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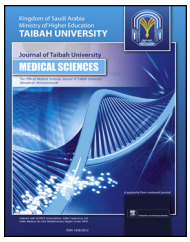

Original Article

Children's electronic screen time exposure and its relationship to dental anxiety and behavior

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الملخص

أهداف البحث: كان الغرض من هذه الدراسة هو تقييم العلاقة بين وقت الشاشة الإلكتروني وقلق وسلوك الأسنان لدى الأطفال الذين تتراوح أعمارهم بين ستة إلى اثني عشر عاما أثناء فحص الأسنان والوقاية وتطبيق الفلوريد الموضعي.

طريقة البحث: كانت هذه دراسة مقطعية شملت 402 مريض أسنان أطفال تتراوح أعمارهم بين ستة إلى اثني عشر عاما جاءوا إلى مستشفى جامعة الملك عبد العزيز لطب الأسنان في جدة، المملكة العربية السعودية. تم جمع البيانات من سبتمبر 2020 إلى ديسمبر 2021. تم استخدام الاستبيان الذاتي لجمع البيانات من المريض وولي أمره. كانت تتألف من 8 أسئلة ديموغرافية بالإضافة إلى 13 سؤال متعدد الخيارات فيما يتعلق بوقت شاشة المرضى. تم تقييم القلق عند الأطفال باستخدام مقياس قلق أسنان الأطفال. تم تقييم سلوك الطفل باستخدام مقياس فرانكل للتقييم السلوكي.

النتائج: كان معدل استجابة هذه الدراسة 100٪. من بين 402 مشاركا، وجد أن 248 (61.7٪) يعانون من القلق بينما 154 (38.3٪) لم يكونوا كذلك. من بين جميع المشاركين 274 (68.2٪) كانوا متعاونين و 128 (31.8٪) لم يكونوا متعاونين. تم العثور على علاقة ذات دلالة إحصائية بين القلق والمشاكل السلوكية أثناء زيارة الأسنان وإجمالي ساعات تعرض المشاركين للأجهزة الإلكترونية. أظهر الأطفال الذين تعرضوا للإلكترونيات في سن عامين أو قبل ذلك مزيدا من القلق والسلوك غير المتعاون.

الاستنتاجات: يمكن أن يرتبط التعرض المبكر للشاشات الإلكترونية، خاصة لأغراض الترفيه والتعرض لفترة أطول بزيادة قلق الأسنان والسلوك غير المتعاون لدى الأطفال الذين تتراوح أعمارهم بين 6-12 عاما. يجب توعية الآباء حول مخاطر السماح لأطفالهم باستخدام الأجهزة الإلكترونية وتشجيعهم على استبدال هذه الأجهزة بأنشطة تتضمن نشاطا بدنيا.

الكلمات المفتاحية: الأطفال؛ الأجهزة الإلكترونية؛ وقت الشاشة؛ قلق الأسنان؛ السلوك

Abstract

Objectives: The purpose of this study was to assess the association between electronic screen time and dental anxiety and behaviour among children aged six to twelve years during dental examination, prophylaxis, and topical fluoride application.

Material and methods: This was a cross-sectional study which included 402 paediatric dental patients aged six to twelve years who came to King Abdulaziz University Dental Hospital in Jeddah, Saudi Arabia. The data was collected from September 2020 to December 2021. Self-constructed questionnaire was used to collect data from the patient and his/her guardian. It was comprised of eight demographic questions as well as 13 multiple-choice questions regarding the patients' screen time. Child dental anxiety was assessed by using Abeer Children Dental Anxiety Scale (ACDAS). Assessment of child's behaviour was done by using Frankl Behavioural Rating Scale.

Results: This study had a response rate of 100%. Out of the 402 participants, 248 (61.7%) were found to have anxiety while 154 (38.3%) were not. Of all participants 274 (68.2%) were cooperative and 128 (31.8%) were not. A Significant relationship between anxiety and behavioural problems during a dental visit and the participant's total exposure hours to electronic devices was found ($p < 0.001$). Children exposed to electronics at the age of two years or before displayed more anxiety and uncooperative behaviour ($p < 0.001$).

Conclusions: early exposure to electronic screens, especially for entertainment purposes and longer exposure

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can be associated with increased dental anxiety and uncooperative behaviour in children age 6–12 years.

