level of the mother of the child?" with the answer options: "primary school," "high school," "bachelor's degree," "master's degree," "PhD," and "other." Data on family income and maternal education are important because children's EF skills are related to their families' socioeconomic status (Vrantsidis et al., 2020). However, it is important to consider that family income in this study was estimated only subjectively from the parents' words.

In the questionnaire for caregivers, there was also a list of questions about screen time. In the first question, caregivers were asked to write the number of hours and minutes that the child usually spends watching cartoons and videos (passive screen time) on an average weekday and weekend day separately. In the second question, caregivers were asked to write the number of hours and minutes that the child usually spends on the computer, tablet, smartphone, or game console, not counting the time spent watching cartoons and videos (active screen time) on an average weekday and weekend day separately. Then, the active and passive weekly screen times in minutes were calculated.

2.4 Statistical analysis

All analyses were performed using Jamovi version 2.0.0.0. The Shapiro–Wilk test indicated that the variables followed a normal distribution. Therefore, parametric tests were used. To examine Research Question 1, the paired samples *t*-test was conducted to test the differences in screen time between first-born and second-born children. To answer Research Question 2, a set of general linear models were used. Birth order, active screen time, and passive screen time were used as predictors, and each EF skill (dependent variables in each general linear model). Effect sizes were calculated: Cohen's *d* for the paired samples *t*-test, η^2 for general linear model. Mothers' education and family income level were not included as predictors in the general linear models because of the sample homogeneity in terms of these two factors (namely, 89% of mothers had higher education, and 78% of the families had a middle level of income).

An *a priori* power analysis was performed using G*Power version 3.1.9.4. (Faul et al., 2007) to determine the optimal sample size required to detect a medium effect if the effect exists. An *a priori* power analysis was conducted separately for each test. Results indicated that the sample size required to achieve 80% power for detecting a medium effect (Cohen's $d = 0.35$) at a significance criterion of $\alpha = 0.05$ was $N = 260$ for paired samples *t*-test. Results indicated that the sample size required to achieve 80% power for detecting a medium effect ($\eta^2 = 0.04$) at a significance criterion of $\alpha = 0.05$ was $N = 277$ for the general linear model. Thus, the obtained sample size ($N = 271$) was adequate to answer the research questions.

3 Results

3.1 Differences in active screen time and passive screen time between first-born and second-born preschool children from two-child families

Differences in screen time between first-born and second-born preschool children are presented in Table 1. At the first stage of the study (when the children were aged 5–6 years), the second-born children had a significantly higher weekly active screen time than their first-born peers [$t(269) = -2.34$, $p = 0.020$]. First-born children had approximately 25 min of active screen time per day, and second-born children approximately 35 min. There was no significant difference in passive screen time between children with different birth orders [$t(269) = -0.09$, $p = 0.931$]. Both first-born and second-born children aged 5–6 years had approximately 1 h 25 min of passive screen time per day.

Post hoc power analysis for the paired samples *t*-test for active screen time was conducted because the obtained effect size (Cohen's $d = 0.28$) was less than the expected effect size (Cohen's $d = 0.35$). The results of the *post hoc* power analysis indicated that power ($1 - \beta$ error probability) was 63%, which is less than the required 80%.

3.2 Birth order and active screen time, and passive screen time as predictors of EF skills development in preschool children from two-child families

A general linear model based on birth order, active screen time, and passive screen time was performed for each EF skill development over a year (delta) (Table 2). The general linear model was significant only for verbal working memory [$F(3) = 3.36$, $p = 0.020$]. The effect size of this model was medium ($\eta^2 = 0.06$). In this model, birth order was a significant predictor [$F(1) = 7.25$, $p = 0.008$]. In first-born children, verbal working memory development over a year was higher than that in second-born children (Figure 1). The effect size of this result was between small and medium ($\eta^2 = 0.04$). In this model, neither active nor passive screen time was a predictor of EF skills development.

A priori power analyses showed that the general linear model's sample size should be $N = 277$. A *post hoc* power analysis was conducted because the real sample size was less than 277 ($N = 271$). *Post hoc* power analysis indicated that power ($1 - \beta$ error probability) was 93% for the general linear model (based on birth order, active screen time, and passive screen time for verbal working memory development over a year). Thus, a sample size of 271 children was sufficient to detect a medium effect.

