

Original Article

Screen Time and Reported Motor Skills and Concentration Among Preschool Children in Tripoli, Libya: A Cross-Sectional Study Using Parent and Teacher Reports

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Abstract

Background: Little is known about screen use and motor development among Libyan preschool children. This study examined the association between parent-reported screen time and parent- and teacher-reported motor skills and concentration in children aged 3–5 years in Tripoli, Libya.

Methods: We conducted a cross-sectional survey from January to March 2026 using structured, researcher-developed questionnaires (not formally validated) completed by 173 parents and 41 preschool teachers, recruited through kindergartens and online parent groups by convenience and purposive sampling. Associations were examined with chi-square tests, Spearman correlations and group comparisons ($\alpha = 0.05$). Effect sizes with 95% confidence intervals are reported; no correction for multiple testing was applied to the primary analyses, which are exploratory.

Results: Overall, 82.1% of children were reported to use screens for one hour or more per day and 46.8% for three hours or more; television (48.5% of responses) and smartphones (34.6%) were the most frequently used devices. Parent-reported fine and gross motor skills were rated highly and were not significantly associated with screen time. In teacher reports, screen time showed nominally significant (unadjusted) negative correlations of moderate size with gross motor skills ($r_s = -0.312$, 95% CI -0.568 to -0.003 , $p = 0.047$) and concentration ($r_s = -0.341$, 95% CI -0.589 to -0.041 , $p = 0.029$), whereas the correlation with fine motor skills was not significant ($r_s = -0.287$, 95% CI -0.551 to 0.018 , $p = 0.069$). These associations did not remain statistically significant after Holm adjustment for multiple comparisons.

Conclusion: Heavy screen use was common, and associations with lower motor skills and concentration appeared in teacher reports (in unadjusted analyses) but not in parent reports. Because of the cross-sectional design, non-validated questionnaires and small teacher sample, the findings are exploratory and do not establish causality. Studies using validated motor assessments and longitudinal designs are needed.

Keywords: screen time; motor development; preschool children; gross motor skills; fine motor skills; physical activity; Libya

Introduction

The preschool years, from about 3 to 5 years of age, are a critical period for the development of fundamental motor skills, which include fine motor skills (such as holding a pencil or stacking blocks) and gross motor skills (such as running, jumping and climbing). These skills underpin physical activity, play and later learning. At the same time, digital devices have become part of everyday life for young children. The World Health Organisation recommends that sedentary screen time for children aged 2–4 years should not exceed one hour per day, and that less is better [1].

A systematic review linked greater screen exposure with poorer motor development in children [2]. Studies of preschool children have reported that excessive screen media use is associated with poorer motor skills [3], and have examined touch-screen use time in relation to visual-motor integration [4]. A network analysis of 42 Brazilian preschoolers found that screen time was closely connected with executive function and motor variables [5]. A two-wave longitudinal study of 141 preschool children reported a negative path fr

om media use to later fine motor skills [6], and a Canadian cohort of 113 children followed from age 4 to age 7 found that more screen time was negatively related to motor proficiency at age 7 [7].

Evidence from Libya is limited. A study in Al-Bayda examined the effects of excessive exposure to digital screens on fine motor skills and concentration among kindergarten children [8]. We are not aware of comparable data from Tripoli, where family routines, access to outdoor space and kindergarten practices may differ. This study therefore aimed to (1) describe screen-time patterns among children aged 3–5 years in Tripoli; (2) examine the association between screen time and parent- and teacher-reported fine motor skills, gross motor skills and concentration; (3) compare parent and teacher ratings of motor skills; and (4) describe parents' and teachers' perceptions of physical activity and of the availability of places for it.

Materials and Methods

Study design and setting

We used a descriptive, analytical cross-sectional design, which is suited to describing the prevalence of exposures and examining associations at a single point in time but cannot establish causal relationships [9,10]. The study



was conducted in selected kindergartens in Tripoli, Libya, and in online parent groups, between January and March 2026.

