

Screen Time and Health Impact among Preschool Children

Saadiah Ridzuaniah Abu Hassan Ashaari, Shuganti
Mayilvahanam, Dahlilawati Ahmad, Roslida Saat, Faliza Erylina
Rameli

Faculty of Nursing and Health Sciences, Islamic University Melaka, Malaysia
Email: saadiah@unimel.edu.my

To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v14-i5/21550>

DOI:10.6007/IJARBSS/v14-i5/21550

Published Date: 25 May 2024

Abstract

Screen time has become common in this digital era where using computers, televisions (TV), smartphones and tablets has become a part of daily living, easy to access and serves as a platform for activity and entertainment especially among children. Although there are benefits to children using screens, there are also many drawbacks associated with prolonged screen use during childhood. These studies outline the effect of excessive screen exposure among preschool children that gives an impact to child development. It shows that excessive screen time causes an impact toward health, development and behaviour. However, it can be controlled by implementing strategies by maintaining a balanced lifestyle.

Keywords: Screen Time, Children, Preschool, Health, Behaviour

Introduction

In the digital era, people are surrounded by a wide range of technological gadgets ranging from computers, televisions (TV) to smartphones and tablets in most daily activities including as a platform for education and employment. A gadget is a little piece of machinery or equipment that serves a practical purpose. The device might be static but needs input from the user. Study conducted by Rashid et al (2021) reveal that over 87% of the respondent utilised electronic gadgets of some kind, most popular device was a smartphone, which was used daily for a variety of purposes by 67.11%, slightly more than 39% of participants watched movies or cartoons; social media and video games came in second and third, respectively, at 27% and 17%.

Early screen exposure is becoming more common for children due to the quick development of technology. The prevalence of screens in everyday life, prompts worry about the potential negative effects of prolonged screen time on children's growth and wellbeing. Barber et al (2017) refers to screen time as the amount of time spent using electronic or digital media devices. The World Health Organization (WHO) has issued guidelines to enable children

to grow up healthy such as limit screen watching time, promote quality sleep and more active play time. However, recent research indicates that children's screen usage has increased dramatically in the last ten years on average. In 2011, 52% of children aged 0 to 8 had access to mobile devices and by 2013, this access had reached 75% (Chassiakos et al., 2016).

The use of gadgets at an early age should facilitate and expose children to interactive learning. Screens also provide a multitude of stimuli, ranging from entertainment content to educational applications, which attract children's minds and frequently result in extended periods of digital engagement. Although this technology tool offers a variety of facilities, it can also have a negative impact on the health of the individual especially in childhood. Excessive screen time between two to five years of age can have a detrimental effect on their cognitive, social and emotional development where their brains are rapidly growing and forming connections. The constant exposure to screens has led to increased concerns about the potential effects on children's physical and mental health. Research suggests that excessive screen time can contribute to a sedentary lifestyle, leading to an increased risk of obesity and other health issues in children. Prolonged screen time may also have an adverse effect on children's social and cognitive development because it can reduce their possibilities for in-person interactions and experiential learning.

The development of technology-based education and recently, COVID-19 pandemic has led to online education methods, allowing screen exposure in children as young as less than one year old which may cause negative impact on their health. Parents, educators, and healthcare professionals are becoming more concerned about this phenomenon as it occurs more frequently and may have unhealthy effects on children's development. To promote healthy development, it is important to understand the extent and trend of screen time and how it affects children's development. This study will focus on determining possible variances among different demographic characteristics and measuring screen time among preschoolers.

Previous Study

Aged group and screen exposure

For the younger generations of today, screen-based media has become an integral component of everyday life. According to Nimbalkar et al (2019), almost half of infants receive regular screen time exposure by the time they are three months old, and by the time they are 24 months old, the number increases to 90%. Early children screen addiction is linked to negative outcomes like obesity, a rise in sedentary behaviour, irregular sleep patterns, and developmental defects. Although, The American Academy of Paediatrics guidelines suggest that children under the age of five should not spend more than an hour a day on screens to prevent these negative impacts, finding in this study shows that TV and smartphones were the main sources of the over 80% of kids who overindulged in screen time.

