Original paper

"Screen addiction" among children and adolescents and the self-efficacy of mothers in screen use management during the COVID-19 lockdown in Sri Lanka

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Abstract

Background

The prevalence of problematic screen use (PSU) or "screen addiction" among children and adolescents may have escalated during the COVID-19 pandemic. The self-efficacy of the mothers in managing screen use in their children may play an important preventive role in children developing PSU.

Aims

This study aimed to assess PSU among children aged 4-18 years during the lockdown period imposed during the COVID-19 pandemic and to explore the association between PSU and self-efficacy of mothers in managing screen use.

Methods

An online survey was conducted using social media groups among mothers of children aged 4-18 years. The PSU in their children was measured using the Problematic Media Use Measure (PMUM), and maternal self-efficacy in managing screen use was assessed using the Parental Screen Use Management Scale (PSUMS). The two questionnaires were translated and validated into Sinhala prior to this study.

Results

A total of 320 mothers responded to the survey. Based on the PMUM cut-off score, 25.3% of the children were found to have PSU. PSU was inversely correlated with maternal self-efficacy in managing screen use (r=-0.63, p<0.001). All three subscales of the PSUMS; reactive management (r=-0.56, p<0.001), proactive management (r=-52, p<0.001), and monitoring (r =-45, p<0.001), were significantly correlated with PSU. Younger age at screen use onset showed a marginal correlation (rho=-0.11, p=0.05) with PSU. The child's age, gender and the educational level of the mother were not associated with PSU.

Conclusion

Maternal self-efficacy in managing screen use among children was associated with lower PSU in children.

Keywords: screen addiction, screen time, children, adolescents, parenting, mothers, self-efficacy

Introduction

Screen time among children and adolescents has been reported to have risen during the COVID-19 pandemic as they became confined to homes and shifted to online education (1,2). In addition, the children would have increasingly sought entertainment through screen devices to reduce their boredom and loneliness experienced during the lockdown and the liberal access to screen devices may have facilitated this (3).

The American Academy of Child and Adolescent Psychiatrists and the World Health Organization strongly recommend limiting activities that include screens (4,5).

"Screen addiction" is a relatively new construct, which broadly encompasses addiction to a wide range of devices and applications, and has been defined as the "excessive, uncontrolled, and compulsive media consumption using screen media devices" (6).

Similar to the conceptual debates over the use of the terms "addiction" versus "problematic use" in relation to other digital addictions, "problematic screen use" (PSU) has been suggested as an alternative term for screen addiction (7,8). The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) proposes the presence of five out of the nine criteria to diagnose internet gaming disorder (IGD), and these have provided

guidance in defining and operationalizing other screen-based behavioural addictions (8-11). Scales that assess screen addiction, appear to extrapolate from the DSM-5 diagnostic criteria for IGD, which include preoccupation about gaming, withdrawal symptoms, tolerance, unsuccessful attempts to control, loss of interest in previous hobbies, continued use despite known harm, deception regarding the amount of gaming, using gaming to relieve negative moods, and jeopardizing significant relationships, job or educational opportunities (11).

A study conducted in India that studied children aged between 8 months and 12 years attending a paediatric out-patient department revealed that the prevalence of "screen addiction" was 28% and that the majority of those addicted were boys (12).

Parents are found to play a vital role in managing problematic screen use among children and they are reported to use one or more of the following strategies for mediation in media use (13,14). In restrictive mediation, they use rule-setting, and in active mediation, explanations and discussions are used as instructive strategies (14). However, the third type, i.e. co-use, where the parent would join the child at times of screen use, has been debated as a useful strategy (14).

Parental mediation behaviours are predicted by self-efficacy and higher parental self-efficacy has been shown to be associated with lower smartphone addiction among children (14,15,16). A scale assessing parental self-efficacy in smartphone use management has been developed recently and this has enabled research in this area (16). The authors of this scale have demons-trated that self-efficacy in smartphone use management comprised three domains, namely, reactive management, proactive management, and monitoring (16). Reactive management is consistent with restrictive mediation, whereas proactive management conforms to active mediation. The third domain, i.e. monitoring, refers to parents' behaviour in monitoring what their children do on their smartphones, whom they talk with, what applications they use, and the websites they visit.

