

A Comprehensive Framework for Assessing Screen-Based Media Use in Young Children: Adapting the ScreenQ Measure for Broader Application

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Abstract

Screen-based media use is increasingly prevalent among young children, posing various health and developmental risks. Despite the American Academy of Pediatrics (AAP) recommendations on screen access, frequency, content, and co-viewing, a comprehensive and validated composite measure reflecting contemporary media use patterns has been lacking. This study addresses this gap by introducing and psychometrically assessing the ScreenQ, a novel 15-item parent-report measure designed to align with AAP recommendations. We employed Rasch methods and Spearman's ρ correlations to evaluate the ScreenQ's properties. The measure was administered to 69 parent-child dyads, with children aged 36 to 63 months. Four established external criteria—Comprehensive Test of Phonological Processing, Second Edition (CTOPP-2), Expressive Vocabulary Test, Second Edition (EVT-2), Get Ready to Read! (GRTR) and StimQ-P, which measures how much cognitive stimulation kids get at home, were used to check if the test is accurate. Our results show that the ScreenQ has solid measurement qualities. The scores tend to go down when kids have better skills in areas like thinking, talking, reading, and writing, or when their home environment offers more cognitive stimulation. These results show that ScreenQ could be a helpful tool for understanding how young kids use screens. It gives important information about how screen time relates to their development and what Parenting approaches look like. This research contributes to the understanding of media's impact on early childhood development and provides a foundation for future interventions and policy-making.

Keywords: Screen-based media use, Young children, ScreenQ, Psychometric assessment, Child development

1 Introduction

Kids today are almost always using screens, starting from when they're still babies[2]. Kids today have almost constant access to digital devices, especially portable ones. This openness to a wide range of content is changing how children grow, learn, play, and connect with others[2, 3]. The American Academy of Pediatrics (AAP) has come out with advice pointing out the mental, behavioral, and health issues that can come from spending too much time on screens or using them at the wrong times[8]. These risks include things like being overweight [4], delays in language development [21], sleep problems[3, 7], trouble with planning and decision-making [4], and less interaction between parents and kids[24, 22, 27]. Recent research in neurobiology indicates that there might be some negative impacts on the brain's structure and how different parts connect[18, 6, 23]. Even though we know there are risks, young kids are spending more and more time in front of screens. Recent numbers show children between three and eight are watching or using screens for about three hours a day on average[2].

The fast changes in screen devices and the variety of media kids see make it pretty hard to really measure how much media they're exposed to and what effect it has on them. Existing measurement tools are often outdated, focusing primarily on traditional television viewing[11], or they rely on simplistic methods like parent-reported diaries or single-frequency items for various devices[20, 12]. There's a big missing piece of evidence because we don't have a reliable way to measure how people use screens today. With so many portable devices and different kinds of content and apps out there, it's hard to capture the full picture. This study addresses this gap by introducing and psychometrically evaluating the ScreenQ, a novel, comprehensive parent-report measure of screen-based media use in preschool-aged children.

The AAP's recommendations provide a conceptual framework for understanding the various dimensions of screen media use that may influence child development. These dimensions include not only the quantity of exposure but also the quality of the content, the context of viewing (e.g., co-viewing with a caregiver), and the accessibility of screens (e.g., in the bedroom)[8]. While numerous studies have explored the associations between screen time and various developmental outcomes, the lack of a standardized and comprehensive measurement tool has limited the comparability and generalizability of their findings. The ScreenQ was developed to address this limitation by incorporating the key domains identified in the AAP recommendations into a single, composite measure.

Previous studies often depend on ways of measuring that don't really reflect how complicated today's screen time actually is. The proliferation of portable devices, such as tablets and smartphones, has made it more challenging to monitor and quantify children's screen time accurately. The type of content people watch and how much parents and kids talk or do things together while using media are really important, but people often forget about that. The ScreenQ was created to give a better overall picture of kids' screen time. It looks at what they have access to, how often they use it, what type of content they're watching, and whether someone is with them while they do it.