Participants and sampling

Two groups of respondents were recruited: parents or guardians of children aged 3–5 years living in Tripoli, and preschool teachers in Tripoli. Recruitment combined convenience sampling (accessible kindergartens and online parent groups) with purposive sampling (only parents of children aged 3–5 years and preschool teachers), so the sample is non-probabilistic. Children younger than 3 or older than 5 years, children with known neurological, developmental or physical conditions that could affect motor skills, and incomplete questionnaires were excluded. The final sample comprised 173 parents and 41 teachers (214 participants).

Unit of analysis and data linkage. Each parent questionnaire described one child; therefore, the child was the unit of analysis for parent data ($n = 173$). Each teacher completed one questionnaire, making the teacher the unit of analysis for teacher data ($n = 41$). Parent and teacher data were analysed separately, and no paired parent–teacher comparisons were performed (Section 3.8).

Instruments

Two structured, closed-ended questionnaires were developed by the research team, informed by published early-childhood surveys, and administered in Arabic. The parents' questionnaire covered parent and child characteristics; screen time (daily duration, devices, content, parental co-viewing, and awareness of risks); the child's fine and gross motor skills and concentration; and physical activity (importance, availability of places, frequency, family support, and interest in guidance programmes). The teachers' questionnaire covered class characteristics, classroom observations related to screen use, ratings of children's fine and gross motor skills, concentration, distractibility and social interaction, physical activity, and an overall assessment. Items were rated on ordinal scales (e.g., never to always or poor to excellent) and scored numerically for analysis. The questionnaires were pre-tested with 20 participants to assess clarity and completion time. Formal psychometric validation and reliability testing, including calculation of Cronbach's alpha, were not conducted.

Motor skills and concentration were therefore measured by informant report, not by a standardised motor assessment. The questionnaires should therefore be regarded as non-validated informant-report instruments, and the findings are interpreted as exploratory.

Variables

The exposure was daily screen time reported by parents in four categories: less than 1 hour, 1–2 hours, 3–4 hours

and more than 4 hours. Because the 1–2 hour category includes exactly one hour, it cannot be determined whether children in that category exceeded the one-hour recommendation. The outcomes were parent-reported and teacher-reported fine motor skills, gross motor skills and concentration.

2.5 Statistical analysis

Data were analysed in SPSS. Descriptive statistics included frequencies, percentages and means with standard deviations. For multiple-response items, percentages are calculated on responses rather than on participants. Associations between categorical variables were tested with the chi-square test and summarised with Cramér's V. Spearman's rank correlation (r_s) was used for ordinal data. Groups were compared with independent-samples t-tests (Welch's correction) and one-way analysis of variance, with Cohen's d as the effect size. Two-sided tests with $\alpha = 0.05$ were used and 95% confidence intervals are reported. No correction for multiple testing was applied, and the analyses should be regarded as exploratory. To show the effect of multiplicity, Holm-adjusted p values were additionally calculated for the six Spearman correlations in Table 7. Results with p values close to 0.05 are described as inconclusive rather than as evidence of an association. Effect sizes (Cramér's V, Spearman's coefficient and Cohen's d) are presented with confidence intervals where available.

Ethical considerations

Ethical approval for this study was obtained from the faculty committee of the Department of Public Health, College of Medical Technology, University of Tripoli. Before data collection, all participants were informed of the study objectives and that participation was voluntary. Confidentiality was assured, and the information collected was used exclusively for academic research purposes. Children did not participate directly; information about them was provided by their parents and teachers. Written informed consent was obtained from parents or guardians, and verbal or written consent was obtained from teachers and kindergarten administrators.

Results

Participant characteristics

Of the 173 parents or guardians, 90.8% were women and 64.7% held a bachelor's degree (Table 1). The children were aged 3 years (35.3%), 4 years (22.5%) and 5 years (42.2%), and 54.3% were boys; 91.9% were reported to take part in outdoor physical activities. Of the 41 teachers, 95.1% were women, 65.9% held a bachelor's degree, and 51.2% had fewer than five years of teaching experience.