In most Sri Lankan households, mothers tend to play the central role in managing the affairs of their children. Therefore, higher maternal self-efficacy in managing screen use in children can be hypothesized to be inversely correlated with screen addiction among children.

This study aimed to assess PSU among children aged 4-18 years as reported by mothers and to examine its correlation with maternal self-efficacy in managing screen use.

Methods

This study had two stages. In the first stage, the questionnaires that were to be used in the study were validated and in the second stage, the correlational study was conducted. The two stages were conducted from July to October 2021, in an online survey among Sri Lankan mothers of children aged 4-18 years. They were invited to participate in the study through social media groups (e.g. Facebook and WhatsApp groups) created for Sri Lankan mothers, and through other social media contacts of the investigators. Informed consent was obtained in the online survey form from each participant. Ethical approval was obtained from the Ethics Review Committee of the Lady Ridgeway Hospital for Children, prior to study commencement.

A minimum of 100 to 150 participants are generally required for confirmatory factor analysis (CFA) (17). Therefore, 162 participants were included in the validation stage of the questionnaires. For the correlational study, the minimum sample size needed to achieve a power of 95%, alpha of 5% and a correlation coefficient of 0.35 based on a previous study was 100 (16).

We translated the scales into Sinhala and Tamil using the guidelines by Beaton and colleagues (18). The English-language scales were forward translated by two independent bilingual translators. Consensus versions were created, and they were back-translated to English by independent bilingual translators. The back-translations were then compared and discussed by a panel that included a consultant child and adolescent psychiatrist, bilingual experts, and other members of the research team, and discrepancies were resolved through discussion. The pre-final version was pretested among mothers of 15 children admitted to a specialized children's hospital before the proper validation stage commenced. Only two participants responded to the Tamil translation of the scales, therefore, a statistical exploration of its psychometric properties could not be conducted. Due to the above reason, the Tamil versions were not used in the second stage.

In the correlational study, a Google form with three sections was made available in Sinhala and English. In the first section, we collected the age and sex of the child, as well as the mother's education; the daily screen time and first age at screen use were recorded using ordinal scales; the perceived impact of the pandemic on their child's education was rated by the mothers on a 5-point Likert scale ranging from not affected at all (1) to very significantly affected (5); and the satisfaction with online education was rated from highly unsatisfied (1) to highly satisfied (5).

The second section consisted of the Problematic Media Use Measure (PMUM)-Short form, a parent-report measure of PSU or "screen addiction" among children aged 4-11 years (8). Although the PMUM was developed focusing those aged 4-11 years, previous researchers have determined that it is applicable to adolescents as

well (19,20). PMUM has two versions and both are found to have high internal consistency (Cronbach α=0.97 and α=0.93, respectively) (8). We selected the shorter version with nine items as it would take a shorter time to complete. Responses were recorded on a 5-point Likert scale, ranging from never (1) to always (5). Previous studies have used a total score of 27 or above (out of 45) as the threshold for a positive screen for PSU (20).

The third section of the questionnaire was adapted from the Parental Smartphone Use Management Scale (PSUMS), which is a 17-item scale measuring the parents' perceived self-efficacy in managing their children's smartphone use (16). Although it was originally developed for parents of children with attention deficit hyperactivity disorder (ADHD), subsequent authors have found the scale applicable to children in general (21). The term "smartphone" was replaced by "screen media" in each question to suit the purpose of the present study. A 7-point Likert scale ranging from no efficacy at all '0' to very strong efficacy '6' was used. Adequate construct validity, criterion validity, and reliability have been demonstrated. Factor analysis has delineated three factors or subscales: reactive management, proactive management, and monitoring. Their internal consistencies (Cronbach α=0.93-0.95) have been excellent.

