Submission to Scrutiny Panel – Children, Education and Home Affairs - May 2025

Scrutiny Review – What protection do children in Jersey have from online harms?

Dear Panel,

I write as a local physician, parent, and a member of Health Professionals for Safer Screens (HPfSS - https://healthprofessionalsforsaferscreens.org/).

HPfSS is a UK-based collective of health professionals, campaigning for safer smartphone and screen use in children.

As part of the work of HPfSS, a recent evidence review was completed on the impacts of screen use and social media on whole-child health. As a member of HPfSS, I have chosen to submit this latest evidence review for consideration by the Panel as part of the current review.

Please find below a 3-part submission:

1) Summary - The Evidence - review of the impacts of screen use and social media on whole-child health (p3-10)
2) An in-depth health briefing on the evidenced risks of screens for early years children (p11-25)
3) An in-depth health briefing on the evidenced risks of smart devices and social media in school-age children (p26-50)

The panel will see that the HPfSS evidence outlines a wide range of potential online hazards and harms related to children and young people.

As an occupational physician (an area of medicine that specialises in risk assessment and protecting people (usually employees) from hazards), I believe I can also offer a relatively unique perspective on protecting individuals from harm.

I would ask that the panel familiarise themselves with the concept of the 'hierarchy of controls', which is a well understood model within the health and safety industry for risk mitigation. The hierarchy (in order of most effectiveness to least) is:

1) Eliminate the hazard
2) Substitute (replace the hazard)
3) Engineering controls (isolate people from the hazard)
4) Administrative controls (change the way people work with the hazard, for example through education or reducing time each person spends on hazardous task)
5) Personal protective equipment (individual protections)

Under the Health and Safety at Work legislation, employers are expected to undertake adequate risk assessments to identify potential hazards and to mitigate risk where possible by applying the hierarchy of controls. It's worth also noting that the law sets out duties employers have, not just to their employees but also to members of the public (including children at school).

It does appear that in the case of smartphone use by children (and particularly in the school environment) there is increasing evidence of hazard and potential harm, yet the appropriate approach to risk mitigation (i.e. to eliminate the hazard where possible) has been set aside for a preference to place administrative controls (such as education and recommendations of individual behaviour change). In the longer term, I am sure that improved product design (i.e. engineering controls as per the hierarchy) will be possible but for the time being it appears that duties under the health and safety legislation are not being adequately balanced against other rights of the child.

In workplace settings, we often have to balance safety against individual rights (for example the rights of a disabled employee to work in safety critical role, where their safety and that of others may be affected by their disability) and it is almost always the health and safety legislation that takes precedence.

We cannot rely on some future protections to keep safe the children of today, and if elimination (i.e. banning social media or devices below a certain age) is the best mitigation available currently then I would congratulate the jurisdictions who have been early adopters of such measures. We won't get a second chance to protect the youth of today.