Recommendations: Parents should be educated about the risks of permitting their children to use electronic devices and encouraged to replace such devices with activities that incorporate physical activity.

Keywords: Behaviour; Children; Dental anxiety; Electronic devices; Screen time

Introduction

Today's electronic media are available in a variety of forms, including televisions, computer desktops, laptops, tablets, electronic readers, and video gaming devices, such as PlayStation, XBOX, Nintendo, etc.[1] All of these have screens and the use of any form of electronic media is referred to as screen time (ST). Today, more than seven billion individuals have access to the internet, and use it on a constant basis.

The American Academy of Paediatrics (AAP) recommends that paediatricians advise parents of children over the age of two to limit their children's total time spent on media (entertainment media) to a maximum of 2 h of quality programming per day.[2] However, although the use of devices with screens has become more common in daily life, their frequency of use has yet to be analysed scientifically with respect to demography and health. According to a 2014 study, American toddlers watch 3 h of TV daily. The same group spent more than twice as much time on screens in 1997.[3] According to a 2019 Common Sense Media study, 8-to-12-year-old children use electronic devices for amusement for approximately 5 h every day, while 13-to-18-year-olds use them for nearly 7 h per day.[4]

Recent research has shown that this generation's children spend up to 8 h a day on electronic media, with only sleep taking up more time.[5] Adolescents' ST has been shown to be similar around the world and is rising continuously and considered a trend.[6] Electronic devices have become part of the child-rearing process quickly over the last ten years and according to research, 78% of parents approve of their children's use of electronic technology and even more say it has not caused any concerns. Nearly 41% of parents equip their children with a tablet or smartphone when dining out to keep them entertained and occupied.[7]

It appears to be nearly impossible to deny or minimize the effect of so many toddlers and children spending so much time using devices. Because of the rapid development of devices with screens, most of the research completed over a decade ago is becoming obsolete quickly. Although these studies are new, certain tendencies have developed.[8]

Researchers have concluded that spending too much time in front of different types of screens has several potential adverse consequences for children's health and behaviours overall, such as unhealthy eating practices, poor sleep quality, cardiovascular disease, and obesity, all of which have been correlated with increased ST.[9] Numerous studies have found correlations between screen use and sleep. For example, Wu et al. (2017) found that children with greater screen use and less sleep per night had more behavioural issues.[10] Another effect of ST on children is its influence on the body mass index (BMI) and obesity. According to Fang et al. (2019), increased screen use in children and adolescents may be a risk factor for becoming overweight or obese.[11] Further, Twenge et al. (2018) observed that children and adolescents who spend more time using screen media had poorer psychological wellbeing than those who spend less time using screens.[12] Furthermore, according to recent study by Robertson et al. (2022), they found that even after controlling for demographic factors, young people who spent more than 2 h per day consuming screen media were more likely to meet criteria for depressive disorders, self-harm, and suicide thought or attempt. More so than with screen time in general, there were stronger connections between the usage of digital media (including media platforms, messaging, gaming, and web videos) and anxiety disorders.[13]

ST can contribute to anxiety and behavior problems as well. For example, Lo et al. (2005) found that game players had higher levels of anxiety than light and non-players and that anxiety increased with online gaming activities.[14] Moreover, Meras et al. (2015) found an association between ST and anxiety intensity, and screen use may be a risk factor for depression.[15]

Children's behavior, psychological status, and anxiety in dental clinics play important roles in the quality of dental services provided for them.[16–18] Paediatric dentists need to tailor suitable behavior management techniques after appropriate anxiety and behavioural evaluation and advice given the child during treatment in dental clinics. However, scientific research on the association between ST and children's anxiety and behavior problems is scant. Nevertheless, studies have shown that children with general anxiety and psychological disturbance tend to exhibit uncooperative dental behavior and anxiety problems.[19–23] Therefore, evidence of the effect of children's ST exposure on dental anxiety and behavior problems in dental clinics is needed. To our knowledge, only one article has discussed the relation between screen exposure and children's dental anxiety and behaviour.[24] Although the study reported a relation between screen exposure and dental anxiety and problematic behavior, the study included only 95 children and the authors reported that their findings may not be conclusive because of the possibility of confounding effects.

