

Written evidence submitted by Sue Smits and Mark Stewart

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Executive summary

- Like many experts, we are concerned about the physical impact of screen time which results in hand and wrist weakness, grip and hand-pinch strength, behavioural and language development, sleep deprivation, obesity, cognitive and social development, as well as developmental delays in problem solving. We are suggesting that the inevitable use of screen time in educational settings is counteracted with dedicated face-to-face contact time and play.
- The COVID pandemic changed education with the introduction of routine online learning via video conference whilst physical activities including outdoor and interactive face-to-face play and learning was essentially prohibited for many children. Research indicates that face-to-face learning is more beneficial than learning from a screen. Experts also suggest that increased screen time is resulting in higher rates of nearsightedness (myopic refraction) and problems with mental wellbeing. We are suggesting integration of physical play, activities and real life discussion between educator/caregiver and child.
- Studies have shown play is an essential part of learning. Likewise, handwriting can activate different parts of the brain compared to typing. Research suggests that taking notes by hand can lead to better retention and understanding of information compared to typing. This is because handwriting requires more mental effort, causing the brain to engage more deeply with the content. When children learn to write by hand, they develop fine motor skills and learn to recognize letters and shapes, which can be crucial for reading and cognitive development. We are suggesting the implementation of a national requirement for a handwriting curriculum that is written by experts to enhance and nurture children's learning and kinetic chain of development.
- Motor-sensory integration and primitive reflex integration are critical for allowing connections between various areas of the brain. They are important for learning, behaviour, communication, and social emotional skills. This cannot be achieved on a digital device; we are suggesting a physical programme for schools written by experts in this field to help all children flourish.

What is the current understanding of how screen time can support and impact children's development and educational outcomes, including the effect on concentration and behaviour?

Physical impact

1. Educators and researchers are not yet fully aware of the true physical impact that prolonged tablet computer use has on children. These devices are being used in schools more and more as a learning aid. Straker et al (2008) supports this concern.
 - 1.1 Hand and wrist weakness caused by repeated flexion and extension of the finger, thumb, and wrists is one of the most common consequences related to the increased use of smartphones (Radwan et al., 2020) and (Osailan, 2021). The researchers focused on the resulting musculoskeletal effects of smartphone overuse: decreased hand grip strength, weaker pinch strength on the dominant side and overall decreased hand function.
 - 1.2 Early screen exposure has been associated with lower cognitive abilities and academic performance in later years (Muppalla et al., 2023). Excessive screen time diminishes the quality and quantity of linguistic interactions between children and caregivers which has an impact on language development. There is therefore a negative impact on social-emotional development such as emotional comprehension and competence. The same study concludes that excessive screen time can lead to obesity, sleep disturbances and poor mental health.
 - 1.3 Hutton et al (2022) found that problems from excessive screen time begin to manifest in pre-school children in such areas as letter formation. Associations between higher digital media use and lower cortical thickness and a shallower groove in the cerebral cortex (sulcal depth) which enhances cognitive abilities of the brain were reported. These brain areas support the beginning phase of both eyes working together to read (binocular vision). Poor or lack of binocular vision can lead to a misdiagnosis of dyslexia. The research also found there to be a number of higher-order functions such as ignoring irrelevant distractions, long and short term memory issues, letter recognition and interpreting social information and behaving appropriately in a social environment.
 - 1.4 Shah et al (2022) sought to determine an association between electronic devices and grip strength, as well as pencil grasp and dexterity. The tripod pencil grasp is an important childhood developmental milestone for stimulating the correct cognitive patterns. Children are coming into classrooms ill-prepared for writing and other activities that require finger muscle strength. Paediatricians put blame on technology and the lack of traditional activities young children often do, such as stringing beads, colouring, cutting with scissors and other pastimes. Handwriting development is not only essential for the success of the child's school career, but aids in developing crucial cognitive abilities that impact normal development on all levels.
 - 1.5 A study of 2,441 mothers and children (Madigan et al., 2019), which collected data repeatedly from the same subjects over time, found that more time per week spent on screens at ages 24 months and 36 months was linked with poorer performance on screening tests for behavioural, cognitive and social development at 36 months. The opposite association (poorer development leading to more screen time) was not seen, suggesting that

the linkage was not a matter of parents leaning on screen time to handle a challenging child. Instead, the excessive screen time seemed to precede the developmental difficulties.

- 1.6 Greater screen time at age 1 year was associated in a dose-response manner with developmental delays in communication and problem-solving at ages 2 and 4 years (Takahashi et al., 2023).

Online learning during the Covid-19 pandemic

2. The COVID-19 pandemic and the need for remote learning increased screen time usage and therefore the possible impacts on various developmental domains. Most importantly, balancing screen time with other forms of play and interaction is crucial to ensure healthy development in young children to mitigate the increased use of screen time in learning environments.
 - 2.1 Panjeti-Madan & Ranganathan, (2023) investigated the negative and positive impacts of screen usage on various age groups in children. It focused on cognitive, physical, language, social and emotional domains. The investigation concluded that screen time is steadily growing across all age groups: infants, toddlers, preschoolers, and school-age children. The positive influences of screen time include enhancing children's learning abilities through educational applications, facilitating video chats with families, accessing educational resources, introducing diverse perspectives, and thus enhancing their creativity and self-expression. The negative influences include technology addiction, stress level increase, reduced physical activities, lack of sleep, emotional distress, relationship issues, and behavioural problems.
 - 2.2 Screen time has been linked to language delay and smaller vocabularies (Anderson & Pempek, 2005). Language skills happen best when it is between people in a room face-to-face rather than on screens. Learning is encouraged through hands-on experience and interaction with others, rather than learning through passive watching of actions or talk on a screen.
 - 2.3 The Anderson and Pempek study also found that learning from educational programmes on the television consistently failed to teach children ages 2 and younger as much as when there was live interaction. This "video deficit" was seen in simple imitation tasks, in language learning and in emotional learning.