4 Discussion

The first research question of the present study was about the difference in active screen time and passive screen time between first-born and second-born preschool children from two-child families. It was revealed that second-born children aged 5–6-years had higher active screen time than first-born children of the same age. It can be inferred that in two-child families, the active screen time of both children is influenced by the active screen time of the first-born child. In the case of 5–6-year-old second-born children, first-born siblings

TABLE 1 Means, standard deviations, and differences in active screen time and passive screen time in children with different birth orders.

	First-born children, $n = 127$		Second-born children, $n = 144$		Differences		
	M	SD	M	SD	$t(269)$	p	Cohen's d
Weekly active screen time, min	171.3	228.37	245.6	287.40	−2.335	0.020	0.2842
Weekly passive screen time, min	590.6	378.86	594.4	329.0	−0.089	0.931	0.0289

TABLE 2 General linear models for EF skills development over a year based on birth order, active screen time, and passive screen time.

ANOVA	SS	df	*F*	*p*	η^2
Verbal working memory, delta					
Model	79.08	3	3.36	0.020	0.061
Birth order	56.88	1	7.25	0.008	0.044
Weekly active time	0.38	1	0.05	0.826	<0.001
Weekly passive time	22.19	1	2.83	0.095	0.017
Visual working memory, delta					
Model	679.0	5	0.68	0.563	0.013
Birth order	32.7	1	0.10	0.754	0.001
Weekly active time	136.5	1	0.41	0.522	0.003
Weekly passive time	305.6	1	0.92	0.338	0.006
Cognitive flexibility, delta					
Model	11.51	5	0.39	0.758	0.007
Birth order	1.25	1	0.13	0.720	0.001
Weekly active time	2.86	1	0.29	0.589	0.002
Weekly passive time	10.49	1	1.08	0.301	0.006
Cognitive inhibition, delta					
Model	51.33	5	1.35	0.259	0.023
Birth order	21.13	1	1.67	0.198	0.010
Weekly active time	4.75	1	0.38	0.541	0.002
Weekly passive time	23.32	1	1.84	0.177	0.011

are usually school-aged, and their active screen time tends to be higher compared to preschool children (Qi et al., 2023). It can also be assumed that caregivers can leave 5–6-year-old second-born children under the care of their older school-aged siblings. The older siblings provide active screen time for the second-born preschool siblings as a form of communication, play, and shared leisure activities. The study also revealed that there was no difference in passive screen time between first-born and second-born children aged 5–6-years. It can be assumed that parents control passive screen time based on the child's age, regardless of birth order. However, caregivers can classify active screen time as play between siblings. Therefore, in the case of second-born preschool children, caregivers believe that videogaming with an older sibling is also a form of play and communication, and they do not strictly limit this time. For first-born preschoolers, video gaming with a younger sibling was less interesting than for second-born preschoolers with older siblings. Therefore, there was a difference in active screen time depending on birth order, while there was no difference in passive screen time. However, the strongly of the results regarding the difference between first-born and second-born children in active screen time was only 63%. Therefore, the sufficient power of the result was not ensured. It means that this difference between first-born and second-born children in active screen time may not be sufficiently reliable. This suggests that this finding needs to be further investigated in future studies. However, it was revealed that birth order was associated with screen time: second-born preschool children may have the risk of prolonged active screen time.