A national school shutdown, lockdown, or sanctuary regulation, and social distancing recommendations have all been outcomes of the COVID-19 pandemic. Since the crisis began, the ST of children of different ages has increased by half. Living under lockdown may necessitate more ST for educational, social, or recreational purposes. Because approximately 90% of children and students are separated from their schools geographically, technology is required to engage, access educational materials, and most significantly, play.[25]

After the first COVID-19 shutdown in Germany, Schmidt et al. (2020) found that physical activity decreased, while

recreational ST increased among children aged 4 to 17.[26] Further, Medrano et al. (2020) found that COVID-19 confinement reduced physical activity and increased sedentary habits among Spanish children. Even before the pandemic, over 80% of children were sedentary and over 60% were exposed to more than the recommended ST limits.[27]

This study's findings help us explore and understand patients' dental anxiety and behavior better, as well as create appropriate anxiety counselling that incorporates current screen use. Therefore, this study's goal was to assess the association between children's electronic screen exposure and both dental anxiety and problematic behavior.

Materials and Methods

Participants

This cross-sectional study was conducted between September 2020 and December 2021 at King Abdulaziz University Dental Hospital (KAUDH) in Jeddah, Saudi Arabia. Ethical approval was obtained from the Human Research Ethics Committee of King Abdulaziz University (IRB number 14022020).

The sample size was calculated using the OpenEpi online program, which is a free, web-based, open-source operating system-independent collection of programs developed for use in public health and medicine for training or practice that offers a variety of epidemiologic and statistical programs to summarize and analyse data.[28] After reviewing the literature, we calculated the sample size according to Wu et al. (2016), who assessed the association between ST exposure and behavior problems at school.[10] The estimated sample size was 314 based upon the 95% confidence level, odds ratio of 0.38, and 80% power.

The inclusion criteria included physically and mentally healthy children aged six-to-12-years old with no previous hospitalization, who visited paediatric dental clinics for the first time or/and those who came to the dental clinic for a follow-up visit at least six months after their previous visit. According to the American academy of Paediatric Dentistry (AAPD)[29] this is the shortest period acceptable for follow-up dental visits. Children with follow-up visits within less than six months from the previous visit or medically compromised children were excluded from the study. Those with previous hospitalization were excluded because Kipper and Leonard (1968) reported that hospitalization itself can cause anxiety in children, regardless of the reason for the stay.[30]

Questionnaire

A single paediatric dentist interviewed parents, the children, and dentist to complete the questionnaire. The study's goal and methodology was explained to the parents before they entered the clinics. Further, they were asked to sign a consent form stating their willingness to participate in this study with their child.

The questionnaire included four sections:

Section 1: Sociodemographic questions, including child's gender, age, parental education level, reason for dental visit, and child's birth order. The child's age was categorised in three groups: 6–7 years; 9–10 years, and 10–12 years old, as children's fear has been reported previously to change with age.[31]

Section 2: Exposure to electronic screens was measured, including the type of electronic screen used, duration of exposure, age at which the child began to be exposed to screens, and what time of the day the child is exposed to electronic screens normally (day time, night time, or both?). With respect to the age at which the child began to be exposed to screens, we divided that age into two categories (before or at the age of two years old) and (more than two years old), which is based upon the AAPD, which recommends that children over the age of two limit the total media time to a maximum of 2 h per day.[2] The duration of exposure includes both entertainment and educational hours. Educational hours are those spent in learning, which is presented largely through the "my school platform" or "Madrasati platform".[32] These are school or governmental websites launched for distance learning in Saudi Arabia, particularly during the COVID-19 pandemic, to facilitate online learning for children.

Section 3: Child's dental anxiety based upon the Abeer Children Dental Anxiety Scale (ACDAS), which includes three main components: child self-assessment (13 questions); cognitive components (three questions), and a parent–dentist evaluation of the child's behavior (three question).[33]

The child self-assessment section evaluates the child's anxiety. A scale of three faces indicating happy, neutral/fair, or anxious was presented to the child, who was asked to select the face s/he preferred for each question. Each face was scored from 1 to 3, and the total score ranged from 13 to 39. The child was considered anxious if s/he scored $\geq$26.

