

**Leading Article**

## **Excessive screen use in children and adolescents: Impact, risk factors and interventions**

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### **Introduction**

The use of electronic media and screens by children and adolescents has increased over the years. Literature shows that screen time in children and adolescents have doubled over the period from 1997 to 2014<sup>1</sup>. This has further increased by 20-66% percent during the pandemic<sup>2</sup>. As well as spending more time on screens, children are also being introduced to screens at a much younger age. Recent studies revealed that the great majority of children nowadays are being exposed to screens even during infancy. A study done in Australia revealed that by 4 months of age, infants were spending an average of 44 minutes on screens<sup>3</sup>. A similar study done in the USA found that 17% of the infants watched more than 2 hours of television daily<sup>4</sup>.

Early exposure to screens is known to lead to developmental delays, autistic-like behaviour, attentional problems, sleep disturbances and mental health problems, in children and adolescents<sup>5-10</sup>. Recognizing the adverse effects associated with excessive screen time, the American Academy of Paediatrics has recommended that children younger than 18-24 months should not be exposed to electronic screens and that children between 24 months to 5 years should have daily exposure of no more than 1 hour of screen time<sup>11</sup>. However, studies have found that many parents were not aware of these recommendations and even those who were aware, did not adhere to these recommendations.

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Studies on screen time in children in Sri Lanka are limited and show varying results. One study showed that the mean duration of screen time among primary school children in Kandy was 32.5-41 minutes per day on weekdays and 50.5-63 minutes per day on weekends<sup>12</sup>. This study revealed that only 6% of the children exceeded the recommended screen time during weekdays whereas 12% exceeded the limits during weekends. A study on screen addiction done among obese and overweight children attending the nutritional clinic in a Teaching Hospital in Sri Lanka showed that 41.4% of the participants were addicted to technological devices<sup>13</sup>. A study on television viewing on children and adolescents in the Anuradhapura Educational Zone revealed that the mean television viewing time per week in children and adolescents was 23.6 hours<sup>14</sup>.

The number of children and adolescents presenting to child and adolescent mental health services in Sri Lanka due to problems associated with excessive screen use has markedly increased since the onset of the pandemic. Clinical experience suggests that the majority of these parents are unaware of the recommendations about screen time. Furthermore, many have received conflicting information with regard to the benefits and adverse effects of screen time from different healthcare professionals, which further complicates the management of these children. Therefore, this paper aims to summarize the current evidence-base about the adverse effects of excessive screen time on children and adolescents and suggests how this evidence can be practically applied in the Sri Lankan setting.

### **Impact of screen time on children and adolescents**

#### ***Impact on child development***

Excessive screen time during early brain development has been shown to be associated with delays in all domains of development. Screen time robs children of time that can be spent on play, communication and social interactions, which are essential for optimal development during early childhood. Studies have confirmed higher levels of screen time at 24 and 36 months, to be associated with poor performance at developmental screening

tests at 36 months and 60 months respectively<sup>9</sup>. An inverse relationship between screen time and motor skills in young children, especially with regard to manual dexterity has been described in some studies<sup>15</sup>. Language delay associated with excessive screen time is well-documented in the literature with several studies confirming this association. The relationship between excessive screen time and language delay has been shown to be especially high for children who are introduced to screens during infancy, to those who started using screens before 12 months and spent more than 2 hours on screens, having a 6-fold risk in developing language delays<sup>5</sup>. Higher screen times at 29 months was also shown to be associated with decreased vocabulary and less school readiness at 65 months of age<sup>16</sup>. Furthermore, screen time has been shown to affect the development of socio-emotional skills and play skills in children. Excessive screen time is also suggested to affect cognitive development in young children. Poor executive functioning, decreased attention, poor problem-solving skills, decreased thinking skills and poor memory have been described as consequences of excessive screen time<sup>9,17</sup>. Early exposure to digital media, greater duration of use and media multi-tasking have been described as risk factors for poor executive functioning. Quite alarmingly, premature neurodegeneration and early-onset dementia have also been suggested as possible outcomes of excessive use of screens, as evidenced by differences in thinning of the cortex in children who used electronic media for more than 7 hours per day<sup>18</sup>. Increasing attention has recently been paid to the association between screen time and autistic-like symptoms in pre-schoolers. Introduction to screens in early life (especially before 2 years of age), longer periods of daily use and longer cumulative screen time since birth have been described to be associated with a higher risk of developing autism-like symptoms<sup>7,19</sup>.