Table 1. Characteristics of participants

Characteristic	Category	n	%
Parents (N = 173): gender	Female / Male	157 / 16	90.8 / 9.2
Parents: education	High school or less	3	1.7

	Diploma	28	16.2
	Bachelor's degree	112	64.7
	Postgraduate	30	17.3
Children (N = 173): age	3 / 4 / 5 years	61 / 39 / 73	35.3 / 22.5 / 42.2
Children: gender	Boys / Girls	94 / 79	54.3 / 45.7
Children: outdoor physical activity	Yes / No	159 / 14	91.9 / 8.1
Teachers (N = 41): gender	Female / Male	39 / 2	95.1 / 4.9
Teachers: education	High school / Diploma / Bachelor's	5 / 9 / 27	12.2 / 22.0 / 65.9
Teachers: experience	<5 / 5–10 / >10 years	21 / 11 / 9	51.2 / 26.8 / 22.0

Screen-time patterns

As shown in Table 2, 61 children (35.3%) used screens for 1–2 hours per day, 57 (32.9%) for 3–4 hours and 24 (13.9%) for more than 4 hours, while 31 (17.9%) used them for less than one hour. Thus, 82.1% (142/173) were reported to use screens for one hour or more per day and 46.8% (81/173) for three hours or more. Television was

the most frequently used device, followed by smartphones, and entertainment clips were the most commonly watched content. Parents reported co-viewing sometimes (60.7%), always (26.6%), rarely (10.4%) or never (2.3%), and 93.1% reported prior awareness of the risks of excessive screen use.

Table 2. Screen time, devices and content reported by parents

Item	Category	n	%
Daily screen time (N = 173)	<1 hour	31	17.9
	1–2 hours	61	35.3
	3–4 hours	57	32.9
	>4 hours	24	13.9
Device most used (237 responses)	Television	115	48.5
	Smartphone	82	34.6
	Tablet	33	13.9
	Computer/laptop; other	4; 3	1.7; 1.3
Content watched (276 responses)	Entertainment clips	92	33.3
	Educational programmes	66	23.9
	Electronic games	59	21.4
	Other; music videos	32; 27	11.6; 9.8

Percentages for devices and content are of responses (multiple selections were possible).

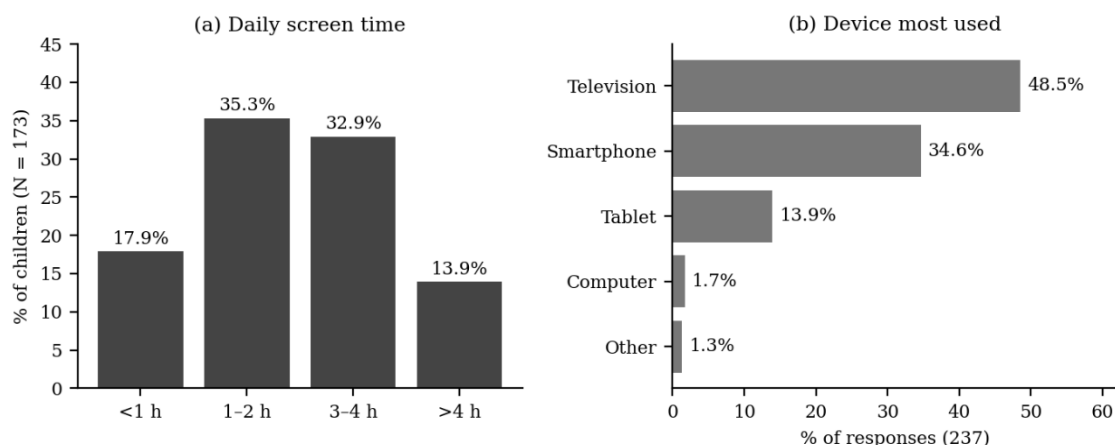


Figure 1. Daily screen time (a) and the most-used device (b) among children aged 3–5 years in Tripoli.

