MEDICUS

ISSN 1409-6366 UDC 61 Vol · 28 (2) · 2023

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Case report

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Betimi i Hipokratit

Në çastin kur po hy në radhët e anëtarëve të profesionit mjekësor premtoj solemnisht se jetën time do ta vë në shërbim të humanitetit. Ndaj mësuesve do ta ruaj mirënjohjen dhe respektin e duhur. Profesionin tim do ta ushtroj me ndërgjegje e me dinjitet. Shëndeti i pacientit tim do të jetë brenga ime më e madhe. Do t'i respektoj e do t'i ruaj fshehtësitë e atij që do të më rrëfehet. Do ta ruaj me të gjitha forcat e mia nderin e traditës fisnike të profesionit të mjekësisë.

Kolegët e mi do t'i konsideroj si vëllezër të mi.

Në ushtrimin e profesionit ndaj të sëmurit tek unë nuk do të ndikojë përkatësia e besimit, e nacionalitetit, e racës, e politikës, apo përkatësia klasore. Që nga fillimi do ta ruaj jetën e njeriut në mënyrë apsolute. As në kushtet e kërcënimit nuk do të lejoj të keqpërdoren njohuritë e mia mjekësore që do të ishin në kundërshtim me ligjet e humanitetit. Këtë premtim po e jap në mënyrë solemne e të lirë, duke u mbështetur në nderin tim personal.

The Oath of Hippocrates

Upon having conferred on me the high calling of physician and entering medical practice, I do solemnly pledge myself to consecrate my life to the service of humanity. I will give my teachers the respect and gratitude which is their due. I will practice my profession with conscience and dignity. The health of my patient will be my first consideration. I will respect the secrets which are confided in me, even after the patient has died. I will maintain by all the means in my power, the honor and the noble traditions of the medical profession.

My colleagues will be my brothers.

I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my patient. I will maintain the utmost respect for human life from its beginning even under threat and I will not use my medical knowledge contrary to the laws of humanity. I make these promises solemnly, freely and upon my honor

Medical Journal

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ISSN 1409-6366 UDC 61 Vol · 28 (2) · 2023

Revistë Shkencore Nderkombëtare e Shoqatës së Mjekëve Shqiptarë të Maqedonisë
International Journal of Medical Sciences of the Association of the Albanian Doctors from Macedonia

Botues/ Publisher: **SHMSHM / AAMD**
Tel. i Kryeredaktorit / Contact: **+389 (0) 71 240 927**
Zhiro llogaria / drawing account: **200-000031528193**
Numri tatimor / tax number: **4028999123208**
Adresa e Redaksisë-Editorial Board Address: **Mehmed Pashë Deralla nr. 16, Tetovë**
e-mail: **shmshm@live.com**

Shtypur në
Shtypshkronjen "Pruf Print", Shkup
Medicus shtypet në tirazh: 600 ekzemplarë
Revista shperndahet falas

Printed in:
Print House "Pruf Print", Skopje
The Jounal Medicus is printed and distributed free of charge with a circulation of 600 copies.

Profesional paper

HEALTH RISKS RELATED TO DIGITAL TECHNOLOGY USE IN CHILDREN

Goran Sanevski[1], Goran Ajdinski[2], Olivera Rashikj Canevska[2]

[1]PHI University Clinic of Physical Medicine and Rehabilitation – Skopje, R.N. Macedonia

[2]Ss. Cyril and Methodius University in Skopje, Faculty of Philosophy, Institute of Special Education and Rehabilitation, Skopje, R.N. Macedonia

Corresponding author: e-mail: sanevski@gmail.com

Medicus 2023, Vol. 28 (2): 242-247

ABSTRACT

Background: There is a rapid expansion of access to the Internet and digital technology today. The aim of the study was to examine the health risks related to digital technology use in children, to estimate the time that children spent with information technology (IT) device daily, and the time spent in exercising and sport.