#### ***Impact on learning and academic performance***

Contrary to popular belief, research shows that children under the age of 2 years do not have the capacity to learn from electronic screens. Children younger than 2 years are in the Piaget's sensory-motor stage of cognitive development, with lack of symbolic thinking and memory flexibility to transfer material learnt from a 2-dimensional screen to a 3-dimensional world<sup>20,21</sup>. Children at this age learn best through play and social interactions with their caregivers. Pre-schoolers, on the other hand, do have the capacity to learn language and literacy skills through high quality, well-designed, interactive educational media. However, research shows that out of the proportion of time pre-schoolers spent on screens, only a minority was used for educational purposes. Studies have found that the impact of screen use on academic performance depended on

the type of activity engaged in, rather than the total time spent on screens. According to the results of a meta-analysis of 58 studies, passive television viewing and video game playing had the highest negative impact on academic performance, whereas the use of electronic media for educational purposes had a positive effect on academic performance<sup>22</sup>. In addition, this study revealed that the adverse impact of screen use on academic performance was higher for adolescents than for children.

#### ***Impact on physical health***

The negative physical effects associated with excessive screen time is well-documented. The association between excessive screen time and increased cardiovascular risk is confirmed by several studies and is thought to occur via sedentary lifestyle and unhealthy food habits leading to obesity, high blood pressure, insulin resistance and high-density lipoprotein dysfunction<sup>23</sup>. In addition to the effects on the cardiovascular system, screen time has been shown to be associated with a variety of visual problems in children and adolescents. Research has described eye fatigue, blurring of vision, dryness of eyes, eye discomfort, myopia, transient diplopia and eyelid tics to be associated with excessive use of electronic screens. Moreover, deterioration of binocular coordination of saccades, lower speed of saccades and decreased divergence capacity have also been described<sup>24-25</sup>. Excessive use of screens is also associated with significant musculoskeletal effects such as reduced bone density and musculoskeletal pain and discomfort via its effect on posture<sup>26</sup>. Children who had greater screen time and shorter viewing distance were especially at risk of developing musculoskeletal problems.

#### ***Impact on sleep***

Electronic media is known to be associated with a reduced amount of sleep, poor quality of sleep, delayed bedtime and delayed onset of sleep. A recent review described an association between screen time and poor sleep outcomes in 90 percent of the cases<sup>6</sup>. An hour of screen time was found to lead to loss of 16 minutes of sleep, in children, in a study done in 2017. Another study demonstrated that adolescents engaging in excessive screen use were 1.34 times more likely to suffer from insufficient sleep. Furthermore, the relationship between sleep and screen time is postulated to be bi-directional. Excessive screen results in insufficient sleep which in turn is thought to lead to daytime fatigue the next day, resulting in less physical activity and further use of electronic media<sup>27</sup>. Several mechanisms have been thought to contribute to the impairment of sleep associated with electronic media. One postulated mechanism is through suppression of melatonin production through exposure to bright light and blue light emitted by the

electronic screens during evening and night time use<sup>28</sup>. Psychological arousal that occurs due to engaging in stimulating video games or watching arousing content is also thought to be responsible<sup>28</sup>. In addition, reduced physical activity associated with excessive use of screens is also thought to contribute to the sleep disturbances.

#### ***Impact on mental health and behaviour***

Excessive use of digital media has been shown to be associated with poor psychosocial health, including loneliness, withdrawal from family and poor self-esteem. A relationship between excessive electronic media use and attention deficit hyperactivity disorder, depression, anxiety and suicidal thoughts has also been confirmed by several studies<sup>8,29</sup>. Depressive symptoms and screen time are described to have a non-linear dose-response relation<sup>30</sup>. There is also abundant evidence on the association between exposure to violent media through television or video games and aggression in children and adolescents. Studies have reported increased aggression and violence, increased anti-social behaviour, social difficulties, reduced prosocial behaviour and lack of empathy to be associated with viewing violence on media<sup>23,31</sup>. Furthermore, a link has been found between exposure to violent media between 6-10 years of age and violent behaviour, antisocial personality disorder and criminal convictions in early adulthood. Digital media has also been shown to have an impact on substance use in adolescents, with the association being greater for higher screen time<sup>32</sup>.

#### ***Risk factors for excessive screen use for children and adolescents***

Demographic factors such as lower socio-economic status, lower maternal education and social marginalization have been showed to be associated with increased screen use in children. Family factors such as single parent families, having a sibling or the father as the primary caregiver, parental divorce and low connectedness between the family members have also been shown to be risk factors for higher screen use in children and adolescents. Higher levels of parental digital media use is an important predictor of excessive screen time in their children and is thought to be moderated through modelling and social learning<sup>33-34</sup>. Positive parental attitudes with regard to digital media, having a television, computer or a video game console in the bedrooms, greater number of televisions, computers and video game consoles in the household and having meals in front of digital media are also identified as risk factors for problems with excessive screen use in children. Parental mental health problems, especially parental depression, have also been described as a predictor of screen time related problems in children.