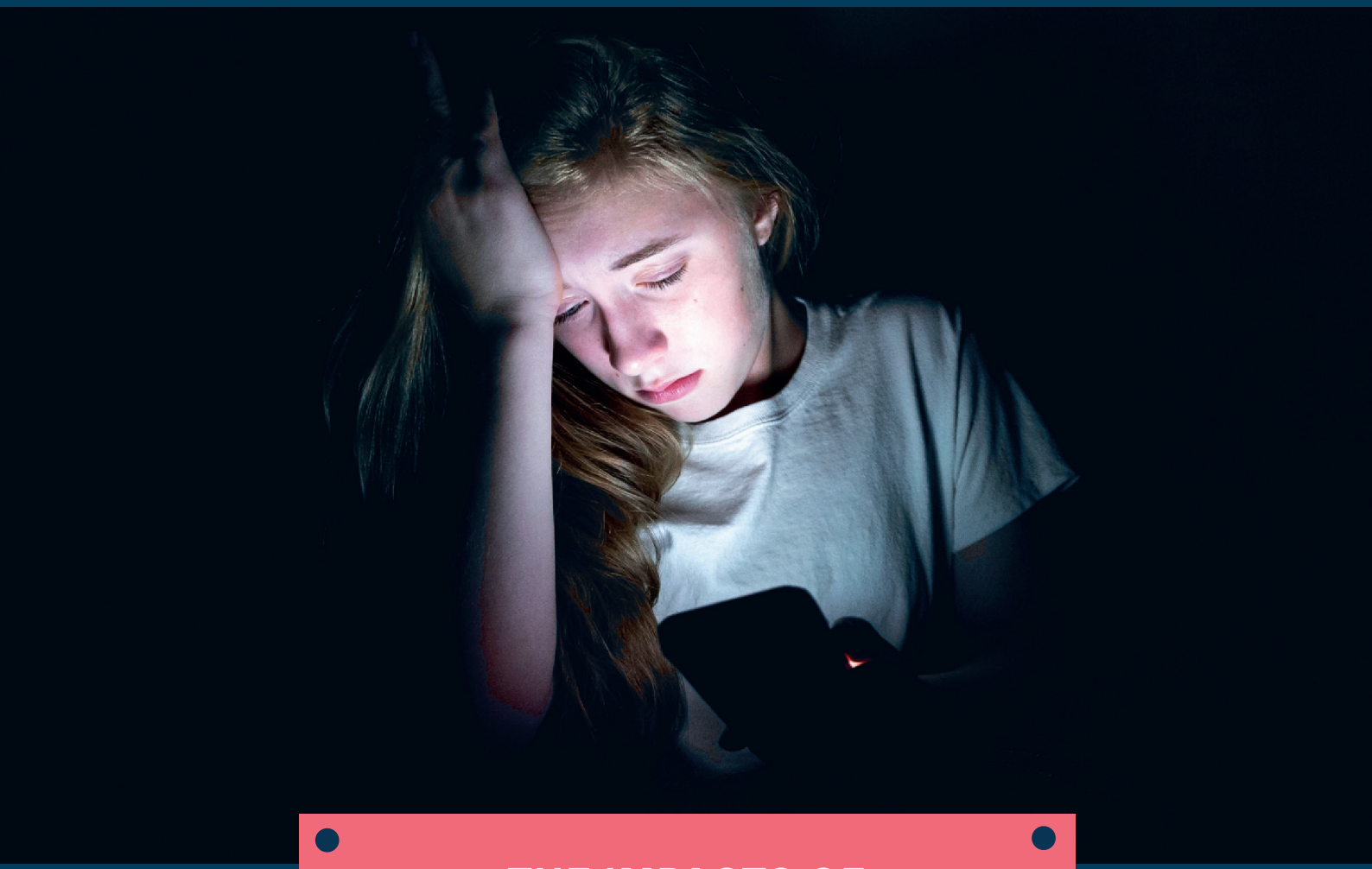
Thank you for considering the enclosed evidence as part of your review.

Dr Chris Edmond

Occupational Physician

What we already know

THE EVIDENCE



THE IMPACTS OF SCREEN USE & SOCIAL MEDIA ON WHOLE-CHILD HEALTH

SCAN ME

HEALTH PROFESSIONALS FOR SAFER SCREENS

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SCAN ME
to visit HPFSS

The risks of harm to children of Early Years (EYs) far outweigh any benefits

LACK OF EVIDENCE OF BENEFIT

There is no evidence to support introducing technology at an early age. Babies need humans not screens.[1] The World Health Organization (WHO) states that children under two years old should not be exposed to any screen time.[2] This guidance is widely accepted across many other countries.[3 4 5]

The WHO's recommendations of 'very limited daily screen time for children under 5'[6] is also widely acknowledged, with a maximum of one hour per day advised and 'less being better.'

The reality:

27% of 3-4 year olds own their own smartphone.[7]

40% By age 2, 4 in 10 children have their own tablet.

under 2 years old average **1hr 3mins/day.**

2-4 year-olds spend **2hrs 8mins/day.**[8]

In EYs, the harm is from all screen usage, not just smartphones, and the content being accessed is not a differentiator.