The primary objective of this study is to introduce and psychometrically assess the ScreenQ as a novel, composite measure of screen-based media use in young children. We want to see if the ScreenQ is reliable and actually measures what it's supposed to by checking how it relates to other well-known tests of thinking skills and parenting styles. Specifically, we hypothesize that higher ScreenQ scores, indicating greater non-adherence to AAP recommendations, will be negatively correlated with children's expressive language, phonological processing, emergent literacy skills, and the level of cognitive stimulation in the home environment. This study aims to add something valuable to the field by developing a reliable tool that researchers and clinicians can use to better understand how children use screens. It offers a more in-depth and accurate way to look at kids' media habits.

This paper is organized as follows: Section 2 provides a review of the relevant literature on screen media use in young children and its associations with developmental outcomes. Section 3 describes the methods used to develop and validate the ScreenQ, including the sample characteristics, the reference measures, and the statistical analyses. Section 4 presents the results of the psychometric analyses, including the item-level statistics, the internal consistency, and the criterion-related validity of the ScreenQ. Section 5 discusses the implications of the findings, the limitations of the study, and directions for future research. Finally, Section 6 provides a summary of the main conclusions.

2 Related Work

People's way of using screens has changed a lot over the last few decades. We went from watching TV together as a group to mostly using personal, portable devices on our own[11]. Early research on screen time primarily focused on television exposure and its associations with child development, often employing simple measures such as daily viewing hours or parental reports of television presence in bedrooms[11, 14]. While these studies provided foundational insights into the potential negative impacts of excessive screen time, such as obesity[19], sleep disturbances[7], and language delays[21], they are increasingly insufficient to capture the complexity of contemporary media environments. The advent of smartphones, tablets, and a vast array of interactive applications has introduced new dimensions to screen media use, including diverse content types, interactive features, and varied social contexts of engagement[2, 3]. This change means we need better, more flexible tools to measure how people are actually using things as patterns evolve.

Traditional measures often fail to differentiate between passive viewing and active, interactive engagement, or between educational content and purely entertainment-driven media[12]. Media use can have different effects depending on when it happens—like during meals or right before bed—and how involved parents are, such as watching together or talking about what's viewed. These things

really matter for a child's development but often aren't fully covered by the tools we usually use to measure media habits[8, 24, 27]. There's no clear, widely accepted way to measure screen time that matches how people actually use devices today or fits with AAP guidelines. This makes it hard for researchers and doctors to study and give good advice[2].

The American Academy of Pediatrics (AAP) has kept changing its advice about kids and screen time. They're now focusing not just on how much time kids spend on screens, but also on what they're watching, where and when they watch, and whether parents are watching together with them[3]. The AAP's guidelines are structured around four key domains: access to screens (e.g., presence in bedrooms, monitoring portable devices), frequency of use (e.g., daily limits, age of initiation), media content (e.g., non-violent, slower-paced, educational value), and caregiver-child co-viewing (e.g., shared engagement, discussion during and after use)[8]. These suggestions emphasize that it's not just about how much time kids spend in front of screens, but also what they're doing during that time. Not all screen time is bad, and when caregivers are involved and pay attention, some media use can actually help a child's development.

Several conceptual models have emerged to frame the study of media effects on children, often drawing from ecological systems theory, which posits that child development is influenced by multiple interacting systems, from the immediate family environment to broader cultural contexts. Within this framework, screen media is viewed as an integral part of the child's "ecosystem," with its impact mediated by various factors, including family dynamics, parenting practices, and the child's individual characteristics[2]. The ScreenQ measure, as presented in the source paper, is explicitly designed based on the AAP's conceptual model, aiming to provide a comprehensive assessment that aligns with these multi-dimensional aspects of media use.

Many tools have been created to track how much time kids spend on screens, but most of them have problems that make it hard to use them effectively today. These include:

Self-report or Parent-report Diaries: These methods can provide detailed accounts of media use but are often burdensome for participants, leading to low compliance and potential recall bias[20]. They may also struggle to capture simultaneous media use or the specific content consumed.