Data analysis was performed using SPSS version 21 and R Studio. At the validation stage, the construct validity of each scale was tested using CFA. For PMUM, the known one-factor model (8) was tested, and for PSUMS, the three-factor model (16) was tested. CFA was performed using lavaan on RStudio. Model fit was assessed using five goodness-of-fit indices: the ratio of chi-square to degree of freedom (χ^2/df), comparative fit index (CFI), Tucker Lewis Index (TLI), standardized root mean square residual (SRMR) and root mean square error of approximation (RMSEA). A good model fit was indicated by χ^2/df < 3, CFI or TLI values ≥0.95, SRMR ≤0.08, and RMSEA ≤0.06 (22). The internal consistencies of the scales and subscales were assessed using Cronbach alpha.

For the correlational analysis, the PSUMS total score, subscale scores and PMUM score were calculated by summing the relevant item scores. Normality tests were performed on these outcome variables to determine whether to use parametric or non-parametric tests of associations. Pearson or Spearman correlation tests were used accordingly. The t test was used to compare means across binary groups for parametric data, and the Mann Whitney U test was used for the non-parametric data. Moderator analysis was performed using PROCESS Macro in SPSS. P values less than 0.05 were considered significant.

Results

Validity and reliability of PMUM

CFA of the one-factor model for PMUM showed excellent fit indices indicating that PSU was a unidimensional construct [χ^2/df=1.3, CFI=0.998, TLI=0.998, RMSEA=0.044, SRMR=0.057]. Factor loadings ranged from 0.474 to 0.922 (Figure 1), and all of them were statistically significant (p<0.001). Internal consistency of the scale was good (Cronbach alpha=0.894).
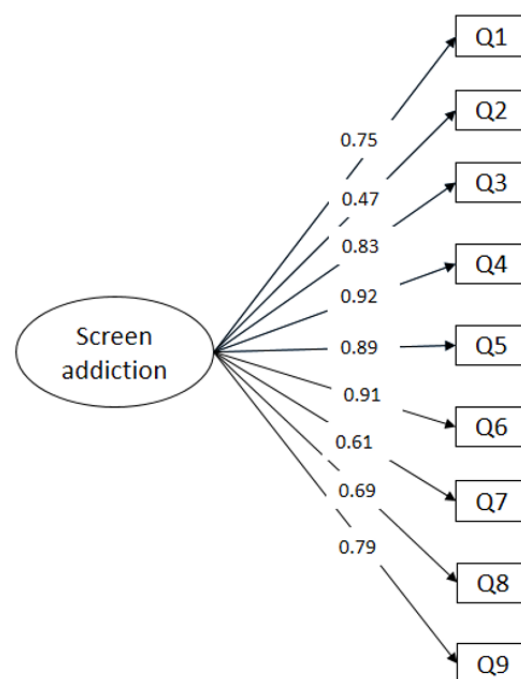

Figure 1. One-factor structure of the Problematic Media Use Measure (PMUM), with factor loadings based on confirmatory factor analysis.

Validity and reliability of PSUMS

CFA of the three-factor model of PSUMS showed excellent fit indices, indicating that mothers' self-efficacy in managing screen use in children could be parsed into three domains [χ^2/df=1.6, CFI=0.994, TLI=0.993, RMSEA=0.062, SRMR=0.071). Factor loadings ranged from 0.526 to 0.96 (Figure 2), and all of them were statistically significant (p<0.001). The full PSUMS scale had good internal consistency (alpha=0.897). The internal consistency (alpha) of the reactive management, proactive management, and monitoring subscales were 0.823, 0.826 and 0.829 respectively.