NEURO-DEVELOPMENTAL IMPACTS

Children aged 0-5 are in a 'time of significant growth and brain development' and it is a time when 'children are heavily dependent on their parent/carer.'[9]

There is now **causal** evidence that increased screen time negatively impacts a young child's development.

'We found a linear relationship, so the more screen time they were exposed to, the worse they fared in terms of outcomes, and that was most evident at the highest levels of screen exposure.[10] Certainly, what we have found is that the less screen time the better for children under 5. All of the research points to the critical importance of face-to-face interactions for children of this age - for learning language, social skills, and emotional skills.'

—

Dr Megan Gath, PhD Senior Lecturer at University of Canterbury, New Zealand.

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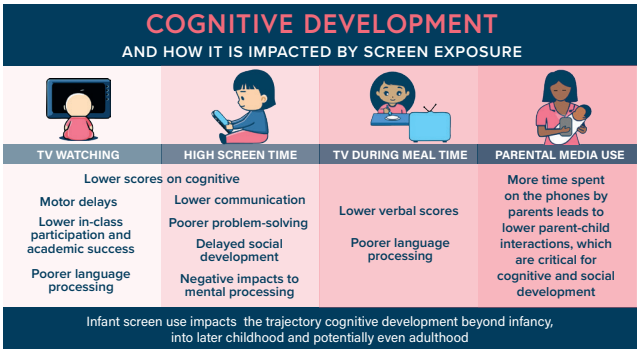

Public Health Message (PHM) for families: There is very limited evidence of the benefit of screens for under 5s. The advice should therefore be to stick to the daily screen time guidance as far as is possible. (Children are likely using screens more at home, so early years settings should focus on prioritising in-person interactions and play, which are essential for their development. Additionally, families who choose not to allow screens for their children should not have this choice undermined in early years settings, as the concept of media literacy for preschoolers is not established or evidenced as beneficial, and can cause unnecessary pressure for parents).

Evidence shows that higher digital use in preschool-aged children is associated with atypical brain development[12] and neural activity.[13] Longitudinal studies have also shown that excessive screen exposure may significantly contribute to the development of ADHD in children.[14]

Research indicates that early exposure to digital media is linked to increased atypical sensory processing in children.[15] Those who spend significantly more time on screens than their peers often exhibit symptoms resembling Autism Spectrum Disorder (ASD), including challenges in communication, delayed language development, slower cognitive and learning abilities, and inappropriate emotional responses. Studies have shown that autistic children are exposed to more screen time than their typically developing peers[16] or other clinical groups and that exposure starts at a younger age.

This has serious implications for these young children growing up, especially if they live in poverty. Older children with neurodiversity or learning disabilities or from deprived backgrounds have been repeatedly shown to be at an increased risk of harm online such as sexual exploitation and the most serious forms of child abuse.[17 18 19 20 21]

PHM: Parents of children who are predisposed to neurodiverse conditions or have existing diagnoses should be informed that these children may be at an increased risk of issues related to screen time. Parents should not be given false reassurance about the potential benefits of screen use, as these benefits have not been reliably proven. These families need **additional and specific** support in safely managing screens in their children's lives.

Digital Dummies and Parental device use

Young children who are given devices to comfort them, ('digital dummies') are being shown to struggle later in life with self-regulating their emotions.

'According to my team's work, how and when screens are used with young children also matters. In particular, the use of mobile devices to soothe children or as a means to avoid a temper tantrum, is associated with worse child self-regulation in the long run.[22] Parent use of mobile devices is also a concern. Our work has found that greater parental screen time is associated with worse child global development and more internalising symptoms.'

—

Professor Caroline Fitzpatrick, PhD. The Digital Lab, University of Sherbrooke, Quebec.