Methods: This prospective study included a sample of 105 children, 59 males (56.2%) and 46 females (43.8%), aged 12-15 years (mean age of 13.5±0.6 years). A physical examination was performed to detect body deformities as well as motor skills testing which included: test of balance (using balance cushion), test of coordination (putting ball in a hoop), and test of accuracy (shooting at a dart target). A survey technique and unstructured interview with parents were also used. For statistical data analysis we used ANOVA test and Chi-square test with a level of significance $p < 0.05$.

Results: A total of 55 children (52.4%) had computer vision syndrome (CVS) without significant difference in terms of the use of eye protection ($p = 0.627$). Other problems were: neck pain, back pain, less physical activity and overweight, present in 12.4%, 14.3%, 47.6%, and 63.8%, respectively.

Conclusions: Extensive use of digital technology has negative effects on the children's health. There is a need for proper use of this technology because it can have many benefits. Majority of children that frequently use IT device are overweight and experienced CVS. Other problems such as neck and back pain are less common.

Keywords: negative effects; digital technology; children

INTRODUCTION

The use of computer as a tool at workplaces, schools, colleges, recreation facilities and homes has become very common. Prolonged viewing of visual display terminal is associated with visual and musculoskeletal symptoms. The initial concern about use of visual display terminals (VDTs) was centered on radiation, which included X-rays, optical, radio frequency, very low frequency, and extremely low frequency radiation. No clear evidence of any negative effects on computer users was found in most studies. There were apprehensions of adverse effects on pregnant women, which were found to be incorrect by evidence [1].

Studies have shown that eye-related symptoms are the most frequently occurring health problems among VDT users. There are several symptoms reported by VDT users known as Computer Vision Syndrome (CVS). Computer vision syndrome symptoms may be the cause of ocular

(ocular-surface abnormalities or accommodative spasms) and/or extraocular (ergonomic) etiologies. However, the major contributor to computer vision syndrome symptoms by far appears to be dry eye [2]. The syndrome is manifested by symptoms of headache, eyestrain, tired eyes, blurred vision, irritation and burning sensation in the eyes, eye redness, and double vision [3]. The terms visual fatigue (VF) and digital eye strain (DES) are also used for the condition [4]. A systematic review and meta-analysis showed 66% pooled prevalence of CVS [5].

Inappropriate use of personal computers and especially cell phones might be related to the development of a complex cluster of clinical symptoms commonly defined as "text neck syndrome". There is an estimation of the stress and weight put on the neck and spine as a result of hunching over a smartphone and handheld devices at varying degrees. The neck flexion angle is the angle between the global vertical and the vector pointing from C7 to the occipitocervical joint. A fullgrown head weighs 5 kg in the neutral position. As the head bends forward, the weight seen by the neck increases to 18 kg at 30χ and 27 kg at 60χ [6].

Musculoskeletal discomfort was found to be a problem among the school-aged children during computer use. Weight and height were implicated as factors that influenced the form of posture and the nature of the reported discomfort [7]. There is considerable evidence that higher levels of screentime is associated with a variety of health harms for children and young people, with evidence strongest for adiposity, unhealthy diet, depressive symptoms and quality of life. Evidence for impact on other health outcomes is largely weak or absent. There is no consistent evidence of health benefits from screentime. While evidence for a threshold to guide policy on children and young people screentime exposure was very limited, there is weak evidence that small amounts of daily screen use is not harmful and may have some benefits [8].

Doctors, educators, and other professionals are in positions of being trusted sources of advice to families. Today, advice about digital technology is integral to parents' decision making in raising their young children. The overall goal for professionals working with families is to support them in developing digital technology use practices that are in the best interests of the child, supporting their health, well-being, and educational development [9].

The aim of the study was to examine the health risks related to digital technology use in children, to estimate the time that children spent with information technology (IT) device daily, and the time spent in exercising and sport.

METHODS

This prospective study included a sample of 105 children, 59 males (56.2%) and 46 females (43.8%), aged 12-15 years (mean age of 13.5±0.6 years). Students attending the following schools: ES "Hasan Prishtina" in Skopje, ES "Todor Angelevski" in Bitola and ES "Vancho Prke" in Shtip were included.

A physical examination was performed to detect body deformities. Motor skills testing consisted of test of balance, coordination and accuracy. For the test of balance we used balance cushion; test of coordination consisted of putting ball in a hoop, and test of accuracy consisted of shooting at a dart target.

