SCREEN TIME

A Health and Development Issue

Dr. Aric Sigman

Introduction

Many people working in education view the issue of children's screen use through an educational and cultural lens. Concerns revolve around whether or which screen materials or screen activities are educational and whether the values and images conveyed are positive or detrimental. Educators are usually informed about these issues through education media and the education sections of newspapers which depend upon advertising and sponsorship from the education technology (EdTech) industry, and through education conferences which increasingly involve the EdTech industry currently valued at over £200 billion. (Forbes 2019).

And like parents, educators are exposed to information about the merits and demerits of child screen use through mainstream media, social media, blogs and free online encyclopedias where the issue is often portrayed as an ongoing 'hotly debated' cultural issue reflecting a clash between generations, with accompanying headlines such as 'Screen Time: Is it good or bad for our kids?'. *The Times* recently informed the British public that the 'mental health risk of screens' for teenagers is no greater than 'eating potatoes'. Other reports imply that if children do not have enough screen time at home they may be 'left behind in the digital revolution' thereby preventing them from developing their full potential. Yet, it is almost entirely unheard of for journalists to reveal that a study being reported on in the news regarding child screen use often emanates from an institution with significant funding from well-known screen media corporations including Google, Facebook and Pearson Education. (Campaign for Accountability 2017; Sigman 2019a; Perrotta & Williamson 2018; Williamson 2016)

Such debate and conflicting stories may be good for news and social media, drawing the eye to contrariness. However, this is undermining the ability of parents and those in education to gain a more accurate picture of the issue of children's screen use. The World Health Organisation has expressed serious concern over the sources that are used by professionals in health and education to formulate policies stating 'it is critically important to try to identify financial and nonfinancial conflicts of interest, avoid them'. (WHO 2014)

A Medical Issue

The subject of screen use is not owned by education researchers nor those who study arts and culture. Children's screen use is now a *medical* issue

researched by scientists in biomedical departments which do not receive any funding from screen-related or EdTech industries and published in medical journals which have no link with nor advertising from child screen-related or EdTech industries.

While the content and context of screen use may affect children, the *medium* of the screen itself and the *amount* of screen use are now formal public health issues pronounced upon by the World Health Organisation and other medical bodies.

In particular it is children's discretionary (non-homework) screen time that is the focus of interest. To child health professionals it is not a case of being 'pro' or 'anti' child screen use, rather there are concerns regarding the overuse, misuse and premature use (under age 2) of screens. And there are related concerns over the way that screen use easily displaces vital activities and experiences for children's health and development. Health professionals merely view screens as a powerful tool to be used at the right age and in the right way, not something that should become a health and development burden.

Discretionary Screen Time

Discretionary (non-homework) screen time (DST) is now the single main activity of British children who in a global study have just been ranked as having the second highest levels of 'excessive screen time' and second highest levels of 'disordered use of technology' (DQ Institute 2020):

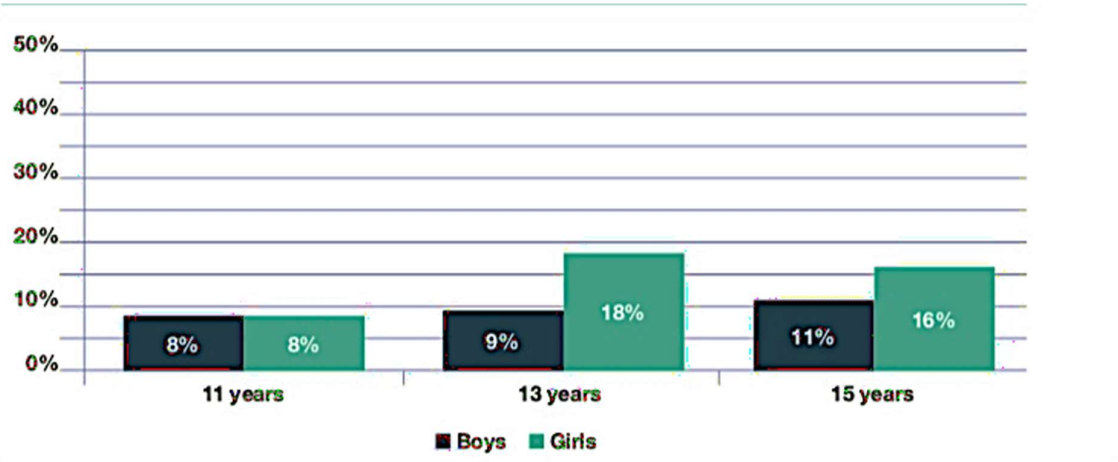
> By the time the average British child finishes their 8th year, they will have spent more than a full year of 24-hour days purely on recreational screen time.
>
> By the time they reach 18 they've spent 3 full years of 24-hour days,
>
> By age 85 they will have spent 20 years of 24-hour days of DST.

