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Predictors of Screen Media Use among Children Aged 3 - 13

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Abstract

Determining the predictors of screen media use will assist nurses and clinicians to identify the children that are in most need for intervention. There is limited literature regarding the predictors of screen media use among children. This study aimed to examine the association between selected predictors and screen media use among children aged 3 - 13. The findings of this study are based on 192 children aged 3 - 13 and their caregivers recruited from Facebook and WhatsApp groups. A descriptive cross-sectional design was employed. The participants filled a demographic questionnaire and the Problematic Media Use Measure Short Form to obtain data about parents' and children characteristics, screen time and problematic use of media. The screen time for 83% of the children was more than two hours. Mobile ownership (beta (β) = 0.22) and conflict about mobile use (beta (β) = 0.16) have significantly predicted the child total screen time. Child age (beta (β) = 0.17) and conflict about mobile use (beta (β) = −0.33) have significantly predicted the problematic use of media. Most children in the current study exceeded the recommended screen time. There is an urgent need to implement interventions that mitigate children's excessive use of media.

Keywords

Screen Time, Problematic, Media, Children, Predictors

1. Introduction

Electronic media use has become an integral part of the lives of the current generation [1]. In the last two decades, the explosion in portable screen media technology and the availability of internet access [2] have led to the rapid spread and extensive use of screen media among youth. The majority of households have televisions, smartphones, and tablets [3]. The portability, small size, interactivity,

and low price of handheld devices, among other qualities, have made them very popular [4] [5].

Children start using mobile devices at a very young age, often before the age of one year [3] [6] [7]. In one study, 20.6% of children who had used a mobile device were between the ages of one and twelve months [6]. Even children from economically challenged households use new technologies such as smartphones and other interactive media [7] [8]. In low-income minority communities, the majority of children have their own device by the age of four [3]. According to a comparison of children's media use across the globe, children from Arabic-speaking countries used mobile devices at high rates [9]. For instance, Bahraini children used mobile phones at the highest rates compared to children from Japan, the Philippines, and Honduras [9]. Another study that looked into the use of mobile phones among children from Algeria, Egypt, Saudi Arabia, and Iraq found that 81% of children use mobile phones, with Saudi children having the highest rates of use (85%) [10].

The number of articles assessing young children's screen use that are published each year has more than doubled [11]. The increase in publications from year to year shows the growing scientific curiosity about tackling this phenomenon and defining the effects of screen time on young children's health and development [11]. Within this context, an increasing amount of evidence shows that excessive use of media has detrimental developmental, physical, and psychosocial effects on children's health [1] [12] [13]. Research has revealed that digital media can significantly influence the duration and quality of children's sleep [1]. Disturbed sleep quality and inadequate physical activity, associated with excessive screen time, can cause obesity [14]. Screen time sedentary behavior is associated with increased blood pressure and dysfunction of HDL, which, in addition to obesity, increases the risk of cardiovascular morbidity [1]. Psychologically, screen time has been associated with depressive symptoms and ADHD behavior among children [1] [15] [16].

In the present study, to assess the use of screen media, screen time and a rating scale that assesses problematic media use among children were used. Problematic Interactive Media Use characterizes behaviors that affect a person's ability to function physically, mentally, cognitively, and/or socially. These behaviors include compulsive use of, increasing tolerance for, and unpleasant reactions to being separated from interactive screen media use [17]. To measure problematic use of media among children in the present study, the Problematic Media Use Measure Short Form (PMUM-SF) was used [18]. The items of the PMUM-SF were based on the nine criteria for Internet gaming disorder in the DSM-5 [18]. In the last ten years, the International Classification of Diseases [19] and Diagnostic and Statistical Manual of Mental Disorders [20] have added behavioral addictions like Internet gaming addiction to the addictive disorders category. Many screen and media-related behavioral issues, such as social media addiction, have been shown in the literature to be rooted in Internet gaming addiction criteria [21].

Problematic use of media has become a public health concern; thus, many recommendations from different health authorities have been proposed to control children's use of media. For children under the age of 18, the AAP advises against

using any screen media other than video chatting [22]. The AAP advises that children under the age of two should only be exposed to high-quality programming, and that children between the ages of two and five should only be allowed one hour of screen time with high-quality content when their parents are present [22]. Parents of children ages six and older should consistently set restrictions on how much time and what kinds of media their children use [22]. They should also ensure that media does not replace getting enough sleep, exercising, or engaging in other healthy behaviors [22]. The updated recommendations urge parents to set aside media-free hours for family time and media-free areas of the house [22]. However, most children exceed the recommended limits of healthy media use. For example, in the USA, children aged 8 - 12 years spend an average of five hours on entertainment screen media; teens spend even more time, with an average of about seven hours [23]. In Canada, more than 85% of preschool children exceed the recommended limits of media use [12].