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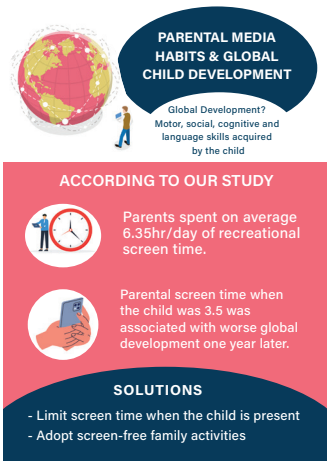
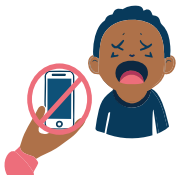


Many parents are currently unaware that their own screen use around their children carries its own risks to a child's healthy development. Research indicates that when parents spend too much time on their devices around preschool-aged children, it can negatively impact the child's overall development a year later.

The combination of parental device usage and the significant amount of time young children spend on screens is negatively affecting parent-child closeness.[24 25]

Research indicates that when parents use mobile devices while parenting, it can trigger a physiological stress response in infants.[26]

PHM: Avoid using devices to soothe young children, as it may reduce their emotional resilience. Additionally, limit parental screen time, as it can negatively impact a child's development and wellbeing. It is especially important to avoid any screen use, parental or otherwise, at children's mealtimes and bedtimes. Daily screen-free activities with children are also vital to their healthy development.



(New evidence[27] shows that parental screen use in front of children increases the likelihood of their exposure to age-inappropriate content and that proactive parental monitoring and setting limits on screen time were linked to less mature media consumption).

SCHOOL READINESS

These developmental issues and delays have consequences for school readiness. Studies show that children with higher screen usage are less ready for school,[28] particularly regarding language and cognitive development.

'Screen time during early childhood is predictive of the skills that children have on arrival to school, and the dramatic rise in screen use over recent years may partially explain why school readiness has been declining over recent years.'

—

Dr Megan Gath PhD University of Canterbury, New Zealand.

These concerns extend to the UK with the alarming findings of the Kindred School Readiness Survey.[29] This report highlights 'a gulf between parent and primary school staff perceptions of school readiness.'

Health Professionals for Safer Screens (HPFSS) would argue that this same 'gulf' exists between what parents currently know about the harmful impacts of screens and what they should know. The NHS currently does not have specific guidelines for children's screen time or clear advice on "school readiness" as an important developmental milestone.

IMPACTS ON SPEECH AND LANGUAGE

Speech and Language UK report[30] there are now

1.9 MILLION
children with speech and language challenges in the UK

27%
an increase of 27% in the past 2 years

Numerous longitudinal studies[31 32 33] provide strong evidence that increased screen time is linked to reduced language skills and developmental delays in communication among children. Early exposure to language significantly influences later linguistic abilities, cognitive development, and academic performance. Moreover, significant disparities in language exposure often correlate with a family's socioeconomic status.

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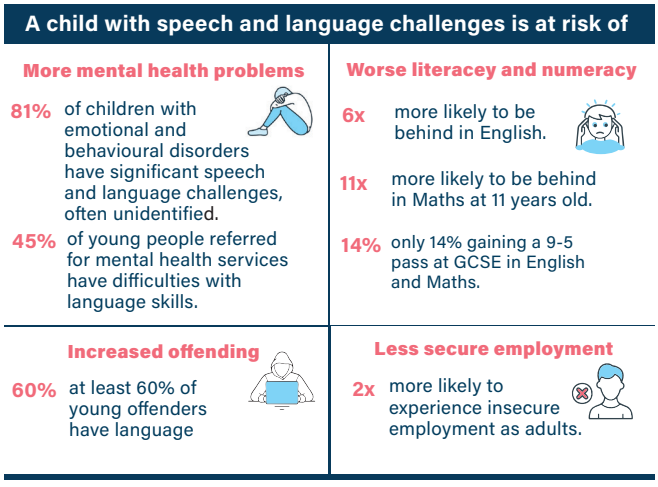


Early intervention for children with these difficulties is vital to prevent the worst outcomes, but in the UK 1 in 4 speech and language therapy posts are currently unfilled.[35]

'The number of children struggling with speech and language has now reached the point of crisis. Apps claiming to be educational, not only offer little or no benefit to young children,[36] but are potentially harmful in that they reduce opportunities for face-to-face interaction, essential for the development of good communication skills. Watching videos online, plus parental screen time, adds to the increasing amount of time that young children spend alone, which is detrimental to the development of their language, social skills and wellbeing.'