Section 4: Child's behavior based upon the Frankl Behavioural Rating Scale, which includes four categories: definitive negative (–ve), which is completely uncooperative; negative (-ve), which is reluctant to cooperate, positive (+ve), which indicates the child accepts treatment with caution, and definitive positive (++ve), i.e., the child offers no resistance and is highly cooperative.[34] We grouped the Frankl classifications into two groups: uncooperative behavior, –ve and -ve, and cooperative behavior, +ve and ++ve.

Twenty participants assessed the questionnaire for face validity. Based upon their feedback, minor changes were made to the ST questions to improve clarity. To evaluate content validity, 5 experts reviewed the questionnaire for relevance, clarity, simplicity, and ambiguity. The item content validity index (CVI) = 100.

Data collection

Dental and behavior management was standardized for all patients and conducted by one operator to overcome any bias. The management consisted of clinical examination, dental prophylaxis, and fluoride application. No dental X-rays were taken. All patients were examined while sitting comfortably in a chair with good lighting conditions. Dental mirrors were used to examine the child's teeth and begin the prophylactic treatment and fluoride application. An assistant helped assess the child's anxiety and behavior after she/he received a detailed explanation of the way to observe the child and use the assessment scale.

Statistical analysis

The data obtained were entered and analysed using SPSS v. 26 (IBM Inc., Armonk, NY). Frequencies, percentages, and the Chi-square test were computed for categorical data, while means were calculated for continuous variables. To compare group means, the *t*-test (for parametric data), Mann–Whitney (for non-parametric), and a one-way ANOVA analysis were performed. Binary regression analysis was computed to assess the association between the child's dental anxiety and behavior (dependent factors) and sociodemographic factors, screen exposure duration, electronic ST type (educational or entertainment), age at which electronic screen exposure began (independent factors) to compute the AOR (Adjusted Odd Ratio), which is an odds ratio in a model that adjusts for other predictor factors that illustrates the predictors' dynamics. Statistical significance was set at 0.05.

Results

Parents of 402 children met the inclusion criteria to participate in the study, and there were no missing data. Of the total sample, 206 (51.2%) were females and 196 (48.8%) were males; in addition, 295 (73.4%) of fathers and 285 (70.9) of mothers had more than a high school education. Dental anxiety was exhibited by 248 (61.7%) children, and 128 (31.8%) demonstrated uncooperative behavior during the dental visits. Details of ACDAS are presented in Supplementary Tabless 1 and 2. For electronic ST, 102 (25.4%) of children were exposed to electronic screens first before or at the age of two, 189 (47.0%) had their own device at the time of the study, and 235 (58.5%) used their device both day and night (Table 1).

Children with dental anxiety or those who exhibited uncooperative behavior in dental clinics were exposed to smart phones (for dental anxiety and uncooperative behavior, $p < 0.001$) or TV (for dental anxiety, $p = 0.002$, and for uncooperative behavior, $p < 0.001$) for a significantly longer duration than children with no dental anxiety or those with cooperative behavior. The mean electronic ST exposure was 3.57 (SD: 1.49) hours for educational exposure, 5.98 (SD: 4.19) for entertainment exposure, and 9.54 (SD: 4.66) for total exposure. The mean ST exposure per day for children with dental anxiety was 10.16 (SD: 4.50) hours and uncooperative behavior was 10.86 (SD: 5.12), compared to 8.54 (SD: 4.76) for children with no anxiety, and 8.92 (SD: 4.30) for children who exhibited cooperative behavior (Figures 1 and 2).

A binary regression analysis was performed to assess the relation between electronic screen exposure and children's dental anxiety and uncooperative behavior after the effect of confounders was removed. Those whose exposure to electronic screens began before or at the age of two years showed a statistically significantly higher AOR of dental anxiety (AOR: 2.48, $p = 0.007$) and uncooperative dental behavior (AOR: 3.29, $p < 0.001$). Increased hours of exposure to screens for entertainment were associated with a statistically significantly higher AOR of dental anxiety (AOR: 1.09, $p = 0.020$) and non-significantly higher AOR for the child's uncooperative dental behavior (AOR: 1.06, $p = 0.091$). In addition, a lower level of maternal education

Table 1: Distributions of the sample according to sociodemographic data and child dental anxiety according to ACDAS and dental behavior according to frank.