Parent-reported motor skills and perceptions

Parents rated their children's motor skills highly: 83.2% reported that their child could always perform fine motor

tasks easily (mean 3.80, SD 0.49 on a 4-point scale) and 84.4% reported the same for gross motor tasks (mean 3.84, SD 0.38). Regarding perceptions, 38.2% of parents

felt that electronic devices had a major impact on the child's daily activity and 42.2% a minor impact; 48.6% believed that screen time affects motor skills to a high degree and 37.0% to a moderate degree. When asked whether they had observed a relationship between excessive screen use and impaired motor skills, 28.3% said yes, 38.2% no, 23.1% maybe and 10.4% to a small degree. Most parents (78.6%) reported improved movement when screen time was reduced.

Parent-perceived risks and observed effects

Asked to name the risks of excessive screen use (multiple responses allowed), parents most often selected reduced

physical activity and behavioural delay (96 responses each; 24.1%), followed by impaired motor skills (86; 21.6%) and sleep problems (75; 18.8%). In an open-ended item, 33 parents described effects they had observed in their own child, which were coded into categories (Table 3). Emotional and behavioural dysregulation, reduced physical activity and attention difficulties were mentioned most often, and two parents described improvement after reducing screen time. Because responses could fall into more than one category, percentages exceed 100%.

Table 3. Effects of excessive screen use observed by parents (open-ended responses, n = 33)

Coded category	n	%
Emotional and behavioural dysregulation	14	42.4
Reduced physical activity and lethargy	12	36.4
Attention and concentration deficits	10	30.3
Sleep-related disturbances	5	15.2
Social withdrawal and reduced interaction	5	15.2
Cognitive and learning-related concerns	4	12.1
Dependency and craving for devices	4	12.1
No observed effect / neutral response	3	9.1
Improvement after screen reduction	2	6.1

Teacher observations

Teachers rated children's fine motor skills as good or excellent in 80.5% of cases (33/41). Table 4 summarises

selected classroom observations. Most teachers reported that heavy device users are more distractible, and many reported effects on concentration and social interaction

Table 4. Selected teacher observations (N = 41)

Observation	n	%
Heavy device users are more distractible ("yes")	34	82.9
Excessive screen time affects concentration "greatly"	28	68.3
Heavy device users show less physical activity ("slightly" 43.9%; "clearly" 24.4%)	28	68.3
Screen use has a "major" impact on children's social interaction in class	22	53.7
Increased physical activity improves motor skills ("yes")	32	78.0
Regulating screen time "certainly" may improve motor skills	30	73.2

Physical activity and access to places

Most parents (83.8%) considered physical activity very important for developing motor skills, and 91.9% believed it greatly reduces screen time. Suitable places for physical activity were rated as highly available by 16.2%, moderately available by 41.6%, slightly available by 36.4% and not available by 5.8% of parents; thus, 42.2% reported slight or no availability. Children's

participation in physical activity was daily for 39.9%, 3–4 times per week for 28.3%, once per week for 18.5% and rarely for 13.3%. Family support in limiting screen time was reported as adequate by 40.5%, as partial by 52.0% and as absent by 7.5%. Two-thirds of parents (66.5%) were interested in programmes or guidance on balancing screen time and physical activity, as were 39 of 41 teachers (Table 5).

Table 5. Physical activity items reported by parents and teachers

Item	Group	n	%
Physical activity is "very important" for motor skills	Parents (N = 173)	145	83.8
Physical activity "greatly" reduces screen time	Parents	159	91.9
Suitable places are moderately or highly available	Parents	100	57.8
Suitable places are slightly available or not available	Parents	73	42.2
Child is active daily or 3–4 times per week	Parents	118	68.2
Interested in guidance programmes ("yes")	Parents	115	66.5
General level of physical activity in class rated "high"	Teachers (N = 41)	24	58.5
Suitable places at school moderately or well available	Teachers	35	85.4
Interested in training programmes ("yes")	Teachers	39	95.1