—

Sandy Chappell, Paediatric Speech & Language Therapist, BA (Hons), HCPC Reg. MRCSLT, MASLTIP

PHM: Parents should be informed to avoid apps claiming to be educational unless they are evidence-based and endorsed by health experts. In-person interactions with children remain proven as the best way to develop their communication, social, and language skills.

EDUCATIONAL ATTAINMENT AND LIFE CHANCES

The opportunity cost alone to children's lives is a very serious concern. Research shows that the average 12-year-old spends 29 hours a week, equivalent to a part-time job, on their smartphone.[37]

There is now evidence of what parents and teachers have long suspected, 'digital distractions' are dragging down many children's educational attainment.[38] A report in February 2025 from Parentkind[39] found 1 in 5 teenagers are disturbed daily by others using smartphones in lessons.

Children from disadvantaged backgrounds are more likely to be negatively impacted by technology interference[40] and they perform better academically when schools ban smartphones during the school day.[41] The observational Birmingham study[42] found no impact on grades by removing smartphones from the school day. However, the limitations of this study were acknowledged, such as only 20% of the restrictive schools have a full phone ban in place. Furthermore, one of the authors emphasised broader wellbeing issues that resonate more with the perspectives of teachers and parents; 'we did find a link between more time spent on phones and social media and worse outcomes, less physical activity and poorer sleep, lower educational attainment and a greater level of disruptive classroom behaviour. This suggests the reducing time spent on phones is an important focus.'[43]

There is little evidence that digital technology supports education,[44] yet the UK is one of the largest consumers of Edtech globally.

'Despite academics, campaigners and even UNESCO[45] raising the alarm, the DfE increasingly allows edtech designed on the same reward-loop principles with unproven pedagogical values and poor privacy practices into the classroom.'

—

The Baroness Kidron OBE[46]

ADOLESCENT MENTAL HEALTH

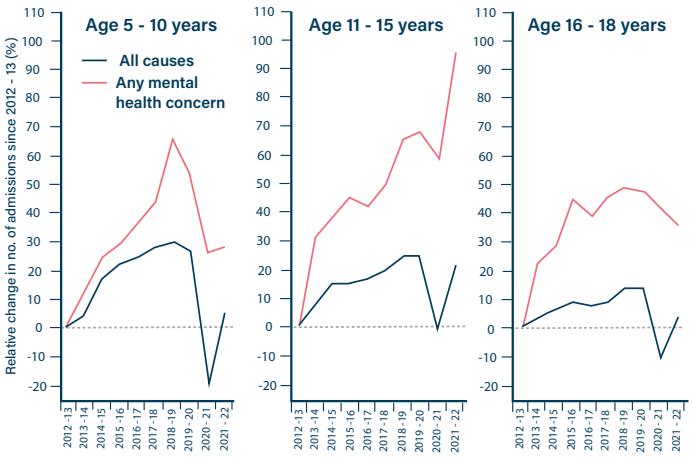
Adolescence is a period of life in which our sense of self, and particularly our sense of social self, that is how others see us, undergoes a profound transition. As teenagers become more conscious of how others perceive them, they often experience increased self-consciousness and self-criticism.

Social media can amplify this. With every post, like and comment, young people have to navigate a cycle of self-presentation and comparison, shaping their identities based on the curated, filtered lives fed to them by social media algorithms. Young people's evolving sense of self and what society expects of them are influenced and distorted by what they are exposed to both offline and online.