(Childwise 2015; Ofcom 2017; Office National Statistics 2017; Sigman 2019b)

None of these figures include, school, homework or work-related screen time.

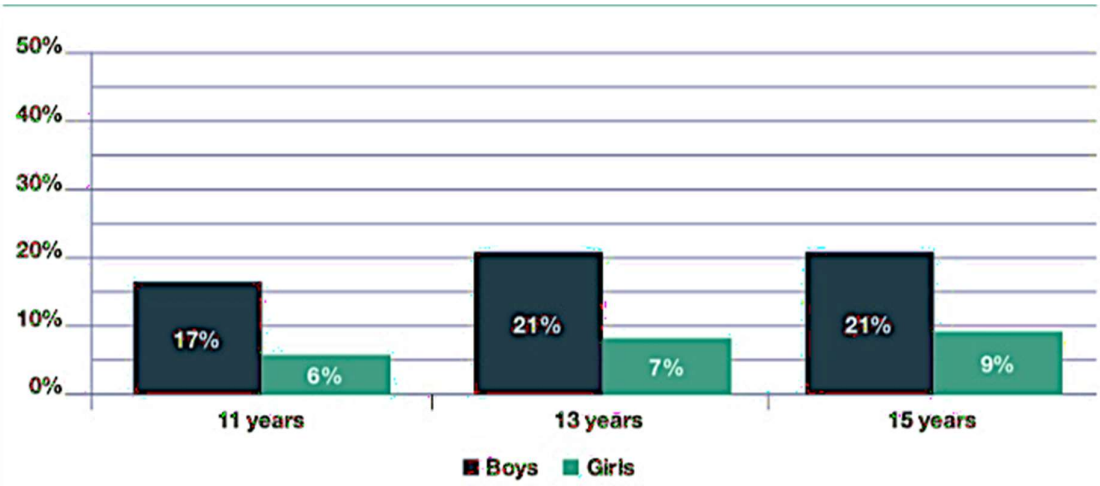
A study by the World Health Organisation recently found that a high proportion of children and adolescents in England now exhibit 'problematic' screen use. By age thirteen 18% of girls exhibit 'problematic social media use'(See Figure 1 below, WHO 2020)

Figure 1: Proportion of social media users classified as indicating problematic social media use by age (World Health Organisation 2020)



By age eleven 17% of boys exhibited 'disordered game use' and by age thirteen it rises to 21% (See Figure 2 below, WHO 2020)

Figure 2: Proportion of gamers classified as indicating disordered game use by age (World Health Organisation 2020)



Medical Positions

While there is a current mainstream media focus on the possible effects of social media and violent computer gaming, health professionals are also concerned about the sheer *amount* of all discretionary screen time and the *time* of night that DST is taking place. DST is now considered a form of consumption often referred to by medical researchers as a 'dose', and overconsumption or misuse may pose risks to child health.