Increases in nearsightedness (Myopia)

3. Increased screen time was associated with more reported cases of nearsightedness, which occurs when refracted light is focused in front of the retina instead of onto the retina, making it difficult to read things at a distance, for example reading from the interactive whiteboard. There are also increased odds of the cornea having a different shape than normally seen (astigmatism), (Harrington & O'Dwyer, 2023) also reported increased weight and decreased reading/writing time.

Physical activity

4. A recent cross-sectional study (Tandon et al., 2021) found that more physical activity and less screen time were associated with better mental health for children. This suggests a potential strategy for mitigating the adverse effects of the increased screen time during the pandemic.
- 4.1 There is evidence that having a television on in a room makes it harder for a child to focus on interactive activities with others as they are distracted and less able to concentrate. (Schmidt et al., 2008)

The importance of play

5. Very young children learn best by relating to real live people through touch, sensation, sound and body language, but they also learn by moving and doing. Children must spend time practising face-to-face interactions in real life or they may lose their ability to evaluate emotions. Part of the problem with screen time is that young children who watch TV and DVDs or use computer games may be substituting these activities for free play. During play, each child creates their own challenges and solutions at little or no cost. This is the ultimate “personalised educational curriculum,” which teaches children to think about different situations and learn from other people’s viewpoints, tapping into their curiosity and encouraging them to learn (Strasburger et al., 2010).
- 5.1 Play provides children with opportunities for different types of learning, including physical, social, emotional, intellectual, and language development in a context they understand. As a result, children are more likely to remember what they learn while playing. Child development experts insist that play is essential for social, cognitive, emotional, physical and moral development. (Bay Area Early Childhood Funders, 2007).

Handwriting vs typing

6. The movements involved in handwriting allow a greater memorisation of new words (Ihara et al., 2021). Writing words on paper increases information retention, retrieval and memory storage as it utilises more brain activity. The key factor seems to be due to the tactile and spatial properties of writing on paper.
- 6.1 A study (Mueller & Oppenheimer, 2014) states that writing notes by hand allowed participants to retain information better than those who typed on a laptop, even if they wrote fewer words overall. When students take notes by hand, it develops a stronger conceptual understanding than by typing. Since handwriting is slower and more tedious, it makes it harder to take notes verbatim. Therefore students have to actually process the information and summarize it in a way that makes sense for them.
- 6.2 Recently, Sweden decided to devote more time to learning to write by hand than using screens for learning due to the noticeable decline in basic motor skills. (The Guardian, 2023).

How can schools and parents be better supported to manage children’s screen usage, for example, through age-related guidance? Could the Department for Education be doing more in this area?

7. Recent research (Sugiyama et al., 2023) concluded that when children play outdoors, some of the negative effects of screen time on daily living skills were reduced by 20%. Therefore, time spent playing outdoors should be increased.

7.1 A simple motor-sensory and primitive reflex screen (Logan, 2023) can identify if a child has postural deficits, motor planning and sequencing difficulties or underpinning sensory processing disorder. If primitive reflexes are still present long after they should have integrated, the child will display certain characteristics specific to the retained reflex, many of which limit their development and academic skills. These characteristics may be similar to dyslexia, dyspraxia, autism and ADHD which may result in the child being misdiagnosed with these conditions.

Summary

The COVID-19 pandemic led to unprecedented increases in screen time for all children. Therefore, it is important to consider both content and context when designing any intervention to maximize the reduction of children's screen time. Interventions should be physical interventions because we know that a child needs to physically engage before they can have abstract thoughts or really understand complex ideas on a screen.

Given the increase in the use of digital devices over the last several years, we risk having one or more generations lose the ability to write by hand; an unfortunate consequence of increased screen time.

Solutions

- Comprehend the true effect of screen time on neurodevelopment and other health outcomes, including obesity and mental health outcomes
- provide off-screen time so children can improve their social and cognitive skills and be healthier and happier
- promote co-viewing with the caregiver so discussion in real life can occur after viewing
- increase the time dedicated for outdoor play
- strike a balance between physical play and screen time with structured activities to ensure that children master motor-sensory integration
- ensure children engage in purposeful movement to integrate primitive reflexes and improve gross and fine motor skills
- incorporate integration of retained primitive reflexes into physical education using a programme designed by experts in this field
- dedicated physical education programmes promoting decreased screen time to prevent nearsightedness and support eye and general health
- develop national guidelines to ensure children receive at least a minimum amount of a 30 minute handwriting instruction a week and 10 minute daily handwriting activity

- offer whole school handwriting training to all nursery, primary and secondary schools using a training programme designed by experts in this field with knowledge on the kinetic chain of human development
- give clear guidelines and policies to help children reduce screen time and re-establish healthy screen time usage in schools, setting maximum screen time limits and ensuring content is both relevant and appropriate to learning.

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November 2023