Variables		Anxiety		*p* value	Un-cooperative		*p* value
		Yes N (%)	No N (%)		Yes N (%)	No N (%)	
Paternal Education	≤High school	65 (61.3)	41 (38.7)	0.897	40 (37.7)	66 (62.3)	0.134
	>High school	183 (62.0)	112 (38.0)		88 (29.8)	207 (70.2)	
Maternal Education	≤High school	65 (55.6)	52 (44.4)	0.105	40 (34.2)	77 (65.8)	0.517
	>High school	183 (64.2)	102 (35.8)		88 (30.9)	197 (69.1)	
Child Gender	Female	129 (62.6)	77 (37.4)	0.694	53 (25.7)	153 (74.3)	0.007
	Male	119 (60.7)	77 (39.3)		75 (38.3)	121 (61.7)	
Child age	6–7	104 (63.4)	60 (36.6)	0.715	62 (37.8)	102 (62.2)	0.080
	8–9	82 (59.0)	57 (41.0)		36 (25.9)	103 (74.1)	
	10–12	62 (62.6)	37 (37.4)		30 (30.3)	69 (69.7)	
Child order	First	95 (60.5)	62 (39.5)	0.889	41 (26.1)	116 (73.9)	0.098
	Middle	91 (63.2)	53 (36.8)		48 (33.3)	96 (66.7)	
	Last	62 (61.4)	39 (38.6)		39 (38.6)	62 (61.4)	
Screen Starting age	≤2	82 (80.4)	20 (19.6)	<0.001	54 (52.9)	48 (47.1)	<0.001
	>2	166 (55.3)	134 (44.7)		74 (24.7)	226 (75.3)	
Personal device?	Yes	106 (56.1)	83 (43.9)	0.029	62 (32.8)	127 (67.2)	0.696
	No	142 (66.7)	71 (33.3)		66 (31.0)	147 (69.0)	
Time device of use	Day time	52 (49.5)	53 (50.5)	<0.001	29 (27.6)	76 (72.4)	0.555
	Nigh time	25 (40.3)	37 (59.7)		21 (33.9)	41 (66.1)	
	Day & night	171 (72.8)	64 (27.2)		78 (33.2)	157 (66.8)	
Total		248 (61.7)	154 (38.3)		128 (31.8)	274 (68.2)	

Significant level set at 0.05.

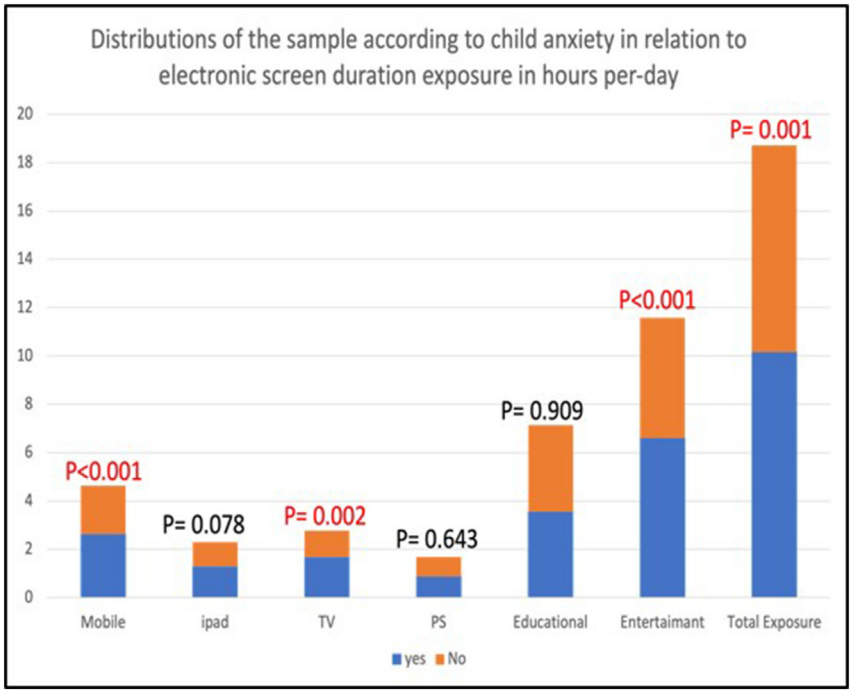

Figure 1: Distribution of the samples according to child anxiety in relation to electronic screen duration exposure in hours per day.