Another study done by Yalçın et al (2021) using "Seven-in-Seven Screen Exposure Questionnaire," a measure created to assess PSE in Turkish preschoolers. It was revealed that 35.5% of 6–9-year-old children spent at least two hours a day in front of a screen, while 2–6-year-old children looked at screens for an average of 86 minutes a day. Nonetheless, previous cross-sectional research of Turkish preschoolers (3–6 years old) found that they watched TV for an average of 2.2 hours a day, with half of them doing so alone, without the presence of a parent or carer. Five decades ago, the average age at which a child was exposed to a screen for the first time was approximately 4 years old; today, that age is 4 months. Except for video chatting, the AAP does not advise children under the age of 18 months to utilise screen media.

Because the young brain is still maturing and at its most vulnerable, early screen exposure may have detrimental impacts such as the development of addictive behaviour, impaired vocabulary acquisition, and impairment of language, cognitive, and executive skills. Study also showed that preschoolers who spend too much time on screens typically have a prevalence of 10 to 93% in high-income nations and 21 to 98% in middle-income countries. This excessive screen time is linked to several health problems.

Based on study conducted by Xiang et al (2022), One-hour or more of screen time was reported by approximately 34.8% (n = 1734) of preschool-age children, and 11.9% (n = 592) reported beginning to use screen-based media before the age of two. Children who used screens excessively were more likely to have primary carers other than their parents when compared to children who used screens moderately. Rejecting and overprotective parenting approaches, as well as negative emotional states including despair, anxiety, and tension, were more common in parents of children who spent too much time on screens. These parents were also less educated, younger, and had lower monthly per-capita incomes. In addition, compared to children who began using screen-based media after the age of two, those who experienced early screen exposure were younger, more likely to reside in a household with low levels of family harmony, and their parents were more likely to experience negative emotional states of stress and anxiety. The study also found that children who are exposed to screen exposure are more emotional than those who are less exposed.

Impact on health

According to Sarla (2019), excessive smartphone use might result in repetitive stress injuries or overuse syndrome, which can impede hand function and produce thumb pain. People who use cellphones excessively are likely to feel that their social interactions are not fulfilling and encouraging, and that they are not actively boosting the happiness and well-being of others, due to their decreasing levels of in-person connection. Griffiths et al (2007) also said that gadgets also can have negative effects on the brain, overall structural behaviours, and psychological issues. Overuse of computers can result in significant radiation exposure, which poses a risk to one's health. It can have major effects on the immune system, nervous system, DNA, hormone balances, productive system, and more. Other health issues associated with heavy computer use include an increase in cancer and heart disease.

Habibzadeh (2018) did mention in his study, beside smartphones, another common gadget like computer also giving an impact to health. Increased computer use can have an effect on aspects of mental and physical health. It is associated with poor posture, musculoskeletal pain, obesity, deteriorating vision, and mental health issues. The health risks associated with computer use are extremely concerning. High computer usage can cause discomfort and injury to the musculoskeletal system, which can then affect posture and movement. Overuse of computers can raise the risk of obesity and associated illnesses. It can weaken eyesight and give you headaches all the time. As additional, overuse of computers and the internet can lead to a number of mental health conditions, including social anxiety disorder, stress, and anxiety. Overindulging in computer use can increase an individual's risk of developing major physical and mental health issues.

A crucial multifaceted notion, health-related quality of life encompasses social, emotional, and physical facets of one's life. A prior study in children and adolescents by Wong et al (2021), found a correlation between sleep duration, screen time, and physical activity level and that the health-related quality of life (HRQoL) was highest in those with lower screen time and moderate physical activity. Particularly, usage of screen-based media during the

hour before bedtime was linked to a poorer HRQoL in children and adolescents, indicating the importance of promoting healthy sleep patterns and limiting screen time in this age group. The results of the current study were in line with those of earlier ones in that children and teenagers with lower screen time, more adequate sleep, and higher levels of physical activity generally had higher HRQoL scores. This research has generally highlighted the connection between screen time, physical activity, and sleep quality and quantity on HRQoL-based health outcomes.

Another issue that also needs to be an alarm is the usage of laptops, another type of gadget as according to Mortazavi et al (2016), male reproductive health is negatively impacted when laptops are used on the lap. Not only may the heat from a laptop warm men's scrotum while they are on their laps, but the electromagnetic fields produced by the laptop's internal electronic circuits and the potential for Wi-Fi radiofrequency radiation (in laptops that are connected to Wi-Fi) can also lower the quality of sperm. Additionally, using a laptop on one's lap for extended periods of time is not recommended owing to bad posture.