—

Professor Sarah-Jayne Blakemore FBA FMedSci FRS Professor of Psychology and Cognitive Neuroscience University of Cambridge[47]

The number of children requiring admissions for mental health emergencies has significantly increased according to a recent UCL study[48] published by the Lancet. Increases in admissions were greatest among girls aged 11-15, rising from 9,091 to 19,349 (112.8% increase), and for eating disorders, rising from 478 to 2,938 (514.6% increase).



500 children per day in England are referred to mental health services for anxiety.[49]

Children whose anxiety is serious enough to prompt a referral to mental health services are just the tip of the iceberg. There are many others not getting the support and help they need and mental health services simply cannot cope with this increased demand.

As of June 2024 **109,000** children and young people under the age of 18 were waiting over a year for community mental health services.[50]

Claire Murdoch, NHS England's National Mental Health Director, said "This generation of young girls has been under increasing pressures on competing fronts – from social media and cyber bullying to growing up through the once-in-a-century pandemic, there are new and emerging pressures that we haven't always had to manage in the past."[51]

The scale of the issue is undeniable: many parents believe smartphones have disrupted their children's wellbeing. This sentiment has contributed to the popularity of Jonathan Haidt's book, "The Anxious Generation."

There has been much discussion about the link between excessive device use, social media use, internet use and mental health issues. Even though much research already exists, the UK government always wants more evidence on this topic. DSIT's recently commissioned work will report on a proposed methodology in May 2025[52] and is unlikely to report its conclusions before 2028.

There is increasingly strong UK and international *causal evidence:

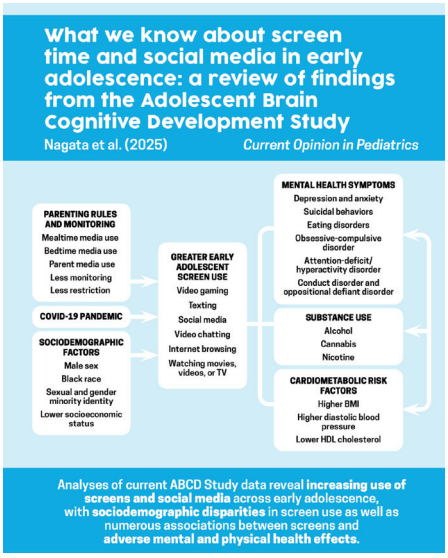
* Between 1 in 3 to 1 in 10 young people are exhibiting problematic smartphone use (PSU). These are behaviours that are consistent with the symptoms of a behavioural addiction. Teens with PSU are twice as likely to have anxiety.[53]

* Between the ages of 13 and 17, girls who spend more time online are linked to higher levels of major depression symptoms, as well as generalised and social anxiety. These results held up after controlling for possible reverse correlation, or the possibility that adolescents with worse mental health may choose to spend more time online.[54]

* The early findings of Oxford University's Brainwaves study, have found a linear relationship between rates of anxiety and depression and time spent networking on social media sites.[55]

* A recent Swedish study showed a causal link between screens, sleep and depression. It is estimated that the screen sleep disturbance could explain about half (38 per cent- 57 per cent) of the association between screen time and depression in girls.[56]

PHM: Parents should be aware of the growing issue of problematic smartphone use and the importance of managing their child's screen time. It's essential to note that girls aged 11 to 15 are particularly vulnerable to the negative effects of social media and excessive internet use on their mental wellbeing.



ADDICTION

Children are particularly vulnerable to addictive-by-design applications. This concern is repeatedly expressed by clinicians who work with children, as they observe the negative impacts of this.

'Since the widespread adoption of smartphones in the early 2000s, ADHD diagnosis rates have seen a substantial relative increase of approximately 56%. Constant exposure to fast-paced, highly stimulating content, such as social media and video games, may contribute to attentional difficulties by conditioning the brain to expect frequent, rapid rewards, making it harder to sustain focus on less stimulating tasks.'