Single-item Frequency Measures: Many studies rely on single questions about daily screen time, which provide a quantitative estimate but lack the granularity to assess the quality, context, or content of media exposure[12]. Such measures cannot differentiate between a child watching an educational program with a parent versus passively consuming violent content alone.

Technology-specific Measures: Some tools focus exclusively on specific technologies, such as television viewing[11], neglecting the increasing prevalence and impact of portable devices like tablets and smartphones. This small focus doesn't show the whole picture of what a child's screen time is really like.

The main problem is that there aren't any proven ways to combine different aspects of screen media use into one overall score. This makes it challenging to assess adherence to multi-faceted guidelines like those from the AAP and to understand the cumulative impact of various media-related behaviors.

For instance, the StimQ assessment, which measures cognitive stimulation in the home, served as an inspiration for the ScreenQ's conceptual model, particularly in its approach to assessing environmental factors influencing development. However, StimQ does not specifically focus on screen media. Other validated measures, such as the CTOPP-2 (Comprehensive Test of Phonological Processing, Second Edition), EVT-2 (Expressive Vocabulary Test, Second Edition), and GRTR (Get Ready to Read!), These are important for understanding how a child develops, but they don't tell us much about how the child actually interacts with media.

The current ways of measuring screen time don't quite capture what's really going on. We really need a new tool that's reliable, well-designed, and covers everything, so we can get a clear picture of how young kids are using screens these days. Such a measure must be capable of capturing not only the quantity of screen exposure but also the qualitative aspects, including content, context, and co-viewing, as outlined by the AAP recommendations. The ScreenQ was created to fill this gap by giving a single score that shows how well kids are following these suggestions. It gives a more complete and realistic picture of how children experience screen media in their daily lives. This new way of looking at things helps us better understand how watching screens, parenting habits, and how kids grow all connect. It makes it easier to develop focused solutions and create policies based on real evidence.

3 Methodology

3.1 Research Strategy and Design

This study employed a cross-sectional design to psychometrically assess the ScreenQ, a novel parent-report measure of screen-based media use in young children. The overall research strategy involved the development and refinement of the ScreenQ instrument, followed by its administration to a sample of parent-child dyads. Concurrently, a battery of validated external measures assessing child cognitive abilities and parenting practices were applied. The study aimed to establish the internal consistency and criterion-related validity of the ScreenQ by examining its correlations with these external criteria. This approach allowed for a comprehensive evaluation of the ScreenQ's utility as a composite measure reflecting adherence to AAP recommendations, particularly in the absence of a direct "gold standard" for screen time measurement in contemporary media environments.

3.2 Participants and Recruitment

The study was conducted between August 2017 and November 2018, involving a sample of 69 parent-child dyads. Participants were recruited through advertisements at a large children's medical center and local pediatric primary care clinics. Inclusion criteria for children were: age between 3 and 5 years (36 to 63 months), born at least 36 weeks gestation, from a native English-speaking household, no history of neurodevelopmental disorder conferring risk of delays, and no contraindications to MRI. The mean age of the children was 52 ± 8 months, with 51% being girls. The sample exhibited diversity in terms of household income and maternal education, as detailed in Table 1 of the original paper. All participating families received compensation for their time and travel. The study protocol received approval from the Institutional Review Board.

3.3 ScreenQ Measure Development and Administration

The ScreenQ is a 15-item parent-report measure conceptually derived from the four key domains of media use cited in the American Academy of Pediatrics (AAP) recommendations: access to screens, frequency of use, media content, and caregiver-child co-viewing[8]. These domains are incorporated as subscales within the measure. The instrument was designed to be administered by a clinical provider, with wording refined through consultation with measure development experts and parents of young children. A previous version was pilot tested and revised [18]. Items are largely binary or ordinal (Likert scale), with some frequency-based items translated to an ordinal score based on AAP recommendations. Ordinal scoring assigns 0 to 2 points, with 0 indicating perfect adherence to recommendations and higher scores reflecting greater non-adherence. Weightings for binary items were determined a priori based on the level of evidence of risks (e.g., use in bedrooms scored 2 points for high risk, fast vs. slower-paced content scored 1 point for moderate risk). The total score ranges from 0 to 26 points. For this study, research coordinators administered the ScreenQ to a custodial parent in a private room, with responses entered into a REDCap database[10].