Associations between screen time and motor skills and concentration

In the parent data, screen-time category was not significantly associated with motor-skill level or concentration (Table 6), and Spearman correlations with fine motor skills, gross motor skills and concentration were weak and not significant (95% CI -0.551 to 0.018; Table 7). In the teacher data, chi-square tests were not significant, but screen time was negatively correlated, at the nominal 5% level, with gross motor skills ($r_s = -0.312$, 95% CI -0.568 to -0.003, $p = 0.047$) and concentration ($r_s = -0.341$, 95% CI -0.589 to -0.041, p

$= 0.029$). The correlation with fine motor skills was of similar size but not significant ($p = 0.069$). The lower bounds of the confidence intervals approach zero, so these estimates are imprecise. After Holm adjustment across the six correlations in Table 7, none remained statistically significant (adjusted $p = 0.174$ for concentration and 0.235 for gross motor skills, and 0.252 for each of the other four), so these findings should be regarded as hypothesis-generating rather than confirmatory. Child age group was associated with screen-time category ($\chi^2(6) = 14.267$, $p = 0.027$, $V = 0.203$).

Table 6. Chi-square tests of association

Association	χ^2	df	p	Cramér's V	95% CI for V
Parents: screen time $\times$ motor skill level	0.547	3	0.908	0.056	0.000–0.189
Parents: screen time $\times$ concentration	6.077	6	0.415	0.133	0.000–0.264
Parents: child age group $\times$ screen time	14.267	6	0.027	0.203	0.031–0.361
Parents: education $\times$ family support	8.943	6	0.177	0.161	0.000–0.308
Teachers: screen time $\times$ motor skill level	2.134	3	0.545	0.228	0.000–0.512
Teachers: screen time $\times$ concentration	3.891	6	0.691	0.308	0.000–0.621

Table 7. Spearman correlations between screen time and outcomes

Rater	Outcome	r_s	p	95% CI
Parents	Fine motor skills	-0.142	0.063	-0.289 to 0.010
	Gross motor skills	-0.089	0.244	-0.237 to 0.063
	Concentration	-0.118	0.123	-0.266 to 0.034
Teachers	Fine motor skills	-0.287	0.069	-0.551 to 0.018
	Gross motor skills	-0.312	0.047	-0.568 to -0.003
	Concentration	-0.341	0.029	-0.589 to -0.041

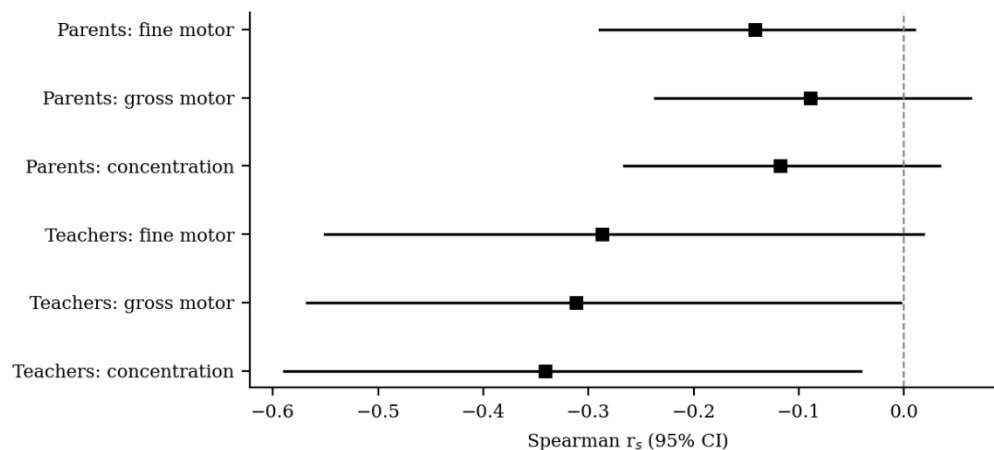


Figure 2. Spearman correlations (95% CI) between screen time and fine motor skills, gross motor skills and concentration,

by rater.

