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The association between screen time exposure, parent depression, and development of social communication skills among preschool children in Qassim Region

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Abstract

Background Screen exposure among children continues to increase worldwide. It has negative effects on children of developmental age, including obesity, poor attention, sleep disorders, vision problems, language delays, and deficits in communication skills. It has been reported that parental depression is associated with both increased screen time for children and poor function and skills in children. However, other studies have reported no association between screen time and parental depression.

Research methodology A cross-sectional study was conducted using a convenience sample of 340 parents of 4- to 6-year-old children in the Qassim Region of Saudi Arabia. Data were collected from the primary health care vaccination clinic by contacting parents of children aged 4 to 6 years to fill out the Social Communication Questionnaire (SCQ) for the child and the Patient Health Questionnaire-9 (PHQ9) for the parents.

Research results We conducted a regression analysis to assess the influence of screen time exposure on social communication skills (SCQ score). The results of this study indicated that there was no significant effect observed ($B=0.283, P>0.05$), indicating that a positive correlation between screen time usage and SCQ score may not apply to the entire population. Conversely, we discovered a crucial link between screen time exposure and parental depression (PHQ), as it displayed noteworthy impact values ($B=1.136, P<0.05$), indicating an affirmative correlation between them. In addition, our results also indicated apparent positive associations between parental depression and SCQ scores ($B=0.229, P<0.05$).

Conclusion Our findings revealed that there was a significant association between parental depression and both screen time exposure and SCQ score, while there was no correlation between screen time exposure and SCQ score.

Keywords Screen time, Parents' depression, Developmental skills, Social skills, Communications skills, Neurodevelopment

Introduction

Screen time exposure in children continues to increase globally [1] and has doubled between the ages of 0 and 2 years. The average age of first exposure to electronic screens was reported to be 4 months [2]. It negatively affects children of developmental age, leading to

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obesity, poor attention, sleep disorders, vision problems, language delays, and defects in communication skills [3–5]. Children who stay for a long time on electronic screens will lose their opportunity to engage in verbal dyadic exchanges that have a strong promotion in improving communication skills and developing language [3, 6]. The World Health Organization recommends that children aged 1 year or younger should not be exposed to screens; moreover [7], from 4 to 6 years, screen time should not exceed 1 h per day [3]. The American Academy of Pediatrics recommends restricting screen exposure and social media use. Age should be at least one and a half years to balance the risks and benefits [7].

Studies have found that exposure to screens at a younger age can lead to neurochemical and anatomical changes that result in behavioral and social communication problems in children [4, 8]. Therefore, children exposed to screens for more than 3 h per day will have a high risk of developing a defect in communication and language delay [4]. Another study reported a decrease in boys' prosocial skills compared with girls, which was reflected by increased screen exposure. In addition, a few studies applied in Saudi Arabia to detect the most common electronic screen to be used showed that the most used device is a television, with a duration of more than 4 h a day [3]. An exciting study in the Qassim Region of Saudi Arabia mentions the impact of electronic exposure on children proportionally with low social skills and relations and rare face-to-face interaction [9]. Parents' psychopathology greatly affects their children's behavior and functioning. Children who have parents with personality disorder symptoms, anxiety, depression, and substance use at age three will have poor functioning and social skills at age 6. The presence of more than one type of psychopathology in parents is associated with poorer functioning, behavior, and social skills at age 6 [10].

There are varied findings regarding the correlation between children's screen time and parental depression. A systematic review found no evidence of an association between screen time for children and depression in parents. However, screen time was moderately associated with parental screen time, television in the home, and monitoring screen time [1].

We conducted this study to investigate the association between screen time exposure, parent depression, and social communication in children in the Qassim Region of Saudi Arabia and identify the risk factors that affect their social skills development. Thus, the current study aimed to identify and clarify the relationships between these elements.

Materials and methods

A cross-sectional study was conducted to examine the correlation between the development of social skills in preschool children and their exposure to screen time, utilizing a validated Arabic version of the Social Communication Questionnaire (SCQ) [11]. Additionally, the investigation sought to explore the relationship between parental depression, the development of social skills, and screen time exposure using the (PHQ9) Questionnaire [12]. The sample comprised 340 children aged between 4 and 6 years, gathered through a multi-step process. Initially, the researchers visited seven primary health-care centers in Buraydah: Al-basateen, Ar-rubayyah, Ash-shimasiyah, An-naqa, Al-salimiyyah, As-sadah, and Ash-shmmas, offering vaccinations for the specified age group. Subsequently, the medical records of eligible patients were obtained, and consent from the Ministry of Health was obtained to access participants' phone numbers. Phone numbers were extracted from records and entered into a digital database. The data collectors, along with the participants, ensured that informed consent was obtained after elucidating the study's goals and methods.