3.4 Reference Measures

We used four proven measures of kids' thinking skills and parenting habits that are linked to how much kids use screens:

The Expressive Vocabulary Test, Second Edition (EVT-2; Pearson) is a tool used to measure how well children aged 2.5 years and up can use and understand words. It compares their results to those of other children their age[1].

The CTOPP-2 (Second Edition of the Comprehensive Test of Phonological Processing), from Pearson, includes a subtest called Fast Object Naming. It's a detailed test that compares your results to normal ranges to check your abilities in phonological processing — the skills that are important for learning to read smoothly[25]. The Fast Object Naming subtest was picked because it works well for preschoolers. It measures how quickly and easily they can find and name objects.

Get Ready to Read! (GRTR): A norm-referenced assessment of core emergent literacy skills for children aged 3–6 years, predictive of reading outcomes [15].

StimQ-P: A validated measure of cognitive stimulation in the home for children aged 3 to 6 years, comprising four subscales: availability of learning materials, reading, parental involvement in developmental advance, and parental verbal responsivity[13].

The EVT-2, CTOPP-2, and GRTR were administered to the child prior to MRI scans, while the StimQ-P was administered to the parent after the ScreenQ.

3.5 Statistical Analysis

Statistical analyses were conducted in four main steps. First, demographic characteristics of the sample were computed. Second, descriptive statistics for all ScreenQ items, subscales, external standards, and relevant demographic variables were calculated. Third, individual ScreenQ items were analyzed using a combination of classical test theory and modern Rasch analysis. Partial-credit Rasch modeling was deemed appropriate given the ordinal and varying nature of response options across items [24]. Rasch coefficients, expressed as log odds ratios (logits), were used to estimate item difficulty. Model fit was tested for each item to identify any undue influence on scale-level distributions. Finally, relationships between ScreenQ scores and those on external standards were explored using Spearman's ρ (r) correlation coefficients, chosen due to the non-normal distribution of the data. Cronbach's coefficient alpha (α_{Cr}) was used to assess internal consistency. The criterion for statistical significance was set at an unadjusted $\alpha = 0.05$. All analyses were performed using SAS v9.4 and Winsteps v4.0 software.

4 Results

4.1 Demographic Characteristics

The study included 69 parent-child dyads. The mean age of the children was 52 ± 8 months, ranging from 36 to 63 months. Girls constituted 50.7% ($n=35$) of the sample, while boys made up 49.3% ($n=34$). The racial distribution was 32% African American/Black ($n=22$), 67% Caucasian/White ($n=46$), and 1% Other ($n=1$). Parental marital status showed 29% single ($n=20$), 65% married ($n=45$), and 6% divorced/separated ($n=4$). Annual household income distribution was diverse, with 18.8% earning $\leq \$25,000$, 14.5% between $\$25,001$ and $\$50,000$, 30.4% between $\$50,001$ and $\$100,000$, 20.3% between $\$100,001$ and $\$150,000$, and 15.9% above $\$150,000$. Maternal education levels were also varied: 10.1% had high school or less, 23.2% had some college, 34.8% were college graduates, and 31.9% had more than college education. These demographic details are summarized in Table 1.