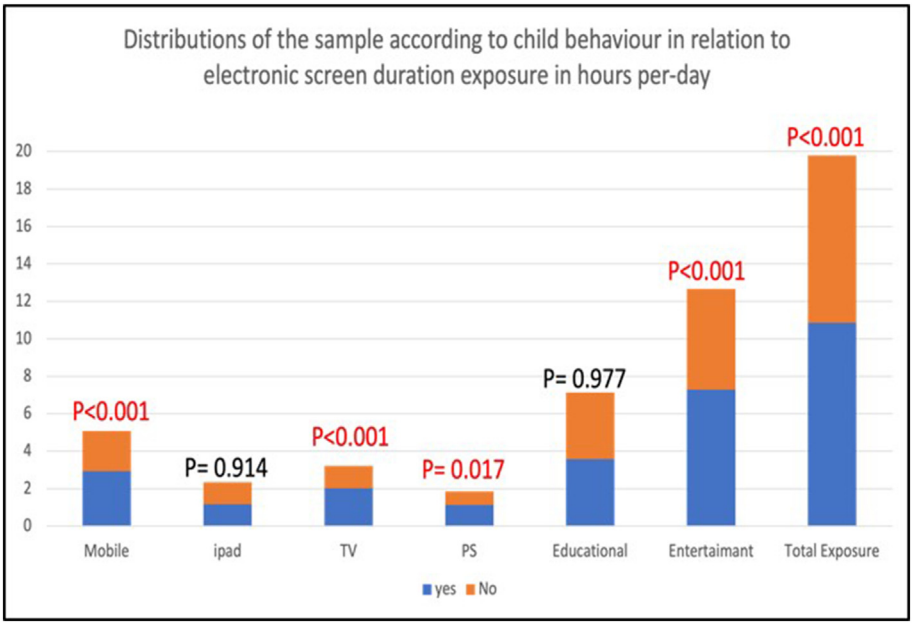

Figure 2: Distribution of the samples according to child behaviour in relation to electronic screen time duration exposure in hours per-day.

was associated with a statistically significantly lower AOR of the child's dental anxiety (AOR: 0.48, $p = 0.033$), and educational screen exposure was not associated with dental anxiety ($p = 0.614$) or uncooperative behavior ($p = 0.996$) (Table 2).

Discussion and conclusion

The data of this study showed a significant association between children's dental anxiety and behavioural problems and the use of mobile phones, iPads, and TV devices. The

Table 2: Binary regression analysis for the association between electronic screen exposure and dental anxiety and behaviour in the dental clinic.

Variables		Anxiety			Behavior		
		AOR	95% CI	P value	AOR	95% CI	P value
Paternal Education	≤High school	1.498	0.315,1.051	0.116	1.966	1.039,3.721	0.038
	>High school	1	–	–	1	–	–
Maternal Education	≤High school	0.575	0.315,1.051	0.575	0.848	0.466,1.706	0.707
	>High school	1	–	–	1	–	–
Child Gender	Female	1.232	0.801,1.893	0.342	0.584	0.369,0.952	0.022
	Male	1	–	–	1	–	–
Child age	6–7	0.912	0.580,1.840	1.033	1.279	0.693,2.361	0.432
	8–9	0.988	0.568,1.718	0.965	0.867	0.464,1.653	0.683
	10–12	1	–	–	1	–	–
Child order	First	1.085	0.663,1.851	0.765	0.565	0.313,1.02	0.058
	Middle	1.156	0.657,2.035	0.615	0.830	0.470,1.467	0.522
	Last	1	–	–	1	–	–
Screen Starting age	≤2	2.616	1.449,4.724	0.001	2.909	1.748,4.842	<0.001
	>2	1	–	–	1	–	–
Education screen	Yes	0.974	0.834,1.138	0.742	1.013	0.860,1.194	0.875
	No	1	–	–	1	–	–
Entertainment screen exposure	Yes	1.085	1.01,1.165	0.025	1.063	1.000,1.131	0.050
	No	1	–	–	1	–	–

AOR: adjusted odd ratio. Significant level set at 0.05.

devices the participants in our study used most were mobile phones, followed by iPads. Mobile phones are popular devices today because of the accelerated development of media games and educational apps that target young children, whose interest in using these devices is growing.[35]