The World Health Organisation has recently Issued 'Screen Time Recommendations':

> Ages 0 – 2 yrs: 'not recommended'
>
> Ages 2 – 5 yrs: 'no more than 1 hour; less is better.' (WHO 2019a)

The US Department of Health (2020) considers excessive DST as one of its key national 'health improvement priorities' and a key 'disease prevention objective'
and issued 'recommended limits for screen time': for ages 0 – 2 no screen time and 'from ages 2 - 17 … outside of school (for nonschool work) for no more than 2 hours a day'. (USDH 2020)

The Australian Department of Health (2020) and New Zealand Ministry of Health have recommended more stringent limits. The NHS (2018) advises parents: 'Limit the amount of time your child spends on inactive pastimes such as watching television, playing video games and playing on electronic devices … experts advise kids should watch no more than two hours of screen time each day – and remove all screens (including mobile phones) from their bedroom at night.'

The key factors for screen use that are linked with problems both at home and at school are:

CHILD'S AGE

LOCATION OF SCREEN (i.e. bedroom)

AVERAGE 'DOSE' (hours per day)

TIME OF DAY (i.e. late evening/night use)

TYPE OF ACTIVITY (e.g. computer game, television)

CONTENT (e.g. violent, documentary educational)

CHILD VULNERABILITY (pre-existing autism, depression, anxiety)

While public discussion of screen time tends to focus on concerns over mental health or social skills, the reason the health authorities have issued guidance is because of the links between excessive DST or screen misuse and the wide range of different body parts and biological systems implicated. Higher levels of children's DST are increasingly linked with negative cardiometabolic, psychosocial and other medical outcomes, often exhibiting a 'dose-response' relationship with children's health and development outcomes ranging from increased body fat, Type-2 Diabetes, changes in brain structure and function, elongation of key cells in children's eyes leading to myopia, impulse control, sleep deprivation, clinical depression and anxiety, body dissatisfaction and eating pathologies to screen dependency disorders and ADHD (World Health Organisation 2017; Nightingale, et al 2017; Howie et al 2017; Simonato et al 2018; Sigman 2012, 2017; Ra et al 2018; Ku et al 2019; Tideman etal 2019).

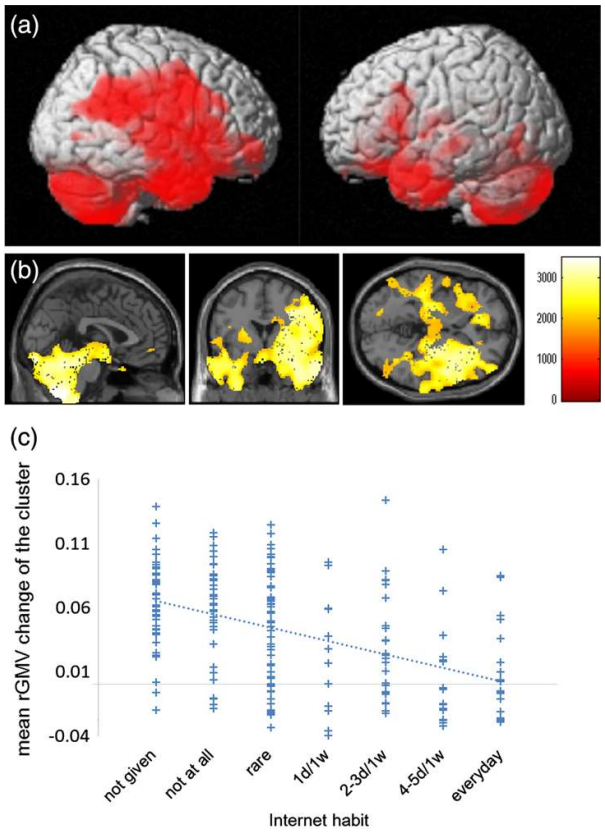
It is important to consider some specific examples of the medical concerns listed above.