Table 1: Demographic characteristics of participants (N=69)

Characteristic	N (%) or Mean \pm SD (Min, max)
Child age (months)	52 ± 8 (36, 63)
36+	23 (33.3)
48+	28 (40.6)
60+	18 (26.1)
Child gender	
Male	34 (49.3)
Female	35 (50.7)
Child race	
African American/Black	22 (32)
Caucasian/White	46 (67)
Other	1 (1)
Parental marital status	
Single	20 (29)
Married	45 (65)
Divorced/separated	4 (6)
Annual household income (\$)	
$\leq 25,000$	13 (18.8)
25,001–50,000	10 (14.5)
50,001–100,000	21 (30.4)
100,001–150,000	14 (20.3)
Above 150,000	11 (15.9)
Maternal education	
High school or less	7 (10.1)
Some college	16 (23.2)
College graduate	24 (34.8)
More than college	22 (31.9)

4.2 Descriptive Statistics for ScreenQ and External Standards

Research coordinators reported no difficulties in administering the ScreenQ, with all parents completing the survey in less than 2 minutes and no concerns regarding item clarity. The mean ScreenQ total score was 9.6 ± 5.0 , with a range of 1 to 22. Subscale scores were as follows: Access 3.2 ± 2.0 (range 0–7), Frequency 2.6 ± 2.0 (range 0–7), Content 1.2 ± 1.3 (range 0–5), and Co-viewing 2.6 ± 1.5 (range 0–6).

The average CTOPP-2 Swift Object Naming standard score was 9.1, with a typical variation of about 3.2 points, ranging from 2 to 15. The mean EVT-2 standard score was 110.3 ± 15.4 (range 87–144), with 70% of scores falling within the average range for age ($\pm 1SD$; 85–115). The mean GRTR score was 16.5 ± 6.4 (range 5–25), with 18% below average, 38% average, and 44% above average. The mean StimQ-P total score was 41.8 ± 6.9 (range 21–52). These descriptive statistics are summarized in Table 2.

Table 2: Summary statistics for ScreenQ and external measures (N=69)

Measure	N	Mean \pm SD (Min, max)
ScreenQ total score	69	9.6 ± 5.0 (1, 22)
Access	69	3.2 ± 2.0 (0, 7)
Frequency	69	2.6 ± 2.0 (0, 7)
Content	69	1.2 ± 1.3 (0, 5)
Co-viewing	69	2.6 ± 1.5 (0, 6)
CTOPP-2 Rapid Object Naming scaled	49	9.1 ± 3.2 (2, 15)
EVT-2 scaled score	66	110.3 ± 15.4 (87, 144)
GRTR total score	69	16.5 ± 6.4 (5, 25)
StimQ-P total score	68	41.8 ± 6.9 (21, 52)

4.3 ScreenQ Item Analysis

Item analytics for the ScreenQ, including response frequency counts, percentages, item difficulty, standard error, and Spearman's ρ point-measure correlation, are presented in Table 3. All 15 ScreenQ items were evaluated for difficulty, smoothness, modality, polarity, and sufficiency of scores. Item response density was over a minimum of 5% for each response option. Rasch estimates of item difficulty were balanced overall and symmetrical around zero (average difficulty), ranging from -1.22 (less difficult; item 4: Use on school nights) to 1.45 (more difficult; item 10: Violent content). Point-measure correlations were all positive, ranging from 0.14 (item 12: Fast/slow content pacing) to 0.71 (item 7: Hours/day of use), indicating that each item contributed uniquely to the overall score. Item fit statistics were within acceptable limits, suggesting no outliers influencing the distributions. The correlations between items were mostly low to moderate. The strongest link was between item 1 and item 8, with a correlation of 0.72, which looks at bedroom access—using a device to help sleep. The lowest was between item 1 and item 2, with a correlation of 0.25, both focusing on bedroom access but one about having a portable device.

4.4 Internal Consistency and Validity

Internal consistency of the ScreenQ, as estimated by Cronbach's coefficient alpha (αCr), was 0.74, indicating strong reliability for a new measure. The results showed that higher scores on ScreenQ were linked to lower scores on all the external tests, and these connections were statistically major (all $p \leq 0.01$). Specifically, the correlations were: EVT-2 (about -0.45), CTOPP-2 Swift Object Naming (around -0.57), GRTR (roughly -0.30), and StimQ-P (approximately -0.42). These correlations are visually represented in Figure 1, showing scatter plots of ScreenQ total scores against each criterion-referenced standard.