Study design

The Social Communication Questionnaire (SCQ) comprises 40 items, while the Patient Health Questionnaire-9 (PHQ9) consists of 9 items. Validated Arabic versions were used for both questionnaires. The SCQ, a parent-reported scale, demonstrated high reliability, with a Cronbach's alpha coefficient of 0.916, along with notable sensitivity (0.796) and specificity (0.966). The 40 dichotomous items used "yes" and "no" as response options. While Item 1 assesses the child's ability to speak with short phrases or sentences, Items 2 through 40 contribute to the scoring. Items 2, 9, and 19 through 40 are negatively worded, with a score of 1 for "no" responses and 0 for "yes." This eliminated the need for score reversal. For other items (Items 3 to 8 and 10 to 18), a score of 1 is assigned for "yes" and 0 for "no." The PHQ-9, a self-reported scale, exhibited good reliability, with a Cronbach's alpha of 0.857. All items except item 9 (suicidal ideation) contributed positively to the total scale of Cronbach's alpha. Item deletion decreased alpha, and all items correlated well with the total scale (lowest $r=0.378$). Inter-item correlations ranged from 0.177 to 0.648.

Statistical analysis

R v 3.6.3 was employed for statistical analysis. Categorical variables were summarized as counts and percentages, while means \pm standard deviation or median/interquartile ranges were used to describe the distribution of normal and non-normal continuous variables. The chi-squared

Table 1 SCQ scores

SCQ scores	Count, n (%)
SCQ ≤ 15	280 (82.4%)
SCQ > 15	60 (17.6%)
Total	340

Table 2 Association between screen time exposure and SCQ scores: a cross-tabulation with chi-square analysis

Screen time exposure ^a	Count (%)		p value
	SCQ ≤ 15	SCQ > 15	
Less than 1 h/day	41 (85.4)	7 (14.6)	0.1866
1–2 h/day	115 (85.8)	19 (14.2)	
3–4 h/day	89 (81.7)	20 (18.3)	
More than 5 h/day	51 (73.9)	18 (26.1)	

^a Multiple responses

test was used to explore the associations between categorical variables. Linear regression was used to assess factors associated with higher total SCQ scores. Hypothesis testing was performed at the 5% significance level.

Results

The study survey was completed by the caregivers of 340 children. The majority of respondents in the study survey were parents of 6-year-olds, comprising 46.2% of the total. In contrast, those with 4-year-old children accounted for 32.7%, and 5-year-olds represented 21.2% of the study sample. The majority have more than one child (47.7%) while 33.3% have two children and about 19% have only one child. Regarding the occupation of the caregivers, 29.3% of the respondents are housewives or unemployed, while 70.7% had a full-time job.

Table 1 of SCQ scores shows that out of the total valid responses (340), 280 responses fall into the category of “SCQ ≤ 15.” This represents 82.4% of the valid responses. On the other hand, the “SCQ > 15” category consists of 60 responses, accounting for 17.6% of the valid responses.

Table 2 shows a trend of increasing percentages of individuals with higher SCQ scores as daily screen time increases. For instance, among those who spent less than 1 h per day on screens, 85.4% had an SCQ score of 15 or lower, which suggests typical development. This number drops slightly to 81.7% for those in the 3–4-h screen time category. The most notable change is seen in the “More than 5 h/day” category, where only 73.9% have an SCQ score of 15 or lower, with the remaining 26.1% scoring higher. However, this association was not statistically significant ($p=0.1866$). Further research is required to

Table 3 Association between screen children’s age and SCQ scores: a cross-tabulation with chi-square analysis

Children’s age	Count (%)		p value
	SCQ ≤ 15	SCQ > 15	
4	90 (81.1)	21 (18.9)	0.312
5	55 (77.5)	16 (22.5)	
6	135 (85.4)	23 (14.6)	

Table 4 Depression severity among parents

		Count (%)
Severity of symptoms	Non or minimal	124 (36.5)
	Mild	91 (26.8)
	Moderate	64 (18.8)
	Moderately to severe	43 (12.6)
	Severe	18 (5.3)
Parental diagnosis of depression	Not depressed	292 (85.9)
	Depressed	48 (14.1)

solidify the connection between screen time and social communication.