The second research question was whether active screen time, passive screen time, or birth order more strongly predicts EF skills development over a year in preschool children. This study demonstrated that birth order is a predictor of verbal working memory development over a year. In two-child families, verbal working memory development over a year was higher in first-born 5–6-year-old children than in second-born children of the same age. The result obtained in this study is consistent with the results obtained in the study by Brody et al. (2003), who found that first-born and middle-aged children are better at recognizing the speech of people of different genders and ages compared to last-born and only children. Furthermore, there is evidence that the effect of birth order might be stronger for verbal and literacy skills than for non-verbal skills (Lehmann et al., 2018; Liu et al., 2022). This may explain why the general linear model in this study turned out to be significant for verbal working memory development over a year, but not for other EF skills. There are several potential reasons why first-born preschool children may have the advantage in verbal working memory. First, there is an assumption that first-born children have a better home learning environment, which includes more opportunities for activities such as book reading, storytelling, and engaging in high-quality interactions with their parents. This enriched environment may help them develop verbal skills more effectively than second-born children (Liu et al., 2022). For example, Lehmann et al. (2018) found that parents spent more time teaching and reading to their first-born child. Second, first-born children with the birth of last-born siblings often become "more mature" in the eyes of their parents, and they are often imposed additional responsibilities, such as assistance in caring for the youngest (Almazova and Mostinets, 2023). In contrast, last-born children, who are seen as "babies" compared to other family members, are more likely to face a situation in which other family members adjust their speech to accommodate them. This tendency can lead to a slightly less developed verbal working memory for last-born children (Almazova and Mostinets, 2023). Third, first-born children can provide cognitive scaffolding to their younger siblings. It places first-born children in an advantageous position in terms of verbal working memory development (Hill and Palacios, 2019). In summary, in the current study, of all the EF skills, only the development of verbal working memory was predicted by birth order.

For visual working memory, cognitive inhibition, and cognitive flexibility development over a year screen time and birth order were not significant predictors. The lack of differences between first-born and second-born children in these EF skills can be explained by the fact that almost all children were from families with middle socioeconomic status. This factor may moderate the effect of birth order on EF skills development (Liu et al., 2022). Preschool children from low socioeconomic families tend to have lower EF skills compared to those from middle and high socioeconomic backgrounds (Vrantsidis et al., 2020). The lack of differences between first-born and second-born children in these EF skills can be also explained by the fact that the children in the sample had an average screen time that was less than critically excessive. In the current study, daily screen time was approximately 1 h and 40 min in first-born children and 2 h in second-born children. Screen time of more than 2 h a day is considered critical for preschool children's development (World Health Organization, 2020). It can be assumed that if children had excessive screen time, then screen time could also be a predictor of the development of EF skills. Numerous studies have shown that screen time is inversely correlated with EF skills in preschool children (Hu et al., 2020). At the same time, it is worth noting that screen time can

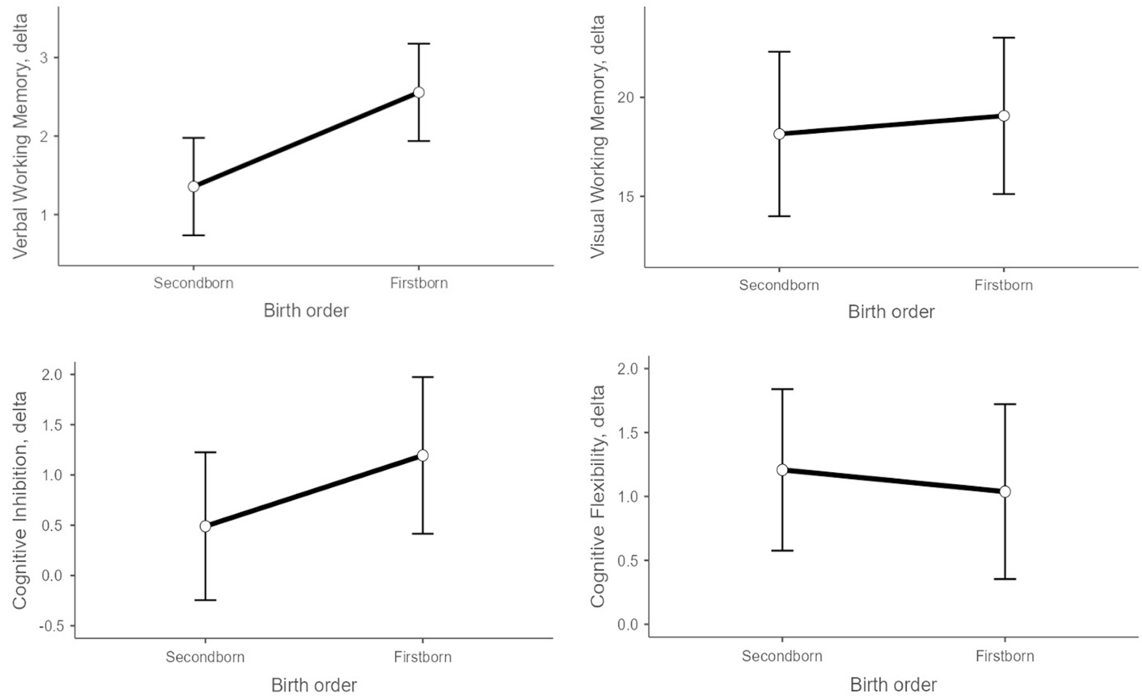

FIGURE 1
EF skills development over a year in children with different birth orders.