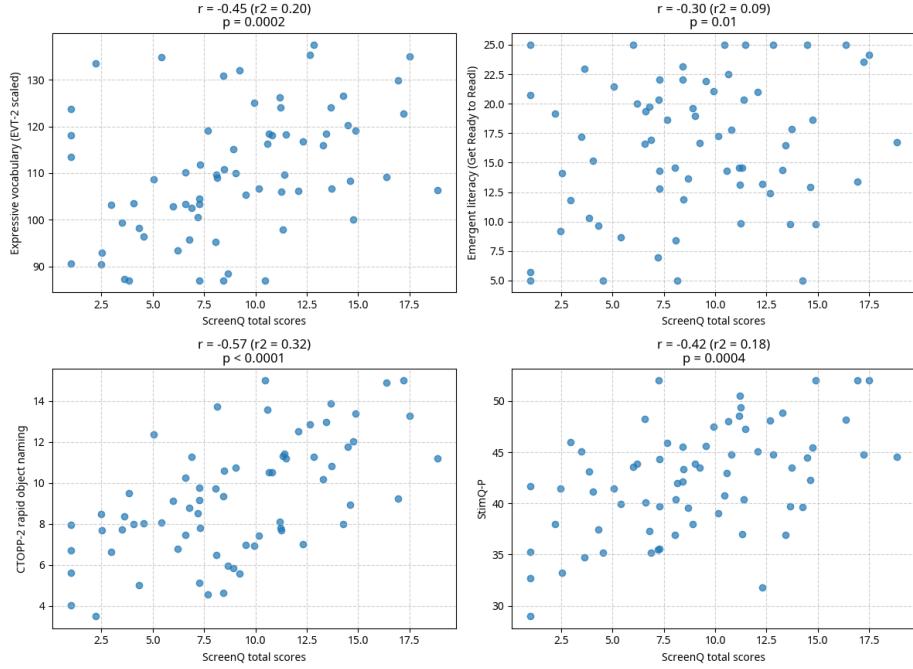
4.5 Demographic Associations

There was a noticeable link between higher ScreenQ scores and some basic demographic factors. Specifically, higher scores were associated with male child gender ($r\rho = 0.31$), non-Caucasian race ($r\rho = 0.44$), unmarried parent ($r\rho = 0.41$), lower household income ($r\rho = -0.54$), and lower maternal education ($r\rho = -0.41$; all $p \leq 0.05$). There was no clear link between the child's age and the result.

Table 3: Item-level summary statistics for ScreenQ ($n = 69$), including response frequency counts and percentage for individual items, item difficulty, standard error, and Spearman's ρ point-measure correlation.

Item description (question number)	Domain	0 f (%)	1 f (%)	2 f (%)	Item difficulty	Standard error	Point-measure correlation
Violent content (Q10)	Content	40 (58.0)	21 (30.4)	8 (11.6)	1.45	0.26	0.37
Use to help calm down (Q9)	Frequency	57 (82.6)	8 (11.6)	4 (5.8)	1.29	0.25	0.39
Fast/slow content pacing (Q12)	Content	42 (60.9)	5 (7.3)	22 (31.9)	0.84	0.30	0.14
Use during meals (Q3)	Access	51 (73.9)	18 (26.1)	N/A	0.66	0.29	0.46
Use to help sleep (Q8)	Frequency	50 (72.5)	7 (10.1)	12 (17.4)	0.50	0.19	0.60
Screen(s) in bedroom (Q1)	Access	49 (71.0)	0 (0.0)	20 (29.0)	0.14	0.16	0.66
Co-view TV/videos (Q13a)	Interactivity	43 (62.3)	26 (37.7)	N/A	0.04	0.27	0.20
Dialog after use (Q15)	Interactivity	24 (34.8)	35 (50.7)	10 (14.5)	0.01	0.20	0.36
Chooses media by self (Q11)	Content	57 (82.6)	9 (13.0)	3 (4.4)	-0.07	0.16	0.53
Dialog during use (Q14)	Interactivity	25 (36.2)	31 (44.9)	13 (18.8)	-0.12	0.19	0.25
Age child started use (Q6)	Frequency	32 (46.4)	7 (10.1)	30 (43.5)	-0.51	0.16	0.59
Hours/day of use (Q7)	Frequency	14 (20.3)	42 (60.9)	13 (18.8)	-0.51	0.22	0.71
Use while waiting (Q5)	Access	32 (46.4)	37 (53.6)	N/A	-0.73	0.26	0.47
Co-use games/apps (Q13b)	Interactivity	30 (43.5)	39 (56.5)	N/A	-0.87	0.26	0.44
Child has portable device (Q2)	Access	27 (39.1)	0 (0.0)	42 (60.9)	-0.90	0.15	0.57
Use on school nights (Q4)	Access	25 (36.2)	44 (63.8)	N/A	-1.22	0.27	0.26