Table 3 shows that in the “SCQ ≤ 15” category, 90 participants (81.1%) were 4-year-olds. Additionally, 55 participants (77.5%) were 5-year-olds, and 135 (85.4%) were 6-year-olds. In the “SCQ > 15” category, 21 participants (18.9%) were 4-year-olds. Additionally, 16 participants (22.5%) were 5-year-olds, and 23 (14.6%) were 6-year-olds.

Table 4 shows the distribution of depression severity among parents. More than one-third (36.5%, $n=124$) of the parents reported no or minimal symptoms. The remaining parents exhibited a range of depression severities, with mild (26.8%, $n=91$) and moderate (18.8%, $n=64$) being the most common categories. A smaller portion fell into the moderately severe (12.6%, $n=43$) and severe (5.3%, $n=18$) categories. Regarding depression diagnoses, 85.9% ($n=292$) of parents were classified as not depressed, whereas 14.1% ($n=48$) were diagnosed with depression. This suggests that a significant number of parents experience some level of depressive symptoms, with a smaller portion meeting the criteria for a clinical diagnosis.

Table 5 reveals significant associations between parental depression and SCQ scores among the children. Children with depressed parents had a significantly higher proportion of scores exceeding 15 (30%) than those without depression (10.7%), suggesting a potential link between parental depression and increased SCQ in children ($p=0.00$). Meanwhile,

Table 5 Association between parental severity of depression and whether their child has SCQ and the correlation of screen time exposure in contributing to a mood disorder such as depression in parents using the chi-square test

		Parental diagnosis		p value (chi-square)
		Not depressed	Depressed	
		Count (%)		
Children SCQ	SCQ ≤ 15	250 (89.4)	30 (10.7)	0.00
	SCQ > 15	42 (70)	18 (30)	
Screen time exposure in a day**	Less than 1 h/day	46 (95.8)	2 (4.2)	0.1965
	1–2 h/day	114 (85.1)	20 (14.9)	
	3–4 h/day	91 (83.5)	18 (16.5)	
	More than 5 h/day	58 (84.1)	11 (15.9)	
Children's age	4 years	92 (82.9)	19 (17.1)	0.002
	5 years	54 (76.1)	17 (23.9)	
	6 years	146 (92.4)	12 (7.6)	

** How many hours per day

there was a slight upward trend in SCQ scores with increased screen time; however, this association was not statistically significant ($p = 0.1965$). Moreover, age emerged as a significant factor, with 4-year-olds exhibiting a significantly higher proportion of elevated SCQ scores ($p = 0.002$) than 5- and 6-year-olds. These findings underscore the potential influence of parental depression and age on preschool children's social communication skills.

Table 6 presents the results of a binary logistic regression model that investigated the association between parental depression and children's Social Communication Questionnaire (SCQ) scores. For children with SCQ scores exceeding 15, the coefficient estimate for parental depression was 1.273, with a standard error of 0.342, a Wald statistic of 13.886, and a statistically significant p value of 0.000. This indicates that children with parents experiencing depression were 3.571 times more likely to have SCQ scores above 15 compared to children without parental depression (95% C.I. 1.828 to 6.976). The constant term in the model was -2.120 , with a standard error of 0.193 and a statistically significant p value of 0.000, suggesting that even when parental depression is absent, there is still a significant association with SCQ scores exceeding 15 (OR = 0.120).

Discussion

There is a scarcity of literature on the association between screen time exposure, parental depression, and the development of social communication skills among preschool children in the Qassim Region of the Kingdom of Saudi Arabia. Our study revealed a lack of significant correlation between screen time exposure and high Social Communication Questionnaire (SCQ) scores, contradicting previous research that found a positive association. A significant correlation between prolonged electronic device use and SCQ scores ≥ 15 was demonstrated by Alrahili et al. [3]. Furthermore, a study conducted by Sarfraz et al. contributes a broader perspective by exploring early screen time exposure and its association with the risk of developing autism spectrum disorder (ASD) [13]. Our study complements this by narrowing the focus to a specific social communication domain. These findings reflect the critical role of considering both the timing and duration of screen time exposure in developmental outcomes [14, 15]. Moreover, the relationship between screen time and ASD characteristics, as explored by Dong et al., revealed that children with ASD tend to have longer screen time, and this is positively correlated with specific measures of ASD, highlighting the intricate connection between screen exposure and various developmental aspects [16]. A study in the Qassim Region of

Table 6 Binary logistic regression analysis of parental depression and children's SCQ scores

	Coefficients	S.E	Wald	df	p value	OR	95% C.I for OR	
SCQ ≤ 15	Reference group							
SCQ > 15	1.273	0.342	13.886	1	0.000	3.571	1.828	6.976
Constant	-2.120	0.193	120.416	1	0.000	0.120		

Saudi Arabia showed that electronic exposure affects children proportionally, with low social skills and relations and rare face-to-face interactions [9]. It is crucial to conduct additional research to validate our findings and to explore the factors behind the discrepancies observed in other studies. This will help establish robust conclusions and advance our understanding of this topic.