When children were grouped by screen time (≤ 2 hours versus > 2 hours per day), parent-reported fine motor scores did not differ (3.84 versus 3.81, $p = 0.628$, $d = 0.08$), nor did they differ across the four screen-time

categories ($F(3,169) = 0.13$, $p = 0.941$). In teacher reports, gross motor scores were lower in the > 2 hours group (2.63 versus 3.24, $p = 0.026$, $d = 0.75$), while the difference in fine motor scores was not significant (2.75 versus 3.12, $p = 0.072$, $d = 0.60$) (Table 8).

Table 8. Motor-skill scores by screen-time group (≤ 2 h/day vs > 2 h/day)

Rater	Outcome	≤ 2 h, mean (SD)	> 2 h, mean (SD)	p	d
Parents	Fine motor	3.84 (0.37), n = 100	3.81 (0.46), n = 73	0.628	0.08
Teachers	Fine motor	3.12 (0.68), n = 25	2.75 (0.79), n = 16	0.072	0.60
Teachers	Gross motor	3.24 (0.72), n = 25	2.63 (0.82), n = 16	0.026	0.75

Parent and teacher ratings

Parents rated children's motor skills higher than teachers did (fine motor: 3.83 versus 2.98, mean difference 0.85, 95% CI 0.60–1.10, $d = 1.40$; gross motor: 3.85 versus 2.93, mean difference 0.92, 95% CI 0.67–1.18, $d = 1.45$;

Table 9). Parents and teachers were different respondents, so these ratings are not paired and may reflect differences in context and expectations, not true differences in children's skills.

Table 9. Parent and teacher ratings of motor skills (independent groups)

Outcome	Parents, M (SD), n = 173	Teachers, M (SD), n = 41	Mean difference	95% CI	Cohen's d
Fine motor skills	3.83 (0.41)	2.98 (0.76)	0.85	0.60–1.10	1.40
Gross motor skills	3.85 (0.38)	2.93 (0.81)	0.92	0.67–1.18	1.45

Ratings are on a 4-point scale. Parents and teachers are different respondents; the comparison is not paired.

Discussion

In this sample of preschool children in Tripoli, screen use was common: more than four in five children were reported to use screens for an hour or more per day, and nearly half for three hours or more. Because the 1–2 hour category cannot separate exactly one hour from longer use, the proportion exceeding the WHO limit of one hour [1] cannot be stated precisely, but it appears to be substantial. Television and smartphones were the main devices, and entertainment content was the most commonly watched type, a pattern consistent with concerns raised in the literature [2].

Parent-reported motor skills were uniformly high and unrelated to screen time, whereas teacher reports showed nominally significant (unadjusted) moderate negative correlations of screen time with gross motor skills and concentration. This pattern resembles other studies that associate screen exposure with poorer gross motor performance and lower physical activity [11,12], and it is in line with the Al-Bayda findings on concentration [8,13]. However, the divergence between informants calls for caution. Parents may rate their children more generously, or may be less able to compare them with peers, while teachers observe many children in a structured setting. Parent and teacher ratings come from different respondents and cannot be directly compared, and the teacher analyses are based on only 41 respondents, with confidence intervals whose limits come close to zero. Moreover, the associations did not remain statistically significant after adjustment for multiple comparisons (Section 3.7).

Respondents regarded physical activity as important and as a possible way to reduce screen time, and most parents reported improved movement when screen time was reduced. These are perceptions and not intervention outcomes, and no mediation analysis was performed; studies of active play and physical activity suggest it may support motor skill acquisition [14,15], but this cannot be tested with the present data. Regarding the environment, 42.2% of parents reported slight or no availability of suitable places for physical activity, whereas 57.8% reported moderate or high availability. Limited access

may therefore affect a substantial minority of families, but our data do not show that it drives screen use.