A descriptive and comparative analysis were also applied in the research. A survey technique and unstructured interview with parents were used to collect data about the time that children spent with information technology (IT) device and the time that they spent participating in sport and exercises. A questionnaire was constructed containing a total of 24 questions. They address demographic characteristics for children, issues related to child physical activity, and issues related to the use of digital technology. Answers were offered to most of the questions.

For statistical data analysis we used ANOVA test and Chi-squared test with a level of significance $p < 0.05$.

RESULTS

Several variables as possible negative effects of digital technology use in children were analyzed. We calculated the percentage of children with computer vision syndrome (CVS) in terms of the use of eye protection (Table 1). A total of 55 children (52.4%) experienced CVS. A statistical analysis with Chi-square test showed that there is no significant difference between the occurrence of CVS and using of eye protection ($\chi^2 = 0.236$, df = 1, $p = 0.627$).

Table 1. Presence of computer vision syndrome (CVS) in children in terms of the eye protection

Using eye protection	With CVS		Without CVS		Total		P*
	No	%	No	%	No	%	
Yes	5	4.8	6	5.7	11	10.5	
No	50	47.6	44	41.9	94	89.5	
Total	55	52.4%	50	47.6	105	100	0.627

Other problems for which the excessive use of digital technology was contributing factor were: neck pain, back pain, less physical activity and overweight (Table 2). A total of 13 children (12.4%) reported neck pain, 15 children (14.3%) had back pain, 50 children (47.6%) had insufficient number of hours spent in physical activity, and 67 children (63.8%) were overweight (including obesity).

Table 2. Possible negative effects of excessive digital technology use in children

Negative effects of digital technology use	Present		Absent		Total	
	No	%	No	%	No	%
Neck pain	13	12.4	92	87.6	105	100
Back pain	15	14.3	90	85.7	105	100
Less physical activity	50	47.6	55	52.4	105	100
Overweight	67	63.8	38	36.2	105	100

The study also included an estimation of the time that children spent IT device daily, and the time spent in exercising and sport. The percentage of children according to the time spent with IT device daily (Figure 1). We included both use of IT device for educational purposes and recreational use. A total of 30 children (28.6%) reported ≥ 3 hours daily use of IT device and 22 children (21%) use IT device 1-2 hours daily. Surprisingly, a total of 53 children (50.5%) claimed that they use IT device < 1 hour daily.

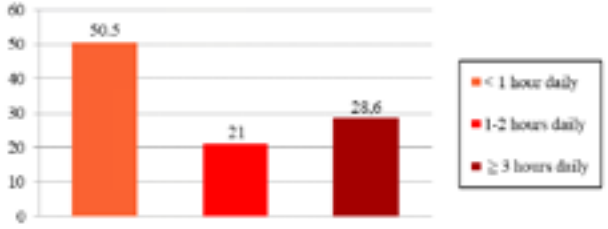

Figure 1. Percentage of children in terms of the time spent with IT device daily

A coordination and accuracy in children as indicators of motor skills were analyzed in terms of the daily time spent with IT device (below average, average, and above average). Table 3 shows descriptive statistics.

Table 3. Coordination and accuracy in terms of the mean daily time spent with IT device

Variables		N	Mean	Std. Deviation	Std. Error Lower Bound	95% CI Upper Bound		Minimum	Maximum
Coordination (putting ball in a hoop)	< 1 h	53	8.9	1.1	0.1	8.6	9.2	7	10
	1-2 h	22	8.9	0.9	0.2	8.5	9.3	8	10
	≥ 3 h	30	8.7	1.1	0.2	8.3	9.2	7	10
	Total	105	8.8	1	0.1	8.7	9.1	7	10
Accuracy (shooting at a dart target)	< 1 h	53	16.9	7.9	1.1	14.8	19.1	2	33
	1-2 h	22	16	6.8	1.4	13	19	2	26
	≥ 3 h	30	14.9	7.5	1.4	12.1	17.7	2	34
	Total	105	16.2	7.5	0.7	14.7	17.6	2	34

A statistical analysis with ANOVA test shows that there is no statistical significance between the daily time spent with IT device and tested coordination and accuracy as an indicators of motor skills of children (Table 4).