As a result of the increased availability and ownership of electronic screen devices, it is crucial to understand the correlates of their use among children [5]. Determining the most important correlates of electronic media use will help identify the children who are most in need of intervention [24]. It is also important to improve the effectiveness of interventions that aim to develop healthy child screen use behavior. Bioecological and social ecological models have been used frequently in the literature to explain various correlates associated with children's screen time [5] [25] [26]. Within the context of these models, many child- and family-related, as well as sociocultural-related factors, determine a child's use of media [26]. Many demographic, developmental, and environmental factors might also account for variations in research findings about the effect of media on children's health [27].

However, there is limited research regarding screen time and its predictors in low- and middle-income countries [5] [26]. Further studies within this field are recommended to reach robust conclusions about the relationships of different variables and screen media use among children [5]. Therefore, the current study aims to investigate predictors of screen media use among children aged 3 - 13 years in Jordan.

2. Materials and Methods

2.1. Study Design

A descriptive cross-sectional design was employed in the current study.

2.2. Setting and Sample

The study was conducted using an online questionnaire which was developed using google forms. The online questionnaire was distributed in different national Facebook and WhatsApp groups. Participants were caregivers of children aged 3 - 13 years. One hundred and ninety-two participants from twelve governance in Jordan (Jordan is a low-income, Arabic speaking Middle Eastern country) were enrolled in the study over a period of 4 months. To be eligible the participant had

to be a caregiver of child aging from 3 to 13 years. We included children within this age group because the Arabic version tool that we used was validated on a sample of children aged 3 - 13 years. We included children within this age group because the Arabic version tool that we used was validated on a sample of children aged 3-13 years. Eligible parents who agreed to participate were asked to complete a consent form and questionnaire through online questionnaire which was distributed in different Facebook and WhatsApp groups. Returning the questionnaire was considered a consent for the participant.

2.3. Ethical Considerations

We obtained the ethical permission to conduct the study from the scientific research committee at the Department of Nursing at Al-Hussein Bin Talal University (reference number 7/7/761). Parents were informed through the post and a questionnaire cover page about the anonymous and voluntary nature of the study. Informed consent to participate in this study was provided by the participants. Returning the questionnaire was considered as a written informed consent. This research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki.

2.4. Instruments

The instrument consisted of two parts, *i.e.*, the Demographic Data Form and the Questionnaire of the Problematic Media Use Measure Short Form (PMUM-SF). The correlates of screen media use and the screen time were collected through the demographic form.

Problematic use of media was measured using the PMUM-SF. This measure consisted of 9 items; the mean of all items (9 items) is calculated to provide a total score [18]. Nine Likert-type items addressed the problematic use of media with each item scored on a scale of 1 = never, 2 = rarely, 3 = sometimes, 4 = very often, 5 = always [18].

The original English version of the scale has high internal consistency (a = 0.93) [18]. The original scale's total score was significantly correlated with total screen time, parent worry about child media use, and parent-child conflict with turning off device which supported the scale's convergent validity [18]. This nine items scale is a short form from the 27-item scale. The construct validity of the short form was confirmed through conducting a confirmatory factor analysis for the factor structure that resulted from the exploratory factor analysis. The results revealed acceptable model fit (RMSEA = 0.085; CFI = 0.961; SRMR = 0.024) [18].

Tool items include such items: screen media is all that my child seems to think about; the amount of time my child wants to use screen media keeps increasing and my child becomes frustrated when he/she cannot use screen media. The Arabic version of the scale was used. The reliability of the translated Arabic version of the scale estimated by the internal consistency reached a Cronbach's alpha of 0.90 [28]. The Arabic version also demonstrated good predictive and convergent validity [28].

2.5. Data Collection Procedure

Questionnaires were distributed through different national Face-book and WhatsApp groups that had many followers and members. The questionnaire was sent to the groups and pages as a post with information about the purpose of the study, target population, and voluntary participation.