This study assessed children's anxiety and problematic behavior during standard dental treatment that lasted 20–30 min. This is the typical length of time for a full mouth dental extra- and intra-oral examination, prophylaxis, and fluoride application. It has been shown that treatment durations of 30–45 min are most ideal for paediatric dental patients, beyond which children's behavior problems and anxiety begin to decline gradually.[36]

The age at which the children began to use electronic screens appeared to be detrimental in our study. The data showed that nearly 25% of our sample began using electronic screens at or before the age of two years and these children demonstrated higher levels of dental anxiety and uncooperative behavior. This age period is very critical in children's development, as the brain makes approximately 700 new neuronal synaptic connections each second to provide the foundation for later, higher-level activities such as language and cognition.[37]

Further, children who are exposed to electronic screens at this age can encounter cyberbullying,[38] videos that may motivate risky behaviour,[39] sexual content, and substance use,[40] which can collectively have an effect on children's mental health, attention span, and stress levels.[41,42] By decreasing free outdoor play, children's physiological wellbeing is also compromised, they can become less curious, have lower self-esteem, and face problems with self-control, friendship, focus, emotional stability, and the ability to complete given tasks.[12]

The findings of this study showed that the mean ST for entertainment purposes was approximately 6 h a day, and increased to nearly 9.5 h during the pandemic. These findings are consistent with a recent study that demonstrated that most children's ST has increased during the pandemic, and reached an average of 6.42 h/day.[43] The data of this study showed that the mean number of hours of ST increased the prevalence of dental anxiety and behavioural problems, a finding that is consistent with previous research that showed that the amount of time spent watching TV, playing video games, and accessing the internet is much greater in children who have dental anxiety and behavioural problems than in those who do not.[44]

Moreover, some previous research has found that even educational hours can lead to behavioural problems, which is consistent with the findings of a study that used an observational methodology to test the association between educational media exposure (EME) and different types of aggressive behavior in early childhood. The researchers found that EME can predict the display of relational aggressive behavior in preschool-aged children.[45]

The number of devices the child uses can also be associated significantly with the level of anxiety and behavior problems. Children who displayed more anxiety and problematic behavior in general had access to at least five electronic devices in their homes, which is consistent with previous studies that have reported that children and adolescents who can access more electronic devices at home have more ST.[46–48]

The American Academy of Paediatrics (AAP) recommends developing appropriate media use habits early in life and limiting school aged children's ST exposure to 2 h daily. The AAP also encourages children and adolescents to get a proper amount of sleep (8–12 h, depending upon age), physical exercise (1 h a day), and time away from media. Further, it is recommended to assign media-free periods (e.g., family dinners), zones (e.g., bedrooms) free of electronic media, including televisions, computers, and

mobile phones,[2] and to turn off media an hour before bedtime.

This study was limited by the nature and duration of the dental procedure during which assessment took place. It may be useful to assess anxiety and behavior during longer procedures, such as restorations or root canal treatments that require more cooperation and a longer attention span from children. Certain confounders should also be controlled in future similar studies, such as parental anxiety, which can have an effect on children's anxiety and behaviour.[49] Finally, the study's cross-sectional design did not allow us to assess causality among the factors under observation.

Based upon this study's findings, we recommend establishing more community educational programs for parents to increase their awareness of the potential harm of children's excessive use of electronic devices and encourage them to replace such devices with physical activities and group participation. Parents should also make educated decisions about the appropriate time to allow their children to have electronic devices. In addition, we recommend activating a parental control option, which is in most electronic devices today, to track children's online activities. Based upon our findings, we conclude that early exposure to electron screens before the age of two years, especially for entertainment purposes is associated with increased dental anxiety and uncooperative behaviour in children at the age of 6–12 years, and that prolonged exposure to screen time can also have a similar effect.

Source of funding

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Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

Ethical approval was obtained from the Human Research Ethics Committee of the dental faculty (IRB number 14-02-2020; May 23, 2019).

Consent

Informed consent was obtained from all subjects involved in the study.

Author contributions

HS, RA, SA - Conceptualization; HS, RA - Formal analysis; RA - Investigation; HS, RA- Methodology; HS, RA, SA - Writing – original draft; HS, RA, SA - Writing – review & editing. All authors approved the final draft and are responsible for the content and similarity index of the manuscript. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jtumed.2022.12.021.

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