Figure 1: Scatter plots of ScreenQ total scores vs. criterion-referenced standards

**Fig. 1:** Scatter plots of ScreenQ total scores vs. criterion-referenced standards.

5 Discussion

5.1 Interpretation of Findings and Comparison with Existing Research

This study provides initial psychometric evidence supporting the internal consistency and validity of the ScreenQ, a novel composite parent-report measure of screen-based media use in young children. The strong performance of the ScreenQ can be attributed to its conceptual model, which is directly derived from the comprehensive recommendations of the American Academy of Pediatrics (AAP) [3]. This evidence-based foundation guided the development of each item and the overall scale, ensuring its relevance to contemporary media use patterns and associated risks. The variety of item difficulty, which shows how often parents agree with different media habits, suggests that ScreenQ can pick up on a wide range of how families follow the AAP recommendations. For instance, items related to violent content, use for calming, and fast-paced content were found to be more difficult (less frequently endorsed), possibly reflecting parental awareness of AAP recommendations or social desirability bias. Conversely, items related to screen access (e.g., child having a portable device, use on school nights) were less difficult, aligning with the widespread prevalence of portable devices and their integration into children's daily routines [1].

The observed negative correlations between ScreenQ scores and measures of expressive language (EVT-2), phonological processing (CTOPP-2), and emergent literacy (GRTR) are consistent with a growing body of literature linking excessive screen time to language delays and impaired executive function[21, 4, 9, 5, 26]. Higher ScreenQ scores seem to be linked to less stimulating home environments, as shown by the negative link with StimQ-P, which measures how much the home supports thinking and learning. This might happen because parents and kids aren't interacting as much when media is involved[24, 27, 16]. This just shows how important it is for parents to engage with their kids and create a good media surroundings to help lessen any possible bad effects from screen time.

Inter-item correlations within the ScreenQ reveal important insights into the interconnectedness of various screen media behaviors. The link between having screens in the bedroom (Item 1) and more hours of use, starting earlier, and using screens to help fall asleep matches what research has shown about how bedroom screens can hurt sleep and lead to unhealthy media habits[14, 17]. Access to portable devices (Item 2) really shows how much they impact total screen time and the habits that come with it[2]. These connections show why using a combined measure like the ScreenQ really

helps. It captures how different factors come together to influence kids' experiences with screens, instead of just looking at how much time they spend.

5.2 Limitations and Future Directions

Despite its strengths, this study has several limitations that warrant consideration. First, the relatively small sample size ($N=69$) and its specific demographic characteristics, while diverse, may limit the generalizability of the findings to broader populations or other cultural contexts. Future research should aim for larger, more diverse samples to enhance external validity. Second, as a parent-report measure, the ScreenQ is susceptible to social desirability bias, where parents may underreport behaviors perceived as undesirable. Future studies could incorporate objective measures of screen time (e.g., app usage data, direct observation) to validate parental reports and quantify potential biases. Third, the cross-sectional design of this study precludes the establishment of causal relationships between ScreenQ scores and developmental outcomes. Longitudinal studies are needed to explore the temporal dynamics and long-term impacts of screen media use on child development.