Basis of Concerns

Brain Structure

A study of Internet time in children and adolescents appearing in *Human Brain Mapping* reported that 'higher frequency of internet use was found to be associated with decrease of verbal intelligence and smaller increase in … widespread brain areas after a few years in longitudinal analyses. …brain areas related to language processing, attention and executive functions, emotion, and reward.' (See Figure 3, Takeuchi et al 2018)

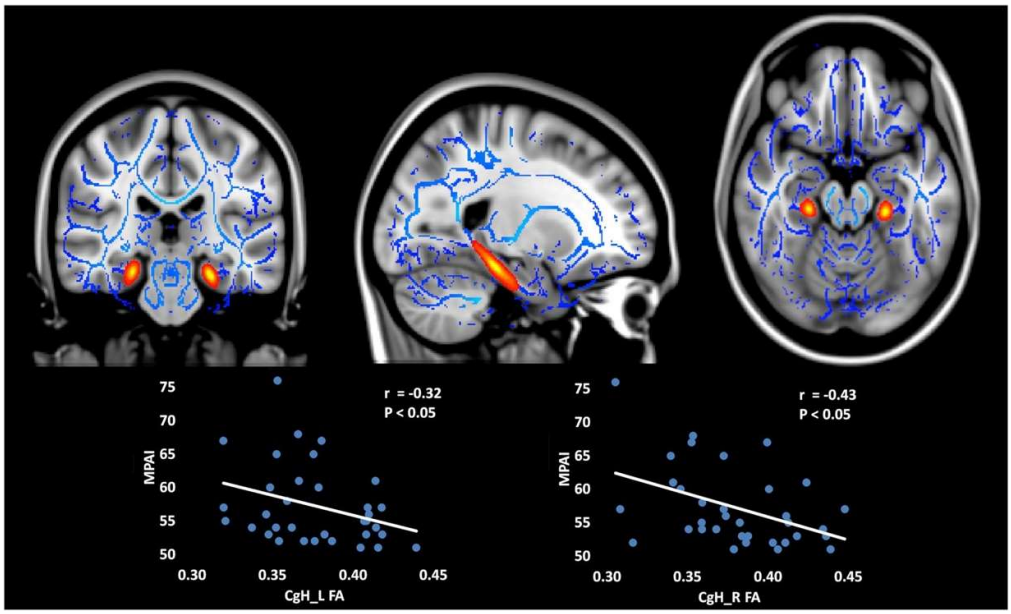
Figure 3. Impact of frequency of internet use on development of brain structures and verbal intelligence. Coloured areas indicate brain regions less well-developed over 3 years as weekly time spent on the Internet increased. (Takeuchi et al 2018)



Screen Dependency Disorders

A study involving Harvard Medical School reported 'the first morphological evidence of altered brain structure ... in college students with mobile phone dependence'. Researchers found that as smart phone 'addiction' scores increased, brain tissue density and brain cell health decreased. (See Figure 4, Wang et al 2017 below)

Figure 4. As mobile phone addiction scores increase, brain tissue density and brain cell health decrease. (Wang et al 2017)



Digital natives, those familiar with computers and the internet from an early age, have a higher prevalence of screen-related 'addictive' behaviour that reflects impaired reward-processing and impulse-control brain mechanisms. (Sigman 2014, 2017) In 2019, the World Health Organisation added disease number '6C51: Gaming disorder' to its official 'morbidity and mortality' list of International Classification of Diseases and are now calling for 'public health strategies … prevention'. Schools, colleges and parents are now expected to play a central role in that prevention. (WHO 2019b)

Mortality and Cardiometabolic Disease

A study in *Public Library of Science One* monitored children's body movements at school and at home for 24 hours in a study entitled 'Extremely Reduced Motion in Front of Screens: Investigating Real-World Physical Activity of Adolescents'. Scientists concluded 'No other daily activities—even sedentary ones such as reading—were accompanied by an absence of physical movements as large as was observed during sitting in front of a screen … as if pupils were freezing'. (Streb et al, 2015)