Child factors such as older age of the child, male sex, difficult temperament, problems with self-regulation and delays in social and emotional development have been described as risk factors for problematic use of digital media. It is thought that parents of difficult children and children with socio-emotional difficulties often use digital media as a means of calming down their children, which leads to problematic screen use later. Being an only child has also been identified as a risk factor due to parents usually being reluctant to set limits to their only child. On the other hand, authoritative or authoritarian parenting styles with clear rules around screen time are shown to be protective factors against problematic use of screens<sup>33-34</sup>.

#### ***Interventions to prevent excessive use of screens in children and adolescents***

Given the physical and psychosocial adversities associated with excessive use of digital media in children and adolescents, measures should be taken for prevention, early identification and treatment of these children to minimise the long-term harmful impact of screens. This cannot be done by parents or a single healthcare professional alone, but requires participation and collaboration between various stakeholders.

#### ***Role of parents***

Parents have the greatest role in preventing their children from excessive use of digital media. The first step in prevention of excessive screen time is to have age-appropriate rules and limits around screen time. These rules should not only focus on the overall time spent on screens, but should also include limits on the timing of use and the content accessed. For example, it is recommended that screens should not be allowed during mealtimes and one hour prior to bedtime. Keeping electronic devices in their bedroom should also be discouraged<sup>11</sup>. However, enforcing strict rules around screen time to older adolescents may be practically difficult and may actually be counterproductive. For older adolescents, open communications about the dangers of online environments and online safety, while enforcing only essential rules around screen time is more practical. It is also essential for parents to familiarise themselves with social media and digital technology so that they are able to monitor the content accessed by their children on electronic media. It is also necessary to periodically check what content or apps have been downloaded by your child and remove any inappropriate content. Using software to limit access to inappropriate content online is also essential. With younger children, co-viewing (i.e. watching television with their children) is important to make sure they understand the content that is viewed and to give them an opportunity to clarify any doubts. Parents should encourage their children

to engage in physical activity, hobbies, face-to-face social interactions and screen-free play. It is also important for parents to spend quality time with their children and build close family relationships. Furthermore, parents should refrain from using electronic screens as a means of controlling difficult behaviour. Finally, it is vital for parents to be vigilant about their own electronic media use and make sure that they model the behaviour that they expect from their children<sup>11,35</sup>.

#### ***Role of healthcare workers***

Given the high prevalence of excessive electronic media use in children, healthcare providers working with children need to inquire about the screen time as a part of routine paediatric history taking. A more detailed history on screen time is needed in children and adolescents presenting with autism-like features, developmental delay, headaches and visual problems, due to their clear association with excessive use of electronic media. This will enable early identification of children with screen dependency, allowing early referral to specialised child and adolescent mental health services. Primary healthcare providers and paediatricians have the most contact with children and adolescents and have the chance to provide advice with regard to healthy use of electronic media. Every opportunity should be taken to advise parents about recommended screen times, impact of excessive use of screens and practical strategies to overcome these problems.

#### ***Role of government and policy makers***

Clinical experience suggests that the great majority of Sri Lankan parents are unaware of the screen time recommendations. They also have poor awareness on where to obtain such information and what services are available in cases of problematic screen use in children. This is especially difficult since most of the parent education material available online are also in the English language, making it inaccessible to the majority of the parents who are not competent in English. Therefore, policy makers should pay attention to developing culturally appropriate parent educational material in Sinhala and Tamil languages, which is widely accessible to parents of all socio-economic states. One way of achieving this is through incorporating this information into the Child Health Developmental Record (CHDR), which is provided free of charge to all parents. Including this information in the CHDR will help in preventing early exposure to screens and the resulting negative impact on child development. In addition, educational material in the form of leaflets and posters can be prepared and distributed to the child welfare clinics of all the Medical Officer of Health (MOH) areas, to ensure wide availability of this information.

Sri Lanka has a well-established primary healthcare system in maternal and child care. Therefore, these primary healthcare workers have a pivotal role in educating parents about healthy use of digital media. However, clinical experience suggests that there is a lack of awareness about healthy screen use among primary healthcare workers and these workers themselves are unaware of the measures that can be taken to prevent problems related to excessive use of screens. Therefore, widespread awareness programmes aimed at primary healthcare workers, especially public health midwives, is essential to promote healthy screen practices among parents. Similarly, conducting awareness programmes for teachers is also important as they are also in close contact with both children and parents. Teachers should be encouraged to have open communication with parents about balancing their children's screen time with education, leisure and face-to-face interactions. Finally, at present, various online websites and apps are being marketed as 'educational websites/apps' in Sri Lanka. Authorities should take measures to monitor these apps and websites to ensure that they meet the required quality standards.

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