The study looked at the possible risks of using screens but didn't really explore the good things, like how educational shows or interactive apps might help kids learn or improve their skills. Future studies might look into how different quality levels of content impact growth in various ways. The ScreenQ's current version also excluded an item on "educational" use due to initial wording concerns; revising and reintroducing such an item in future versions would enhance its comprehensiveness, aligning more closely with the AAP's emphasis on content quality[8]. Finally, while the ScreenQ was administered by research coordinators in this study, its feasibility for routine clinical use by parents during well-child visits needs further investigation, although its simple reading level and brief administration time suggest potential for adaptation.

5.3 Value and Implications

This study is an important step toward creating a reliable and well-rounded way to measure how young children use screens and media. The ScreenQ, grounded in AAP recommendations, offers a valuable tool for researchers and clinicians to assess complex media behaviors beyond simple time spent. It helps us understand how different ways children use screens relate to important parts of their growth, giving a clearer picture of how digital media affects kids in their early years. The results show just how much parents' guidance and what kids are exposed to at home really influence their growth. The ScreenQ helps identify specific issues, support public health efforts, and guide policies to encourage better screen habits for young kids. Ongoing research, like long-term studies and testing with real measurements, will help make the ScreenQ even more useful and impactful as the field keeps changing.

6 Conclusion

This study successfully introduced and psychometrically assessed the ScreenQ, a novel 15-item parent-report measure designed to comprehensively evaluate screen-based media use in young children, aligning with the American Academy of Pediatrics (AAP) recommendations. Our results show that the ScreenQ is reliable and valid. It has good internal consistency, with a Cronbach's alpha of 0.74, and it effectively measures what it's supposed to. Specifically, higher ScreenQ scores, indicative of greater non-adherence to AAP guidelines, were consistently correlated with lower performance in key developmental domains, including expressive language, phonological processing, and emergent literacy skills, as measured by the EVT-2, CTOPP-2, and GRT-R, respectively. Higher ScreenQ scores were linked to having fewer activities and less mental stimulation at home, based on the StimQ-P assessment. These findings emphasize how ScreenQ could be a really useful and easy-to-use tool for both researchers and clinicians. It helps them better understand how children are using screens and how that might relate to their development.

This research offers some important insights into early childhood development and how kids interact with media. It starts by filling an important gap in what we know. It offers a tested way to measure how people actually use screens today, taking into account all the different ways it's done, instead of just looking at how much time is spent. The ScreenQ's alignment with AAP recommendations ensures its practical relevance for guiding parenting practices and clinical interventions. The study also adds to the growing number of findings showing that some ways kids use screens can negatively impact their key developmental milestones. Showing these links means the ScreenQ could

help spot kids who might be at risk of developmental delays because of too much screen time. Lastly, the findings provide a foundation for developing more targeted and effective public health campaigns and educational programs aimed at promoting healthy screen media habits among young children and their families.

While this study offers valuable insights, it is important to acknowledge its limitations. The relatively small sample size and its specific demographic characteristics may limit the generalizability of the findings. Future research should aim to replicate these findings in larger, more diverse populations. The reliance on parent-report data, while practical, introduces the potential for social desirability bias; thus, integrating objective measures of screen time in future studies would enhance the validity of the assessments. The way the study is set up only shows a snapshot in time, so it can't prove one thing actually causes another. Long-term studies are really important to see how different ways of using screens, measured by the ScreenQ, affect development over time.

Future research directions include: (1) conducting longitudinal studies to track the developmental impact of screen media use over time and to assess the predictive validity of the ScreenQ; (2) exploring the effectiveness of interventions designed to improve screen media habits based on ScreenQ assessments; (3) refining the ScreenQ to include items related to the quality of educational content and its potential benefits; (4) validating the ScreenQ in diverse cultural contexts and with different age groups; and (5) investigating the neurobiological mechanisms underlying the observed associations between screen media use and developmental outcomes.

DECLARATIONS

Ethics approval and consent to participate

Not applicable.

Conflict of interest

The authors declare no competing financial interests.

Dataset to be available

All data generated or analysed during this study are included in this published article.

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Authors' information

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