Sociodemographic characteristics

A total of 320 mothers responded. Among their children, 55.4% (n=175) were male. The mean age was 8.3 years

(SD=3.9, range=4 to 18 years). The median number of children in the family was two. The majority of the respondents (59.7%) had graduate or postgraduate educational qualifications. The sample characteristics are summarized in Table 1.
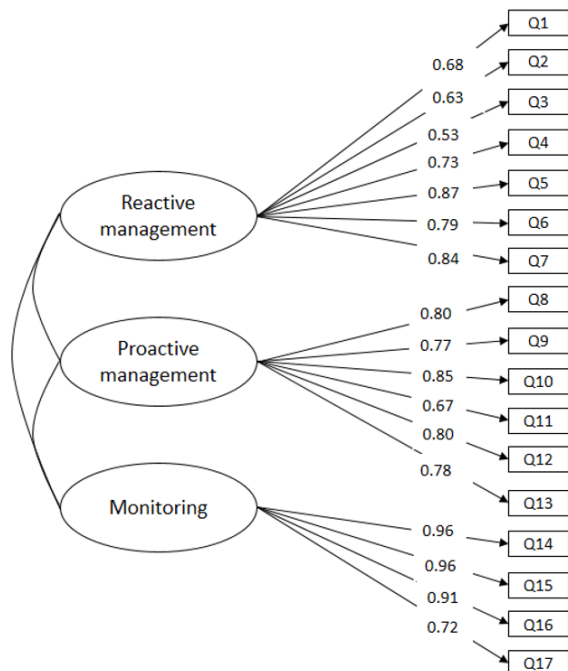

Figure 2. Three-factor structure of the Parental Screen Use Management Scale (PSUMS), with factor loadings based on confirmatory factor analysis.

Screen use patterns among children

Out of all the children, 38.6% (n=123) had over 4 hours of daily screen time. Daily screen time increased with the child's age (rho=0.463, p<0.001). More than two-thirds (67.4%) of adolescents (≥11 years) spent over 4 hours/day on screens according to mothers, in contrast to 27.9% of younger children (<11 years). Among adolescents, 13% (n=11) spent more than 10 hours/day on screens; the corresponding percentage for younger children was 0.9% (n=2).

The mean screen addiction (PMUM) score was 21.16 (SD= 7.4). PMUM scores were approximately normally distributed (Figure 3; p=0.106 in Kolmogorov-Smirnov). Based on the PMUM cut-off (≥27), 25.3% (n=81) of the sample had PSU. Among adolescents, 31.8% had PSU, compared to 22.6% among younger children; however, this difference was not statistically significant (χ^2=2.8, p=0.09).

The association between PSU and maternal self-efficacy in managing screen use in children

Mean maternal self-efficacy (PSUMS full scale) score was 81.7 (SD=15). PSUMS scores were not normally distributed (p=0.001 in Kolmogorov-Smirnov). The subscale scores for reactive management, proactive management and monitoring (averaged per item) were 4.8 (SD=1.1), 4.5 (SD=1.1) and 5.3 (SD=1.1) respectively.
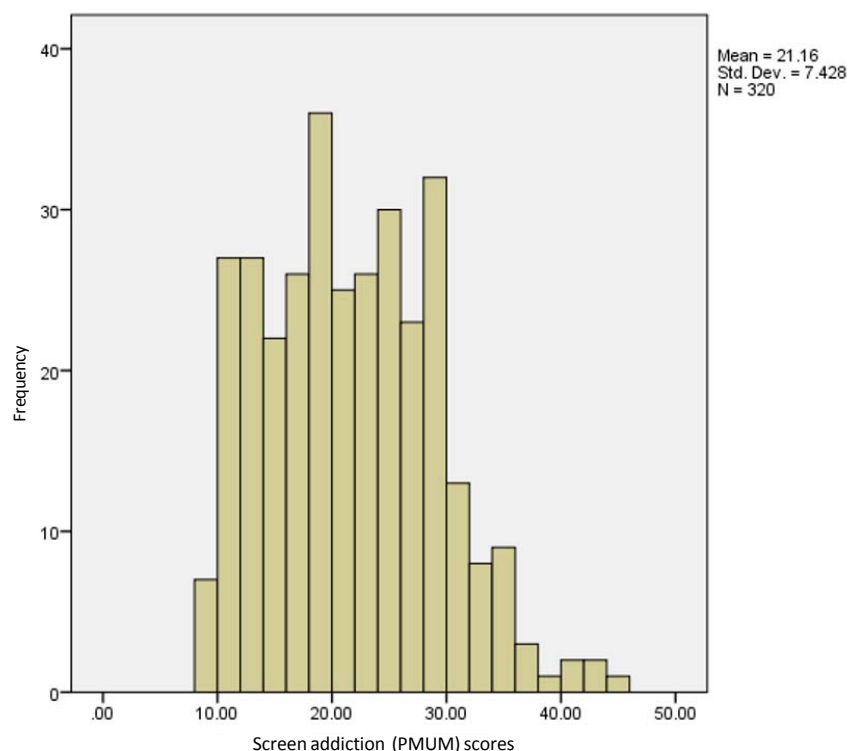