Fine motor skills showed no significant association with screen time in either informant group, contrary to some earlier studies [3,6,8]. Several explanations are possible but untested here. Manual activities in kindergarten curricula, such as drawing and cutting, may offset any effect on fine motor skills at this age. Touchscreen interaction involves finger movements that may be stereotyped and offer less resistance and coordination demand than real-world manipulation, so subtle differences may not be captured by broad questionnaire items. The very high parent ratings also leave little room for variation (a ceiling effect), which would reduce the ability to detect an association. Finally, the sample was small, and the wide confidence intervals mean that a modest association cannot be excluded.

Teachers also reported links between heavy device use and distractibility, concentration and social interaction. These observations are in line with the Libyan studies cited earlier [8,13], but they are subjective impressions of children whose screen exposure the teacher did not measure, and they may be influenced by expectations about screen use. Parents' own observations pointed in the same direction for some families, with emotional and behavioural dysregulation and attention difficulties mentioned most often, although this open-ended item was answered by only 33 parents and 38.2% of all parents reported no observed relationship between screen use and impaired motor skills. The overall picture is therefore one of heterogeneous perceptions, not of a uniform effect.

Strengths and limitations

Strengths include the use of two informant groups and the focus on a setting with limited published data. Several limitations should be considered. The cross-sectional design does not establish temporal order or causality. Convenience sampling, including recruitment through online groups, and the predominantly female and highly educated parent sample limit generalisability beyond Tripoli. Screen time was parent-reported in broad categories that omit 2–3 hours and may be subject to recall and social-desirability bias. Motor skills and

concentration were assessed using non-validated, perception-based questionnaires rather than standardised motor assessments. The questionnaires' validity and reliability were not formally assessed. Parent and teacher ratings came from different respondents, so agreement between informants about the same child could not be evaluated. The teacher sample was small, multiple hypotheses were tested across Tables 6–9, and the reported associations were exploratory; Holm-adjusted results for the six correlations in Table 7 were not statistically significant. Potential confounders, including age, sleep, family income and parental screen use, were not adjusted for. In addition, the procedure used to assign parent-reported screen-time categories to teacher-level ratings requires clarification, which limits interpretation of the teacher analyses.

Implications

The findings point to several practical steps, which should be read as suggestions drawn from an exploratory study rather than as evidence of effectiveness. Parents may consider following the WHO limit for young children [1] and watching content together with the child; most parents in this sample reported at least some co-viewing, which could be strengthened. Kindergartens could build regular, active free play and group games into the daily programme, since teachers and parents both identified physical activity as valuable and children's preferred activities were free play, running and group games. Awareness and training programmes for parents and teachers, which most respondents said they would welcome, could include guidance on screen limits and on recognising concentration or motor difficulties. Finally, local authorities and kindergartens could consider the availability of safe places for active play, given that about two in five parents reported slight or no availability.

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For research, the priorities are validated or directly observed motor assessments (for example, standardised fundamental motor skill tests), more precise screen-time measures with finer duration categories, larger and more representative samples, adjustment for confounders, and longitudinal designs that can clarify the direction of any association.

Conclusion

Heavy screen use was common among preschool children in this Tripoli sample. Higher screen time was associated with lower teacher-reported gross motor skills and concentration, but not with parent-reported skills, and these associations did not remain statistically significant after adjustment for multiple comparisons. These exploratory findings suggest that parents and kindergartens may wish to follow existing screen-time guidance and encourage daily active play, and they justify larger studies with validated motor assessments, objective screen-time measures and longitudinal follow-up. Parent and teacher awareness programmes, which both groups said they would welcome, are a practical starting point.

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Conflicts of interest: The authors declare no conflicts of interest.

Data availability: The anonymised dataset supporting the findings of this study is available from the corresponding author upon reasonable request.

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16. Both questionnaires used closed-ended items with 3- or 4-point ordinal response options, scored numerically (higher scores indicating a higher category), plus a small number of multiple-response items. The domains are summarised below.