Impact on behaviour and development

Numerous studies have delved into the effects of screen exposure on behaviour, particularly among children and adolescents. In contemporary society, the pervasive use of screens has become an integral part of daily life for individuals of all ages. However, alongside the convenience and entertainment provided by screen technology, concerns have arisen regarding its potential impact on behaviour and health. One of the most significant concerns surrounding screen exposure is its potential to induce behaviour changes, particularly among children and adolescents. Studies have indicated a relationship between increased screen time and behavioural problems, including impulsivity, aggression, attention difficulties, and reduced social skills. Furthermore, sedentary screen-based activities often replace active pursuits, leading to a decline in physical activity levels, which can further exacerbate behavioural issues and impact overall health.

Few studies conducted by researcher from China reported that preschooler with screen time of more than 60 min are tend to have more behavioural problems and they are at risk of negative effect on temper, character, vulnerable inattention and Attention Deficit Hyperactive Disorder (ADHD) symptoms Xie et. al (2020); Chen et al (2020) reported the presence of autistic-like behaviour at preschool aged; and poor communication (Hu, Bi, Wong & Liu, 2023). Meanwhile Suleman et al (2023) reported children tend to suffer withdrawal syndrome and autistic spectrum problems which are characterised by persistent deficits in communication, social interaction and stereotyped patterns of behaviour.

Moreover, findings also reveal that having a television in a child's bedroom at age six predicts decreased emotional understanding at eight years old. Furthermore, gaming appears to be associated with diminished emotional understanding in boys, while this effect is not observed in girls. According to these results, children's emotional development may be impacted differently by various screen activities, possibly depending on their gender (Muppalla et al., 2023). Hence, prolonged screen exposure might pose greater risks to younger children compared to older adolescents (Qu et al., 2023). Excessive screen time may contribute to shorter attention spans, making it challenging for preschoolers to focus on tasks or activities without becoming easily distracted. In addition to this, high levels of screen exposure can lead to heightened levels of hyperactivity among preschool children, making them more restless and fidgety (Tooth et al., 2021).

The rule-breaking behaviour scale comprises items such as "lacks guilt after misbehaving," "engages in lying or cheating," "disobeys rules at home, school, or elsewhere," and "steals outside the home." There exists a potential connection between rule-breaking behaviour and an underlying inclination towards sensation-seeking. It is widely recognized that children exhibiting sensation-seeking tendencies are susceptible to developing addiction to screen media (Choi et al., 2021). However, sensation-seeking could also offer insights into addressing these issues, as children with such tendencies are prone to engaging in rule-breaking behaviour. It is important to note that only the rule-breaking behaviour subscale has demonstrated an increase, apart from aggressive behaviour.

Previous longitudinal studies have revealed that these two behaviours follow distinct developmental trajectories (Choi et al., 2021). Studies have shown a correlation between increased screen time and heightened levels of aggression in preschoolers. Exposure to violent or aggressive content on screens may contribute to the development of aggressive behaviour in young children (Djalalinia et al., 2020). Several studies conducted in India during COVID lockdown reported that the extended use of digital gadgets influenced young children's mobile dependency, socialisation process, cognition, behaviour patterns and exhibited isolation tendencies and behavioural abnormalities among children (Joseph et al., 2022); more screen time associate with 25.53% higher risk of demanding extra attention, temper tantrums (21.31%), increased aggressiveness (19.90%), became fussier (18.74%) and clinging (18.27%) (Gunasekaran et al., 2022).

According to Guerrero et al (2019); Choi (2021), greater time spent playing mature-rated video games was associated with greater somatic complaints, aggressive behaviour, and reduced sleep duration. Besides that, the study also shows that watching television/movies was associated with an increase in rule-breaking behaviour, increase in social problems, increase in aggressive behaviour, and increase in thought problems. This shows that greater time spent in screen time was associated with greater problem behaviours among children. Sleep is important for children and young adolescents because it helps with mental, physical, social and emotional development. According to the World Health Organization (WHO, 2019), children under the age of five should get 10 to 13 hours of good quality sleep each day and limit sedentary time of not more than 60 minutes. For children to sleep healthily, they need to get enough sleep, have regular sleep schedules, high-quality sleep, and no sleep disturbances. Study done Tempesta et al (2018) shows that sleep problems influence emotions and regulation of neurobiological behavioural and cognitive processes, mainly through behavioural tendencies and neurological changes which give to more negative emotions.