Screen media use (screen time and problematic use of media) was the primary outcome measure. Screen media use refers to the child use of any screen, such as: television; video games; tablets; smartphones; handheld video games; laptops and computer. The term "screen time" is used to denote both the fixed screens and mobile media screen device use [5]. Caregivers reported the average total time per weekday and weekend day that their child use screen media. Screen media devices included television; video games; tablets; smartphones; handheld video games; laptops; computers. Minutes/day of screen media use were derived by calculating weighted average for weekday and weekend responses ([weekday*5 + weekend* 2]/7).

In the current study the following correlates of mobile screen media use were investigated: child age and sex; parental age and education; family income; place of residence; availability of media device in child's bedroom; child's mobile ownership parents and child conflict about use of media and parents worry about child's use of media.

2.6. Statistical Analyses

All statistical analyses were performed using Statistical Package for Social Sciences 24 (SPSS 24) program [29]. Descriptive statistics were calculated for children's and caregivers demographic characteristics. All continuous variables were checked for outliers. To address the research question, simple linear regression was first conducted for all variables with screen time and problematic use of media. Next, multiple linear regression models, that included all variables that met a cut-off of $P < 0.05$ in the simple linear regression models, were generated.

3. Results

One hundred and ninety-two participants completed the questionnaire. The average age for the children was 7.6 years and the majority of them were males (56.8%). Most of the caregivers' age ranged between 31 - 40 years (59.4%) and the majority of them were mothers (71.9%). Almost equal proportion of the participants were recruited from the south (42.7%) and from the middle (42.2%) provinces in the kingdom. There was one screen media device in half of children's bedrooms (50%). However, most of the children did not own a mobile (70.3%). The findings of this study showed that most of the children (82.3%) spent 2 hours or more daily using screen media. The mean score for problematic use of media as measured by PMUM-SF was 3.04 out of 5. Characteristics of parents' and children's characteristics are presented in **Table 1**.

Table 1. Characteristics of the participants (n = 192).

Children characteristics	No.	%
Sex		
Male	109	56.8
Female	83	43.2
Primary care giver		
Mother	138	71.9
Father	26	13.5
Uncle	10	5.2
Aunt	7	3.6
Brother/sister	7	3.6
Other	4	2.1
Mobile Ownership		
Yes	57	29.7
No	135	70.3
Bedroom media		
No media	56	29.2
More than one device	40	20.8
one device	96	50
Parental characteristics		
Age		
20 years and less	6	3.1
21 - 30 years	38	19.8
31 - 40 years	114	59.4
More than 40 years	34	17.7
Education		
School	39	20.4
Diploma	16	8.4
Bachelor	87	45.5
Postgraduate	49	25.7
Family income		
100 - 399 jd	31	16.1
400 - 699 jd	59	30.7
700 - 999 jd	47	24.5
More than 1000 jd	55	28.6
Residence		
South	81	42.2
Middle	82	42.7
North	29	15.1
screen time use		
<120	34	17.7
≥120	158	82.3

3.1. Predictors of Total Screen Time

The result of simple linear regression showed that child age (r = 0.21; $P < 0.05$), mobile ownership (r = 0.28; $P < 0.05$) and conflict with parents regarding mobile use (r = −0.21; $P < 0.05$) were significantly associated with screen time. On the other hand, child sex, parental age, education level, monthly family income, residence, worry about mobile use and the availability of media device in child's bedroom were not significantly correlated with total screen time use.

A Multiple linear regression analysis was performed to detect the predictors of screen time. The entered variables to the model included: child age, mobile ownership, and the conflict about mobile use. Data were checked for violation of normal distribution and for multicollinearity. The total variance in screen time use that is explained by the model was 11% (F (3, 188) = 8.69; $P < 0.001$). Based on the model result; the strongest predictor was mobile ownership (beta (β) = 0.22) followed by conflict about mobile use (beta (β) = 0.16). The results are presented in Table 2.

Table 2. Variables predict screen time.

Variable	B	Std error	beta	t	*P*
Child age	4.88	2.68	0.13	1.82	0.070
Ownership	56.43	17.94	0.22	3.15	0.002
Conflict	37.10	16.37	0.16	2.27	0.025

3.2. Predictors of Problematic Use of Media

The result of simple linear showed that the child age (r = 0.25; $P < 0.001$), mobile ownership (r = 0.19; $P < 0.05$), conflict with parents regarding mobile use (r = −0.37; $P < 0.001$), worry about mobile use (r = 0.22; $P < 0.05$), and the availability of media device in child's bedroom (F (2, 188) = 4.285; $P < 0.015$), were significantly associated with Problematic Media Use Score. On the other hand, child sex, parental age, education level, monthly family income and residence were not significantly correlated with Problematic Media Use score.