We found that depression was significantly associated with screen exposure, which aligns with the findings of Park et al., who also reported an association between maternal depression and children's television overuse [17]. A possible mechanism behind this association is that maternal depression frequently poses unique parenting difficulties. Mothers who are depressed may have trouble forming emotional bonds with their children, find it challenging to set consistent boundaries, and have a decreased ability to actively play and engage with them [17]. In addition, women who experience depression may rely more heavily on television as a way to occupy their children, offering a momentary break while dealing with their depression symptoms [17]. Moreover, Parents with depression may have poor screen time habits, which could influence their children's screen time behavior by observing and imitating their parents. There is evidence that depression in adults is associated with increased screen time [18]. A meta-analysis of cohort studies showed an association between screen time and depression in adults; specifically, screen time was found to be a predictor of depression among adults [19]. Children's imitation of their depressed parents' poor screen time behavior is theoretically explained by Bandura's social learning theory, which proposes that learning occurs by observing and imitating other people's behavior [20]. It has been shown that excessive screen time will lead to unpleasant results such as low academic performance, obesity, sleep disorders, aggressive behavior, social problems, and limitations in cognitive functions [17, 21]. Interventions addressing maternal depression may have broader implications for reducing children's screen time, as suggested by the association between maternal depression and television overuse [17].

The present study showed an association between depression in parents and children's high social communication questionnaire scores. The Social Communication Questionnaire (SCQ) is a parent-report screening measure for autism spectrum disorders (ASDs) based on the Autism Diagnostic Interview-Revised (ADI-R) [22]. Mothers of children with autism spectrum disorder (ASD) consistently report significantly higher levels of depressive symptoms than mothers of typically developing children or mothers of children with other disabilities, according to studies that have evaluated depression

among parents of children with ASD [23]. This study shows associations rather than causality; thus, further research is required to determine causality.

The observed associations between screen time exposure, parental depression, and social communication skills among preschool children in the Qassim Region emphasize the need for targeted interventions. Educational programs addressing parental mental health, particularly maternal depression, should be integrated into interventions to promote healthy screen-time habits and enhance overall family well-being [24].

In terms of future research, there is a need for a deeper exploration of the relationships identified in this study. Investigating the specific content and context of screen time activities could provide insights into the varying impacts of different screen activities on social communication skills. Longitudinal studies that track depression among parents and developmental outcomes over time would offer a more comprehensive understanding of the nature of these associations.

Limitations

This study had some limitations. The research focused on a specific region, Qassim, which may limit the generalization of the results to broader populations with distinct cultural or socio-economic contexts. Additionally, since some participants (14%) may have a diagnosis of depressive disorder, this could introduce bias regarding their evaluation of their children's screen time and social communication skills. Permitting a multiple-response format for the screen time question, where participants can choose more than one answer, might have introduced masking of a significant correlation between screen time exposure and high Social Communication Questionnaire (SCQ) scores. We recommend that future studies employ a single-response format for this question to improve data clarity. The cross-sectional nature of the study design restricts the establishment of causal relationships between variables, making it challenging to discern the directionality of the associations. Recognizing these limitations underscores the need for caution when interpreting the findings, and emphasizes avenues for future research to address these limitations and further enhance our understanding of the complex interplay between screen time, parental well-being, and child development.

Conclusions

The present study revealed an association between depression in parents and their children's screen time and high social communication scores. No association was found between screen time and high social communication questionnaire scores. This finding emphasizes the

need for preventive interventions and further research to determine the causative relationship through prospective studies.

Abbreviations

SCQ Social Communication Questionnaire
PHQ9 Patient Health Questionnaire-9

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Authors' contributions

First author A.A.: idea generation, manuscript writing, proposal, and manuscript revision. Second author R.I.A.: literature review, proposal writing, manuscript writing, survey design, and data collection. Third author Y.F.A.: literature review, data collection, and manuscript writing. Fourth author M.A.: literature review, proposal writing, and manuscript writing. Fifth author R.A.: literature review, data collection, and manuscript writing. H.A.: statistical analysis. Sixth author M.S.: statistical analysis. All authors have read and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the ethics committee of Qassim on 13/9/2023. Informed written consent was obtained from all participants. Each student was required to click "agree" on the consent web page before filling out the survey. Qassim health cluster approval and consent to data access were also obtained.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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