Figure 3. Distribution of screen addiction scores based on the Problematic Media Use Measure.

Table 1. Sociodemographic and screen use characteristics of the sample (n=320)		
Characteristics		n (%)
Age group	Children 4-10 years	230 (72.3%)
	Adolescents >11 years	88 (27.7%)
Gender	Male	175 (55.4%)
	Female	141 (44.6%)
No. of children in the family	One	90 (28.3%)
	Two	166 (52.2%)
	Three	59 (18.6%)
	Four	3 (0.9%)
Maternal education	Primary	14 (4.4%)
	Ordinary level	23 (7.3%)
	Advanced level	78 (24.6%)
	Basic degree/diploma	127 (40.1%)
	Postgraduate	75 (23.7%)
Age at screen use onset	<2 years	74 (23.3%)
	2-4 years	121 (38.1%)
	5-7 years	50 (15.7%)
	8-10 years	32 (10.1%)
	>10 years	41 (12.9%)
Daily total screen time	< 1 hour	50 (15.7%)
	1-3 hours	145 (45.6%)
	4-6 hours	86 (27%)
	7-9 hours	24 (7.5%)
	≥ 10 hours	13 (4.1%)
Device/s used by child	Laptop	174 (54.3%)
	Smartphone	161 (50.3%)
	Tablet	63 (19.7%)
	Desktop	25 (7.8%)
Has the pandemic affected child's scholastic performance?	Affected	190 (61.1%)
	Undecided	46 (14.8%)
	Not affected	75 (24.1%)
Are you satisfied with your child's online education?	Satisfied	205 (68.1%)
	Undecided	49 (16.3%)
	Unsatisfied	47 (15.6%)

PSU was negatively correlated with maternal self-efficacy in managing screen use (r=-0.63, p<0.001). All three subscales - reactive management (r=-0.56, p<0.001), proactive management (r=-52, p<0.001), and monitoring (r=-45, p<0.001) - showed significant negative correlations with PSU. In a hierarchical multiple linear regression, the three PSUMS subscales contributed independently to the variance in PSU (p<0.001), indicating the incremental validity of each dimension. In moderator analyses, neither age (interaction coefficient=-0.0002, p=0.97) nor sex (interaction coefficient=-0.0112, p=0.79) significantly moderated the relationship between PSU and maternal self-efficacy.

Other factors associated with PSU

Table 2 summarizes the factors associated with PSU. Younger age at first screen use was marginally associated with higher PSU (p=0.05). PSU correlated significantly with parent-reported screen time (p<0.001), greater perceived impact of the pandemic on scholastic performance (p<0.001) and lower maternal satisfaction with online education (p<0.001).

Factors associated with maternal self-efficacy in managing screen use in children

Mothers of older children (rho=-0.137, p=0.014) and male children (p=0.042) had lower self-efficacy in managing screen use in children. Higher maternal education was also associated with lower self-efficacy (rho=-0.148, p=0.008). Higher maternal self-efficacy was associated with lower screen time (rho=-0.317, p<0.001), lower perceived impact of the pandemic on scholastic performance (rho=-0.204, p<0.001) and higher satisfaction with online education (rho=0.226, p<0.001). The number of children in the family was not associated with maternal self-efficacy.