Table 3. Variables predict problematic media use.

Variable	B	Std error	β	t	*P*
Child age	0.428	0.170	0.168	2.519	0.013
Ownership	1.472	1.179	0.086	1.249	0.213
Conflict about mobile use	−5.310	1.132	−0.332	−4.690	<0.001
Worry about mobile use	−1.574	1.156	−0.088	−1.312	0.191
Bedroom media availability	1.514	1.154	−0.096	−1.361	0.175

A Multiple linear regression analysis was performed to detect the predictors of problematic use of media. The entered variables to the model were child age,

mobile ownership, conflict with parents regarding mobile use, worry about mobile use and the availability of media device in child's bedroom. Data were checked for violation of normal distribution and for multicollinearity. The total variance in the problematic use of media that is explained by the model was 22% (F (5, 185) = 11.65; $P < 0.001$). Based on the model result; the strongest predictors were Conflict about mobile use (beta (β) = −0.33) followed by Child age (beta (β) = 0.168). The results are presented in **Table 3**.

4. Discussion

This study aimed to examine the duration of screen media use by children (3 - 13 years old) during weekdays and weekends in urban areas in Jordan. The study adds to the literature by investigating a variety of parent and child characteristics that might correlate with parental-reported screen media use in a sample of 192 children aged 3 - 13. In the current study, screen media use was measured by two outcome variables: screen time and problematic use of media.

In our study, the majority of children exceeded the recommended time for screen media use. Approximately 83% of children spend more than two hours using screen media devices daily. This finding is consistent with the findings of an Australian study that showed that 85% of school-age children spend more than two hours using screen media devices [30]. Similarly, according to the Common Sense Census report, tweens and teens use media for 5.33 and 8.39 hours daily, respectively [31]. In the Arabic-speaking Middle East countries, there have been reports of similar or even higher trends in children's media use. Before they turn two, Saudi Arabian children begin utilizing screen media devices [32]. Saudi toddlers watch TV and use screen media devices on a daily average of three hours [32]. Older and school-age children in Saudi Arabia are also utilizing media more and more; on average, they use various media devices for 35 hours a week [33].

However, the current study's findings are higher than what has been found in some other studies. A previous Chinese study showed that screen time for approximately 54.7% of children aged 8 - 13 was more than two hours [34], and in the UK, about 43% of primary school children spent more than two hours watching TV on weekends [35]. In France, the average daily screen time for children older than two years was 66 minutes during the week and 103 minutes on the weekend [4]. Our research was conducted just before the COVID-19 pandemic. However, global use of electronic screen-based media has increased as a result of the COVID-19 pandemic [36]. Children aged 3 - 7 used screens on average for more than 50 minutes longer during the pandemic than they had previously. In the USA, pre-pandemic mean daily screen time was 4.4 hours; however, during the first pandemic phase, screen time increased by about 1.75 hours, and during the second pandemic period, screen time increased by about 1.11 hours. This was mostly attributed to increases in screen time spent on entertainment and educational apps [36] [37].

Bergmann *et al.* [38] found that even younger children who had no online

schooling requirements were exposed to higher screen time during lockdown during the COVID-19 pandemic than before lockdown.

Mobiles and tablets had replaced televisions as the major screen devices used by children [3], and parents begin to give mobile devices to their children before the age of one year [3]. This might explain the increase in screen time of children in the last 20 years [39]. As a result of the inevitable global expansion of screen media device use among children, many high-income countries such as America, Australia, and Canada responded by proposing guidelines that control screen media use among children. According to the American Academy of Pediatrics [22], the Canadian Pediatric Society [40], and Australian guidelines [41], children younger than two years should not be exposed to screens, and children aged 2 - 5 years should spend no more than one hour using screen media devices. The Australian guidelines also recommended that children aged 5 - 7 years should spend less than two hours using screen media devices.

Within this context, a variety of factors might explain the differences in screen time among children across the world. In a review study, Kaur *et al.* [26] used the socioecological model to describe the factors and correlates of screen time among children. They described many child and caretaker-related factors, in addition to childcare and sociocultural environment-related factors, that might be correlated with child screen time [26]. These factors included the child's and caretakers' demographic, biological, and behavioral factors. At the microenvironment level (*i.e.*, home or childcare facility), access to screen media devices, rules that regulate a child's screen time and behavior, and the type of childcare are among the factors that affect the child's screen time. At the macro-environment level, the surrounding community, government rules and regulations, and the season might be correlated with child screen time [26].