Excessive screen time, particularly before bedtime, also disrupts preschoolers' sleep patterns, leading to difficulties falling asleep or staying asleep throughout the night. Poor sleep quality can further exacerbate behavioural issues during the day (Hisler et al., 2020). Parent, Sanders, and Forehand (2016) reported that higher levels of youth screen time were associated with more sleep disturbances, which, in turn, were linked to higher levels of youth behavioural health problems. These also supported by Maurya et al (2022) that more than 2 hours on smartphone had higher chances of reporting sleep problems than those who did not use smartphone in the last 24 hours.

According to Bibi (2022), who also found that children exposed to virtual media for more than two hours a day had more significant problems with social interaction, emotional responsiveness, speech and communication where they became anxious to make new friends and communicate with new people. They can neither easily imitate other people's actions nor

understand their emotions. In terms of motor aspects, they had much slower responses than children with less screen exposure. These outcomes were in line with a different study by Lissak (2018) which revealed that children's physiological and psychological health suffered from excessive screen usage.

Conclusion

Excessive use in screens has been connected to a number of detrimental outcomes for children' health and development, such as disturbed sleep, less physical exercise, and poor social skills. Therefore, parents may be proactive in limiting their children screen time and encouraging better behaviours with well-planned strategy and implementation. By using techniques that are often employed and promoting open communication with them, parents may assist their children in developing positive attitudes and behaviours toward technology while still maintaining a balanced lifestyle that prioritises their overall well-being.

This research significantly enhances the existing body of knowledge by providing a nuanced understanding of the correlation between screen exposure and its medical impacts on preschool-aged children. These are some practical techniques for parents and caregivers to limit and reduce screen time. Parents can set screen time limitations by designating specific period limits for certain sorts of screen activity, such as educational or entertainment. Furthermore, creating a daily or weekly calendar with designated times for screen use and non-screen activities can be beneficial.

To introduce healthy technology into the house, it is vital to establish a technology-free zone. Awareness campaigns and technology-free zone slogans should be expanded so that all families can practise and implement them as effectively as possible to balance their online and offline time. A technology-free zone is a designated area of the home where screens and technology are restricted, allowing for valuable family time. Technology-free zones promote meaningful interaction between families, allow for relaxation and creativity, and increase sleep quality and overall well-being.

Creating a technology-free zone at home, for example, by encouraging physical activity through sports, outdoor play, and other physical activities has been shown to be beneficial in keeping children active. Parents and caregivers can encourage their children to engage in hobbies like reading, arts and crafts, music, and other creative pursuits. This is to prioritise quality interaction and healthy habits, as well as establishing family relationships. Technology-free zones promote meaningful interaction between families, allow for relaxation and creativity, and increase sleep quality and overall well-being. To maintain good physical and mental health and great family ties, family members must balance their use of technology and non-technology with meaningful offline time. Additionally, parents are encouraged to provide a good example of healthy screen behaviours by limiting their own screen usage.

Contextually, this study sheds light on contemporary media consumption patterns among young children, reflecting the rapid technological advancements and their pervasive influence in domestic environments. By identifying critical thresholds of screen exposure that correlate with specific health outcomes, this research provides valuable insights for parents, educators, and policymakers, advocating for informed guidelines and interventions aimed at optimising child health and development in the digital age.

To put it into action, the next study should focus more on the establishment of technology-free zones and practical techniques for carrying out a campaign to balance the use of technology with a healthy mental and physical existence.

Acknowledgement

We would like to express our sincere gratitude to all co-author for their effort, dedication and valuable contribution toward this project. To our family, colleagues, and all others for their helpful suggestions, and moral support throughout the duration of this project. Last but not least, to Islamic University Melaka, Malaysia for providing financial support for this research which their funding made this paper possible.

Corresponding Author

Saadiah Ridzuaniah Abu Hassan Ashaari
Islamic University Melaka, Malaysia
Email: saadiah@unimel.edu.my