Being insufficiently physically active is not the same health risk as being too sedentary - scientists now believe that each have their own distinct health consequences: a child may engage in an acceptable level of physical activity but at the same time spend an inordinate amount of time sitting. And all sedentary behaviours are not equal. There may be some physiological and psychological differences between different types of sedentary behaviours e.g. reading a book vs DST. A study by medical schools at Imperial College and Cambridge University concluded that compared to just sitting 'TV viewing time was associated with greater risk … 8% of all mortality and 29% of T2 Diabetes' in England was 'related to TV-viewing'. (Patterson et al 2018)

And all forms of DST are not equal: different types of screen use are thought to produce different physiological and psychological effects. (ADH 2020; Lynch et al 2010; Biddel et al 2018; Gentile et al 2017; Siervo et al 2018)

'Soft' Concerns: socio-emotional and educational

A study in the *British Journal of Developmental Psychology* (2019) entitled 'Screen time and the development of emotion understanding from age 4 to age 8' found that
'more screen time at age 4 predicted lower levels of emotion understanding at age 6. In addition, television in children's bedroom at age 6 forecasted lower levels of emotion understanding at age 8.' The researchers concluded 'extended screen time exposure might impair young children's socialization processes and result in lower ability to understand emotions.' (Skalicka´et al, 2019)

The amount of time children aged 3 – 10 yrs spend at home on both the passive and active use of 5 types of screen media (television, smartphone, computer, tablet, game-console) and potential effects on their imagination have recently been examined and published in *Developmental Science.* The researchers concluded 'screen-time negatively affects mental imagery …Greater screen-time linked to reduced mental imagery in children.' The interpretation proposed was that 'screen media provide children with ready-made and visually dominated mental images, hence may reduce multimodal mental imagery.' (Suggate & Martzog 2020)

A systematic review and meta-analysis of school performance of 587,000 children and adolescents in 23 countries published in the *Journal American*

Medical Association: pediatrics found that television viewing and video game playing were 'the activities most negatively associated with academic outcomes'. The researchers recommended that **'education and public health professionals should consider supervision and reduction to improve the academic performance of children and adolescents exposed to these activities.'** (Adelantado-Renau et al 2019)

Within the classroom, differences are being found between learning via a screen vs a hard paper copy of the same educational material. A new study 'Assessing children's reading comprehension on paper and screen' found that paper was more effective: 'Our results show that 10-year old children across levels of reading competence, in average performed significantly better on a reading test presented on paper than on screen….Our finding that students across all skill levels perform more poorly on a digital test than on paper, is an urgent call for a more nuanced perspective on implementation of digital technologies in elementary education, and a signal to policy makers, **school administrators and educators that the medium matters**, especially for reading comprehension.' (Støle et al 2020)

Conclusions

Medical concerns regarding children's screen use must not be seen to exist in a parallel universe unrelated to education. Although child DST is obviously a heterogeneous, complex, multifactorial lifestyle behavior - unlike sugar, salt, alcohol, pharmaceuticals, tobacco or ultraviolet light, screen-based activities do not involve exposure to physical substances or forces. Therefore, producing definitive 'proof of causation' in the many domains of study from neurobiology to psychiatry to education will be a long time coming. However, as the World Health Organisation makes absolutely clear there are times in child health and development policy when that luxury is not yet available and the accepted practice is to abide by the *precautionary principle*, to merely err on the side of caution and recommend restraint and moderation: 'WHO has frequently issued strong recommendations based on low-quality evidence.' (WHO 2014) While educators may be exposed to claims in the media that precautionary child DST guidelines are 'not evidence-based' or are 'unscientific', the medical world has dismissed such partisan distortions:

'The precautionary principle is occasionally portrayed as contradicting the tenets of sound science and as being inconsistent with the norms of "evidence-based" decision-making … these critiques are often based on a

misunderstanding of science and the precautionary principle … there is no contradiction between pursuing scientific progress and taking precautionary action.' (WHO 2004)

Educators and parents should consider DST as a factor in children's health, development and education. Moreover, schools are highly entitled to prevail upon parents to limit their children's DST and discourage the placement of screens in children's bedrooms. Children should become conscious users of screen media, not unconscious consumers and this requires firm guidance from parents.

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