In our study, we investigated the correlation between screen time and the following factors: child age and sex, parental age and education level, monthly family income, place of residence, parents' worry about mobile use, mobile ownership, conflict with parents regarding mobile use, and the availability of screen media devices in the child's bedroom. The findings showed that child age and parent-child conflict about using screen media significantly predicted both screen time and problematic use of media. Older children engaged in more screen time and demonstrated higher levels of problematic use of media. The more conflict between parents and children about the use of media, the less the child's screen time and the lower the level of problematic use of media. Mobile ownership significantly predicted screen time; children who owned mobile phones spent more screen time than children who did not own one. The other correlates, which include child sex, parents' age and education level, family income, place of residence, screen media devices in the child's bedroom, and parents' worry about the child's use of media, did not significantly predict screen media time and problematic use of media.

In line with the present study, Carson and Kuzik [24] did not observe a significant

correlation between parents' demographics, including parents' age and educational level, with child screen time in a sample of 149 toddlers. Paudel *et al.* [2], in their systematic review about correlates of media use among children aged eight and less, also found that parents' demographics, including age and education, did not relate significantly with children's use of media. Similar to the findings of the current study, children's age was significantly associated with screen time; older children spent significantly more screen time [2] [24] [42]. Many reasons were suggested to explain the higher screen time among older children, such as lower parental supervision and higher rates of screen media device ownership [2]. Within this context, the findings of the current study revealed that owning a mobile phone was significantly correlated with screen time. That is, children who owned mobile phones spent more screen time. Also, the higher cognitive and language development of older children might explain the higher screen time among older children [42]. Moreover, the focus of recommendations on young children's use of media might be associated with parents imposing more restrictions on younger children's use of media [42].

Parents' perception of the risk of screen media device use, such as mobile phones, on their children's health varies. However, the majority of parents recognize that the use of mobile devices is harmful to their children [43]. Nevertheless, it is not necessary for this perception to be translated by parents into following the recommendations of screen media use for their children [43]. In the current study, more conflict between parents and children regarding the use of screen media devices was associated with lower screen time and a lower level of problematic use of media. This might be explained by the fact that those parents who had more conflict with their children about screen media device use had a higher perception of its harmful effects. This explanation is supported by the findings of Akbayin *et al.* [4], which demonstrated that children of parents who have more knowledge about the harmful effects of overusing screens had less screen time. A higher perception might be associated with imposing higher parental control and restrictions on children's use of screen media devices [43]. Also, having more conflict with their children might indicate that parents adopt regulatory behavior, which means they tend to enforce rules for screen media use. Within this context, Pyper *et al.* [44] found that parental support behavior might predict children's screen time; children of parents who adopt regulatory behavior tend to spend less screen time.

Finally, in contrast to the findings of the current study, Carson and Kuzik [24] found that child sex and family income were significantly correlated with screen time; females spent significantly more time using screen media than males. However, across the limited body of evidence, there seem to be few demographic correlates associated with screen time.

Some limitations should be considered when interpreting the study results. First, our research employed a cross-sectional design; therefore, a directional relationship between screen media use and the variety of factors could not be drawn. Moreover, the findings of the current study are based on self-reports, and we

cannot eliminate the possibility of social desirability bias.

5. Implications for Practice

Children's healthcare providers should establish strategic plans for guiding the healthy use of interactive media and limiting its problematic use for parents, educators, policymakers, and the technology sector [17]. Children who are at risk for overexposure to screens should be screened by nurses and general practitioners for screen time and problematic use of media using valid measures. Nurses are also urged to increase parents' awareness of the harmful effects of overusing screens and to educate them about the healthy use of screen media devices. Further research that assesses the effect of the COVID-19 pandemic on children's use of media is recommended. Also, other studies that capture the content, context, and complexity of child screen time are also recommended.

6. Conclusion

Our study of children aged 3 - 13 parents revealed excessive use of screens media devices with a daily average screen time that exceeded the experts' recommendations. Moreover, conflict between child and parents about the use of screen media device, child age, and mobile ownership significantly predicted the use of screen media. The assessment of screen use and the identification of children at risk for overuse by nurses is crucial. Targeting the parents of children who ow mobile phones and other portable screen media devices through education about healthy use of media is important since they tend to spend more screen time than children who did not ow ones. The finding of the current study is a call for policy makers and legislators in middle- and low-income countries to set fourth recommendations that control media use among children.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author, [D.A.D], upon reasonable request.

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Declaration of Interest

There is no conflict of interest.

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