Table 4. ANOVA test for motor skills in terms of the mean daily time spent with IT device

Variables		Sum of Squares	df	Mean Square	F	Sig.
Coordination (putting ball in a hoop)	Between Groups	0.6	2	0.322	0.293	0.747
	Within Groups	112.2	102	1.100		
	Total	112.9	104			
Accuracy (shooting at a dart target)	Between Groups	79.2	2	39.582	0.692	0.503
	Within Groups	5836.4	102	57.220		
	Total	5915.6	104			

We analyzed the time that children spent playing video games daily (Figure 2). A total of 52 children (49.5%) reported that they play video games very rare.

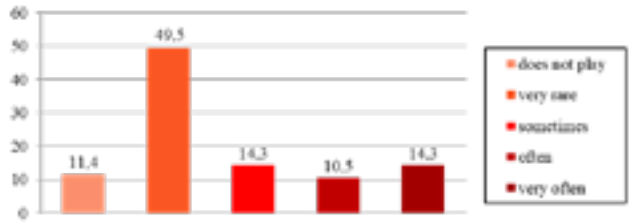

Figure 2. Percentage of children in terms of the how often play video games

Distribution of children in terms of the using social media is displayed (Figure 3).

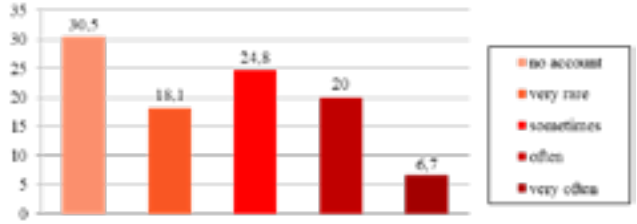

Figure 3. Percentage of children in terms of the how often use social media

We can notice that 32 children (30.5%) do not use any social media. This question was answered by the parents. Only 7 children (6.7%) reported very often use of social media.

Percentage of children in terms of the how often do they watch video on YouTube is displayed (Figure 4). We found similar percentage for the answers "very rare", "sometimes", and "often": 21.9%, 22.9% and 23.8%, respectively.

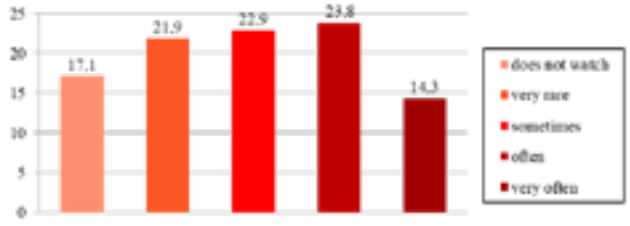

Figure 4. Percentage of children in terms of the how often do they watch video on YouTube

Distribution of children in terms of the participating in sport and exercise weekly is displayed in Figure 5. A total of 50 children (47.6%) declared that they exercise rarely, less than once a week, 13 children (12.4%) reported exercising or participating in sports once or twice weekly and 42 children (40%) reported three times or more exercising or participating in sport weekly.

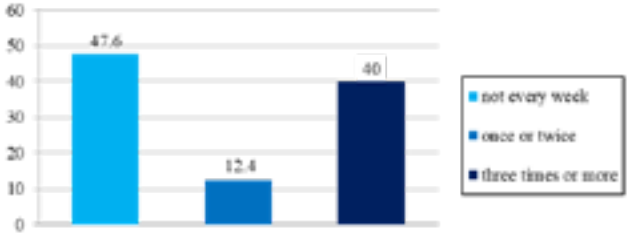

Figure 5. Percentage of children in terms of the participating in sport and exercises weekly

DISCUSSION

Digital device usage has increased substantially in recent years across all age groups including children. We examined the health risks related to digital technology use in school aged children, estimated the time that children spent with IT device daily, and the time spent in exercising and sport.