Table 2. Factors associated with problematic screen use ("screen addiction") among children and adolescents			
Predictor variable	Correlation	Group mean	Significance
Maternal self-efficacy (PSUMS-total)	r=-0.63		p<0.001
PSUMS- Reactive management	r=-0.56		p<0.001
PSUSMS-Proactive management	r=-0.52		p<0.001
PSUMS-Monitoring	r=-0.45		p<0.001
Child's age	r=0.11		p=0.051
Sex Male		21.8	p=0.097[a]
Female		20.4	
Maternal education[b]	rho=0.083		p=0.139
No. of children in the family	rho=-0.019		p=0.743
First age at screen use[b]	rho=-0.11		p=0.05
Daily screen time[b]	rho=0.367		p<0.001
Impact of pandemic on scholastic performance[b]	rho=0.28		0.001
Maternal satisfaction with online education[b]	rho=-0.23		p<0.001

Note: [a]signficance based on the t-test; [b]measured using an ordinal scale.

Discussion

This study was conducted among Sri Lankan mothers with children aged 4-18 years regarding screen use patterns during a period of school closure. Problematic screen use was reported among a quarter of the sample. We also found that higher maternal self-efficacy in managing screen use in children was linked to lower PSU in children which was independent of the child's age or sex.

Our findings suggest that self-efficacy of mothers in managing screen use among children may have played a protective role against "screen addiction" in children. This is consistent with the "protection motivation theory", which posits that parents with greater self-efficacy are more likely to engage in mediation behaviours (14). Conversely, mothers of children with higher PSU may have felt they had failed at managing their child's screen use, leading to lower perceived self-efficacy, thereby introducing reciprocal effects into the relationship between mothers' self-efficacy and PSU in the child.

In our study, we did not find a significant difference in PSU depending on the gender of the child. Previous reviews addressing gender differences in digital addictions show conflicting results, with some reviews indicating male gender as a risk factor, while others report the opposite (23-25). We found that self-efficacy in managing screen use was lower in mothers of male children, however, a previous study on the same topic reports that the child's gender was not a significant predictor (26). Some studies indicate that parental monitoring of screen use is more important for male than female children (27).

Contrary to previous observations, mothers with higher education displayed lower self-efficacy in managing screen use (27). One possible explanation is that mothers who are more educated were more likely to be employed during the pandemic, and may have found it difficult to supervise the child's screen use, resulting in lower perceived self-efficacy.

In our study, almost two- thirds (61.3%) had started to use screens before 4 years of age. This has important implications since younger age at screen use onset has been linked to adverse neurodevelopmental outcomes (28). Our findings also showed that children with earlier onset of screen use were more likely to have PSU. However, recall bias limits the validity of this finding.

As anticipated, children who were "addicted to screens" showed greater perceived deterioration in their scholastic performance during the pandemic. This highlights the importance of taking measures to manage screen addiction in children. Even though schools have reopened, children who became addicted to screens during the lockdown may find it difficult to recover from this addiction.

Limitations

One main limitation of the study was the sample being acquired primarily through social media platforms, which may have resulted in sampling bias. The majority of mothers had graduate or postgraduate educational qualifications, and therefore, we cannot generalize the findings to all mothers in Sri Lanka. Due to the cross-sectional design, we cannot draw causal inferences regarding the observed correlations. Our results are limited to mothers' perceptions, but fathers may also have played a part in managing children's screen use. As some constructs such as the deterioration in academic performance during the pandemic and maternal satisfaction with online education were measured using single questions employing ordinal scales, the validity of these assessments is limited.

Conclusions

Our study found a notable prevalence of problematic screen use among children and adolescents during school closure in Sri Lanka and highlights the importance of taking measures to manage screen addiction in children.

Acknowledgements

Declaration of interest

None declared.

Statement of contributions

All authors contributed to the conceptualization and design of the study, and to acquisition of data. AB curated the data, conducted the data analysis, and wrote the first draft of the manuscript. SW supervised the study. All authors approved the final version of the manuscript.

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