have different effects on different EF skills. For example, quick reaction video games can improve visual working memory (Best, 2014; Al-Gabbani et al., 2014). Exergames and serious games can develop all EF skills such as—inhibitory control, cognitive flexibility, and working memory (Chen et al., 2023). In any case, further study of this topic is required.

In the current study, neither active screen time nor passive screen time was a predictor of the development of EF skills over a year in preschool children. However, it can be assumed that active screen time was also indirectly the reason why first-born children had better verbal working memory development over a year than second-born children. There are studies that have shown that in preschool children, screen time was inversely correlated with verbal working memory among all EF skills the most (Gavrilova and Chichinina, 2023; Lakicevic et al., 2025). In addition, screen time is inversely correlated with parent–child closeness (Gath et al., 2023), which is important for verbal working memory development (Helm et al., 2020). Thus, it can be assumed that active screen time also played a role in the association between birth order and verbal working memory development over a year (since active screen time was higher in second-born children and verbal working memory development in first-born). However, the current study revealed that in preschool children, birth order was a stronger predictor of EF skills development than screen time.

There are several limitations in this study. The first limitation was that the parent-reported nature of the screen time assessment introduces potential bias. In further research, valid screen-time data can be obtained using objective measures (e.g., screen time tracking apps). The second limitation of the study was that most of the children were from families of average income and mothers with higher education (middle socioeconomic status). Due to the sample homogeneity, family socioeconomic status was not controlled in the analysis (not included in the general linear model). Family socioeconomic status is inversely correlated with screen time among preschool children (Hu et al., 2023). According to this limitation, children from low, middle, and high socioeconomic status families should be included in future research. The third limitation of the study was that all study participants were from families with two children. Future research should include more variants of birth order (middle child, only child) and more diverse family structures. The fourth limitation of the study was that parents were not asked about the activities they performed with their children based on their birth order. Additionally, they were not inquired whether these activities were different and why. Similarly, the questionnaire did not contain questions about the activities that the second-and first-born preschool children engaged in with their siblings.

In this study, it was shown that in two-child families, second-born preschool children may have a higher active screen time than their first-born peers. However, this result was weak and needs to be further investigated. However, this result highlights the importance of the recommendation that senior preschool-aged children should have no more than 1 h of screen time a day (World Health Organization, 2019). According to the result obtained, in families with two children, caregivers should pay special attention to ensuring that each child's screen time meets the age limit. This means that a second-born preschool child's screen time should not be less than that of his older sibling of school age. In addition, the current study revealed that second-born preschool children may be in a less advantageous position in terms of verbal working memory development. Based on this result, birth-order-appropriate recommendations for caregivers in families with two children can be formed. Caregivers should pay special attention to the development of verbal working memory in second-born preschool children. For example, to learn poetry together or to ask a child to retell in detail the content of the text the caregiver just read to the child. Verbal working memory enhancement is highly important in senior preschool-aged children because verbal working memory affects future social–emotional competence, school readiness, and academic achievement (Schneider and Niklas, 2017; Shimizu, 2023). In addition, it can be hypothesized that the two main results of the study are connected: screen time mediates the association between birth order and verbal working memory development. This hypothesis needs to be tested in future studies. Thus, based on the research conducted, the prospects for future research and some practical recommendations for caregivers were reflected.

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 Ethical Committee of Faculty of Psychology at Lomonosov Moscow State University (Approval No. 2022/15). 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

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

Funding

The author(s) declare that financial support was received for the research and/or publication of this article. The study was supported by the Russian Science Foundation (Grant No. 22-78-10096).

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.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

Publisher's note

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