References

- Barber, S. E., Kelly, B., Collings, P. J., Nagy, L., Bywater, T., & Wright, J. (2017). Prevalence, trajectories, and determinants of television viewing time in an ethnically diverse sample of young children from the UK. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1). <http://doi:10.1186/s12966-017-0541-8>
- Bibi, A., Khan, N. S., Rasheed, H., Kulsoom, U., Musharraf & Ali, Sajid. (2022). Effects of Increased Electronic Screen Exposure and Its Relation with Autistic Spectrum Symptoms (ASD) – A Cross Sectional Study in Peshawar. *Pakistan Journal of Medical Research*, 61(1), 30-34. Retrieved from <https://www.pjmr.org.pk/index.php/pjmr/article/view/269>
- Chen, J. Y., Strodl, E., Huang, L. H., Chen, Y. J., Yang, G. Y. Y. & Chen, W. Q. (2020). Early Electronic Screen Exposure and Autistic-Like Behaviours among Pre-schoolers: The Mediating Role of Caregiver-Child Interaction, Sleep Duration and Outdoor Activities. *Children*, 7(11), 200. <http://doi:10.3390/children7110200>
- Choi, Y., Lee, D. Y., Lee, S., Park, E.-J., Yoo, H. J., & Shin, Y. (2021). Association between screen overuse and behavioral and emotional problems in elementary school children. *Journal of the Korean Academy of Child and Adolescent Psychiatry*, 32(4), 154–160. <https://doi.org/10.5765/jkacap.210015>
- Creswell, J. W. & Creswell, J.D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Germany: SAGE Publications.
- Djalalinia, S., Kelishadi, R., Keikha, M., Qorbani, M., & Kazemi Tabaei, M. (2020). Screen time activities and aggressive behaviors among children and adolescents: A systematic review. *International Journal of Preventive Medicine*, 11(1), 59. https://doi.org/10.4103/ijpvm.ijpvm_71_20
- Griffiths, K. L., Mackey, M. G., & Adamson, B. J. (2007) The impact of a computerized work environment on professional occupational groups and behavioural and physiological risk factors for musculoskeletal symptoms: a literature review. *Journal of Occupational Rehabilitation*, 17(4), 743-765. <https://doi.org/10.1007/s10926-007-9108-x>
- Guerrero, M. D., Barnes, J. D., Chaput, J. P., & Tremblay, M. S. (2019). Screen time and problem behaviours in children: exploring the mediating role of sleep duration. *International Journal of Behavioral Nutrition and Physical Activity*, 16(1). <https://doi.org/10.1186/s12966-019-0862-x>
- Gunasekaran, A., Karupannagounder, G., Rangaswamy, V., Muraleetharan, G., Panneerselvam, P., Sugahthi, V., & Sasikala, G. (2022). Association between Screen Time and Psychosocial and Behavioural Well-Being of Preschoolers during the COVID-19

- Lockdown in Tamil Nadu. *Apollo Medicine*, 19(4), 234-240. https://doi.org/10.4103/am.am_101_22
- Habibzadeh, N. (2018). The Effect of Long - Term Computer Use on Health- Related Physiological Perspectives. *International Physiology Journal*, 1(3), 9-14. <https://doi.org/10.14302/issn.2578-8590.ipj-18-2471>
- Hisler, G. C., Hasler, B. P., Franzen, P. L., Clark, D. B., & Twenge, J. M. (2020). Screen media use and sleep disturbance symptom severity in children. *Sleep Health*, 6(6), 731–742. <https://doi.org/10.1016/j.sleh.2020.07.002>
- Hu, Z., Bi, S., Wang, W., Liu, C., & Li, L. (2023). Association of screen exposure with psychosocial problems in primary school students. *Frontier in Pediatrics*, 10. <https://doi:10.3389/fped.2022.961137>
- Lissak G. (2018). Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental research*, 164, 149–157. <https://doi.org/10.1016/j.envres.2018.01.015>
- Maurya, C., Muhammad, T., Maurya, P. *et al.* (2022). The association of smartphone screen time with sleep problems among adolescents and young adults: cross-sectional findings from India. *BMC Public Health*, 22, 1686. <https://doi.org/10.1186/s12889-022-14076-x>
- Mortazavi, S. A., Taeb, S., Mortazavi, S. M., Zarei, S., Haghani, M., Habibzadeh, P. & Shojaei-Fard, M. B. (2016). The Fundamental Reasons Why Laptop Computers should not be Used on Your Lap. *Journal of Biomedical Physics & Engineering*, 6(4), 279-284. <https://pubmed.ncbi.nlm.nih.gov/28144597/>
- Muppalla, S. K., Vuppapapati, S., Reddy Pulliahgaru, A., & Sreenivasulu, H. (2023). Effects of Excessive Screen Time on Child Development: An Updated Review and Strategies for Management. *Cureus*, 15(6). <https://doi.org/10.7759/cureus.40608>
- Nimbalkar, S., Shah, R., Fahey, N., Soni, A., & Phatak, A. (2019). Screen time usage among preschoolers aged 2-6 in rural Western India: A cross-sectional study. *Journal of Family Medicine and Primary Care*, 8(6), 1999. https://doi.org/10.4103/jfmpc.jfmpc_206_19
- Parent, J., Sanders, W., & Forehand, R. (2016). Youth Screen Time and Behavioural Health Problems. *Journal of Developmental & Behavioral Pediatrics*, 37 (4), 277-84. <https://doi:10.1097/DBP.0000000000000272>
- Qu, G., Hu, W., Meng, J., Wang, X., Su, W., Liu, H., Ma, S., Sun, C., Huang, C., Lowe, S., & Sun, Y. (2023). Association Between Screen Time and Developmental and Behavioral Problems Among Children in The United States: evidence from 2018 to 2020 NSCH. *Journal of Psychiatric Research*, 161, 140–149. <https://doi.org/10.1016/j.jpsychires.2023.03.014>
- Rashid, S. M. M., Mawah, J., Banik, E., Akter, Y., Deen, J. I., Jahan, A., Khan, N. M., Rahman, M. M., Lipi, N., Akter, F., Paul, A. & Mannan, A. (2021). Prevalence and impact of the use of electronic gadgets on the health of children in secondary schools in Bangladesh: A cross-sectional study. *Health Science Reports*, 4(4), e388. <https://doi:10.1002/hsr2.388>
- Chassiakos, R. Y., Radesky, J., Christakis, D., Moreno, M. A., Cross, C. (2016). Children and Adolescents and Digital Media. *Pediatrics*, 138(5). <https://doi.org/10.1542/peds.2016-2593>
- Sarla, G. S. (2019). Excessive use of electronic gadgets: health effects. *The Egyptian Journal of Internal Medicine*, 31, 408–411. https://doi.org/10.4103/ejim.ejim_56_19
- Suleman, M., Sughra, U., Riaz, A., & Akbar, M. (2023). Effect of screen time on behavior of pre-schoolers in Islamabad. *Pakistan journal of medical sciences*, 39(2), 502–507. <https://doi.org/10.12669/pjms.39.2.6883>