A total of 55 children (52.4%) in our study had CVS. Our findings are similar to study conducted by Mohan et al. They reported a prevalence of CVS 50.2% [10]. Hashemi et al. reported prevalence of CVS in children 49.4% [11].

In our study distribution of children in terms of the how often do they watch video on YouTube showed similar percentage for the answers "very rare", "sometimes", and "often": 21.9%, 22.9% and 23.8%, respectively. Only 24.8% reported playing video games often or very often. We can notice that 32 children (30.5%) do not use any social media. This question was answered by the parents. The general impression is that this number is bigger. American children between 8 and 18 years of age spend approximately 7.5 hours viewing entertainment media (comprising 4.5 hours watching television, 1.5 hours on a computer and over an hour playing computer games [12]. It is estimated that children and adolescents spend a medium of 5 to 7 h a day on their smartphones and handheld devices with their heads flexed forward to read and text. It has been reported that the cumulative effects of this exposure reach alarming results of an excess stress on the cervical spine area, ranging from an average of 1825 to 2555 h a year [6].

In our study, a total of 13 children (12.4%) had neck pain, 15 children (14.3%) had back pain, 50 children (47.6%) had insufficient number of hours spent in physical activity, and 67 children (63.8%) were overweight (including obesity). A study found that only 4 out of 10 children aged 6-11 years met the recommendations of the guidelines for both physical activity and screening duration, further showing that increased age was associated with decreased physical activity in children. Excessive use of technology is linked to lifetime obesity and cardiovascular risk and this relationship is now observed starting from early childhood. The excessive use of social media during the pre-school period is associated with low, but significant increases in BMI, laying the groundwork for weight gain in later childhood [13].

A study that examined head, trunk and arm posture amplitude and variation, muscle activity, sedentariness and physical activity of 3 to 5 year-old children during tablet computer use compared to television watching and toy play showed that during tablet play children had greater mean head, trunk and upper arm angles compared to both TV watching and toy play. Conversely, compared to toy play, children playing with tablets had lesser trunk, upper arm and elbow postural variation, lesser trapezius activity, more time sitting and lesser physical activity. Current findings suggest a potential for this activity to contribute to increased musculoskeletal risk and sedentary behavior and reduced physical activity [14].

Based on currently limited available evidence on mobile touch screen devices (MTSD) use, and other research on risk factors for musculoskeletal symptoms, some tentative suggestions for wise use of MTSD to help reduce musculoskeletal exposures and associated risks for musculoskeletal symptoms from MTSD use are proposed:

- Avoid excessive total usage;
- Avoid prolonged static postures;
- Use opportunities to vary whole body, head/neck and upper extremity postures during MTSD use;
- Avoid awkward postures during prolonged or repetitive use;
- Position MTSD at a height to balance head/neck and upper extremity stress – holding a MTSD at around eye level encourages neutral head/neck posture but increases upper extremity loading; holding a MTSD at around waist/lap level increases head/neck flexion but reduces upper extremity loading;
- For longer durations of use, support MTSD at a tilt angle (e.g. with the use of device accessories) to balance head/neck and upper extremity stresses higher tilt encourages neutral head/neck posture and is good for viewing only tasks; a lower tilt allows lower wrist and finger stresses and is good for tasks requiring finger or thumb input;
- Avoid high repetition of movements such as prolonged typing or swiping on MTSD;
- Avoid forceful exertions such as holding heavy MTSD in one hand for long durations [15].

In present study we did not analyze the impact of digital technology us on children's mental health. Children's behavior and development is heavily influenced by variations in sociodemographic and cultural processes operating within social eco-systems. The relationship between digital life and mental health is best characterized by a complex mix of positive and negative influences varying over time both within and between individuals – conditioned and moderated by personal characteristics and cultural, historical and socio-economic factors. It will be the urgent job of the next generation of research to parse this complexity and heterogeneity to identify new and innovative ways to reduce risk, increase resilience and exploit digital therapeutic opportunities [16].

CONCLUSIONS

Extensive use of digital technology has negative effects

on the children's health. There is a need for proper use of this technology because it can have many benefits. Majority of children that frequently use IT device are overweight and experienced CVS. Other problems such as neck and back pain are less common.

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