child CENTRE FOR HOLISTIC INITIATIVES FOR LEARNING & DEVELOPMENT

Impact of screen viewing during early childhood on cognitive development

KEY POINTS:

- Research from the GUSTO (Growing Up in Singapore Towards healthy Outcomes) study of mothers and children shows that, locally, almost all infants and toddlers ages two and under are exposed to approximately 2 hours per day of digital media via electronic screen-based devices.
- High levels of screen time during the early years can affect cognitive development and executive functioning in later childhood.
- Moreover, high levels of screen time in children under the age of two are associated with the development of a sedentary lifestyle in later life, which is then associated with obesity, high blood pressure, and poorer mental health.
- Based on current evidence, no passive screen viewing time is recommended for children below 18 months. Children 18 to 36 months should have limited unsupervised passive screen viewing of not more than one hour per day.

Why is the issue of high levels of screen time important for a child's development and health?

Advances in digital technology have created greater opportunities for infants and toddlers to engage with digital media[1]. Screen time refers to activities undertaken with electronic devices, such as phones, tablets, computers, and televisions. Infants can focus on a screen from an early age and children as young as 6 months of age are now regularly being exposed to electronic screens, often serving merely as pacifiers. In Singapore, many infants and toddlers ages 2 and under are exposed regularly to digital media. By the age of 18 to 24 months, about 90% of children are engaged in daily passive viewing of screens (passive viewing refers to screen viewing without adult co-viewing and interaction)[2]. This is comparable to findings from studies undertaken in other countries[3, 4, 5]. Recent data suggest that high amounts of passive screen viewing in early childhood

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are associated with numerous developmental and behavioural issues, including language delays[6], social communication deficits[7], and problems with self-regulation[8]. Thus, high levels of exposure to screen time in young Singaporean children warrants public health concern.

In childhood, a sedentary lifestyle is associated with obesity, higher blood pressure and poorer mental health[9]. Screen time is generally considered a sedentary behaviour and has been linked to childhood obesity[10,11]. In addition, screen time in preschool age children has been associated with poorer eating behaviour, poor sleep, attention difficulties, near-sightedness, as well as developmental delays[12].

This brief draws on findings from GUSTO (Growing Up in Singapore Towards healthy Outcomes)[13], Singapore's largest and most comprehensive birth cohort study, as well as relevant international research studies.

Implications for brain development and functions

Findings from GUSTO showed that the duration of infant television viewing at 1 year of age was negatively associated with subsequent cognitive and language skills at 4.5 years of age[14]. This association remained significant even after accounting for perinatal, child and family circumstances. In addition, screen time between 1 and 1.5 years was associated with a variety of social skills deficits commonly found in children on the autism spectrum[15]. Screen time exposure in children between 1 and 2 years of age predicted prominent deficits in executive functions at 8.5 years of age[15]. Executive functions are a set of brain processes that enables us to focus, remember instructions, and perform multiple tasks successfully[16]. Executive functions are critical determinants of both health and human capital [17, 18, 19, 20,21]. Researchers are thus understandably concerned about the differential impact of digital media exposure on multifaceted skills.

There are a number of plausible biological explanations. Neurodevelopmental research has shown that infants need substantially more attention and processing time when viewing two-dimensional screens[22]. Each change in two-dimensional screen dynamics (e.g. camera angles, lighting and sound) presents a novel stimulus for the infant brain[23]. Repeated novel stimuli from screens overwhelm the attentional limits of infants[24]. Furthermore, the fantastical aspect of the fast-paced stimuli of a TV show is associated with later issues in attentional control [25, 26,27].

Findings from other cohort studies corroborate findings from GUSTO, highlighting the negative effects of screen time on cognitive function:

The GUSTO study suggests a link between increasing hours of screen time at 1 year of age and lower verbal IQ scores at 4.5 years of age.[14]

The higher the amount of screen time between the ages of 1 and 1.5 years, the more difficulties are found in attention, language, and social skills in later childhood.[15]

Implications for policy and service provision

High levels of passive viewing of digital media during the early years are associated with impaired cognitive development, possibly limiting human development and potential[14,28]. Existing evidence suggests that more passive screen viewing in young children below the age of 3 years also has implications on attention, executive functions, and social-emotional skills[6, 29].

RECOMMENDATIONS:

The early years are a critical window for children's cognitive development. We draw upon evidence from GUSTO and similar research studies, all of which are in broad consensus with established international guidelines:

- Passive viewing screen time is not recommended for children younger than 18 months as it is associated with poor cognitive and language outcomes.
- For children between 18 and 36 months, unsupervised passive screen viewing should be limited to no more than one hour per day to allow for appropriate social-emotional and executive function development.
- Screen time in young children can be replaced by age-appropriate physical activity, playtime, as well as social and interactive opportunities with peers, parents, and caregivers. Screens should not be used merely to keep young children occupied.
- For older children, screen usage should be commensurate with contextual factors such as schooling requirements and the child's individual learning needs.
- Healthier screen use behaviours can be supported by educating children and parents, as well as through implementing technological solutions, such as parental controls on inappropriate content, and time-use limits on software and digital devices.

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Contributors: Dr Adriana Banozic, Dr Cai Shirong, Dr Chong Shang Chee, Prof Chong Yap Seng, Prof Sir Peter Gluckman, Dr Gayatri Kembhavi-Tam, Dr Evelyn Law, Prof Lee Yung Seng, Prof Michael Meaney, Assoc Prof Robyn Mildon, Dr Alexander Mok, Dr Cheryl Seah and Dr Evelyn Tan.

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The Centre for Holistic Initiatives for Learning and Development or CHILD was established under the umbrella of the NUS Yong Loo Lin School of Medicine (NUS Medicine) with the Lien Foundation. In collaboration with other partners such as the Centre for Evidence and Implementation (CEI) and A*STAR's Singapore Institute for Clinical Sciences (SICS), CHILD brings together experts in the field of translational research, child development, and implementation science to help give children the best start to life.