- Tempesta, D., Socci, V., De Gennaro, L., & Ferrara, M. (2018). Sleep and emotional processing. *Sleep Medicine Review, 40*, 183–195. <https://doi.org/10.1016/j.smr.2017.12.005>
- Tooth, L. R., Moss, K. M., & Mishra, G. D. (2021). Screen Time and child behaviour and health-related quality of life: Effect of family context. *Preventive Medicine, 153*, 106795. <https://doi.org/10.1016/j.ypmed.2021.106795>
- Vadakkemulanjanal Joseph G., Thomas, A., Elizabeth, S., Vargheese, S., & Thomas, J. (2022). The Impact of Screen Time and Mobile Dependency on Cognition, Socialization and Behaviour among Early Childhood Students during the COVID Pandemic. Perception of the Parents. *Digital Education Review, 41*, 14-123 <https://doi.org/10.1344/der.2022.41.114-123>
- Wong, C. K., Wong, R. S., Cheung, J. P., Tung, K. T., Yam, J. C., Rich, M., Fu, K.-W., Cheung, P. W., Luo, N., Au, C. H., Zhang, A., Wong, W. H., Fan, J., Lam, C. L., & Ip, P. (2021). Impact of sleep duration, physical activity, and screen time on health-related quality of life in children and adolescents. *Health and Quality of Life Outcomes, 19*(1). 145. <https://doi.org/10.1186/s12955-021-01776-y>
- World Health Organization. (2019). *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. <https://www.who.int/publications/i/item/9789241550536>
- Xiang, H., Lin, L., Chen, W., Li, C., Liu, X., Li, J., Ren, Y., & Guo, V. Y. (2022). Associations of excessive screen time and early screen exposure with health-related quality of life and behavioral problems among children attending preschools. *BMC public health, 22*(1), 2440. <https://doi.org/10.1186/s12889-022-14910-2>
- Xie, G., Deng, Q., Cao, J. *et al.* (2020). Digital screen time and its effect on preschoolers' behaviour in China: results from a cross-sectional study. *Italian Journal of Pediatrics, 46*(1). <https://doi.org/10.1186/s13052-020-0776-x>
- Yalçın, S. S., Tezol, Z., Çaylan, N., Nergiz, M. E., Yıldız, D., Çiçek, E., & Oflu, A. (2021). Evaluation of problematic screen exposure in pre-schoolers using a unique tool called “seven-in-seven screen exposure questionnaire”: cross-sectional study. *BMC Pediatrics, 21*(1). <https://doi.org/10.1186/s12887-021-02939-y>