—

Dr Federico Campos MD MSc
Deputy Medical Director / Child, Adolescent & Adult Psychiatrist.
The Giaroli Centre. Neurodevelopmental Psychiatry

'We are in the middle of a '**screendemic**' which is severely affecting children from a young age. As a very experienced Paediatrician, I am seeing an increasing number of children in my clinic who are non-verbal, i.e. they speak virtually no words. This is because a very significant proportion of these children spend most of their waking hours in front of a screen, not speaking or interacting with caregivers, and are instead subjected to a passive experience of flashing images and sounds from a device.'

—

Dr Sanjiv Nichani OBE
Senior Consultant Paediatrician
East Midlands Congenital Heart Centre and Leicester Children's Hospital. Honorary Senior Lecturer, University of Leicester College of Life Sciences

The troubling trend of our most vulnerable children being the worst impacted continues with manipulative design features in children's mobile apps. Research indicates that elements aimed at monetising these experiences are common, particularly in apps used by children from lower socio-economic backgrounds.[58]

SLEEP

Sleep and mental health are inextricably linked and the negative impacts of device use on children's sleep of all ages is well established.[59 60 61 62 63] The majority of teens are not getting enough sleep.[64] Smartphones significantly impact sleep patterns and the ability to fall or stay asleep. Blue light, which impacts melatonin and circadian rhythms, has been shown to push sleep back twice as long as coffee, and doomscrolling means teens lose track of time.

Professor Lisa Henderson and Dr Emma Sullivan, Department of Psychology, University of York, the researchers leading the study in the channel 4 documentary 'Swiped - the school that banned smartphones,' had particularly significant findings relating to sleep; students in the phone ban group experienced notable improvements in their sleep quality and on average, were falling asleep 20 minutes faster than before the ban, and getting a full hour of extra rest each night. In contrast, the control group showed no such changes. The study also observed expected correlations between problematic social media use and sleep quality and duration, as well as connections between hours spent on social media and measures of anxiety, depression, and negative feelings.

"The academic community has a real responsibility to gather and synthesise evidence on this critically important topic. A rapid response is crucial here, given the ever-changing digital environment. Our goal here was to demonstrate the kind of study that is needed to influence policy and educate young people on the benefits of smartphone abstinence."

—

Professor Lisa Henderson and Dr Emma Sullivan.

Recent research on sleep[65] has shown that **bedroom screen use** was the strongest predictor of children's exposure to mature media.

This study[66] showed that increased screen time led to deteriorated sleep within three months, impacting both the duration and quality of sleep. This leads to elevated depressive symptoms, particularly in girls.

PHM: Children aged less than five years old should not be on a device in the 2 hours before bedtime and for children over five it is 1 hour. Devices should not be in any child's bedroom overnight, to reduce the risk of them accessing age-inappropriate content or devices interfering with the quality or quantity of their sleep.

EYESIGHT

21% Every additional hour of screen time daily increases myopia risk by 21%.

54% In children already diagnosed with myopia, an extra hour raises the risk of progression by 54%.[67]

Outdoor time remains a crucial protective factor.

"Childhood myopia globally has increased from 24% in 1990 to 36% in 2023 and this is expected to rise. New research[68] has found every extra hour a child spends on screens increases their risk of developing or worsening myopia—and that costs the NHS in spectacle vouchers, with 1 in 5 of children now affected by myopia in the UK. The science is clear: time spent outdoors helps protect young eyes as they grow and develop, while excess screen time increases their risk of myopia. We must help families find a better balance and champion the vital role of outdoor play in safeguarding children's vision."

—

Daniel Hardiman-McCartney MBE, FCOptom, FRSA

Policy Implications

The issues we have now with increasingly younger children being on screens, often for hours per day, are much bigger and far-reaching than the somewhat circular conversation the UK government has become stuck in over teens' social media use and mental health (as important as this is).

We need the Department of Health, not just DSIT to take urgent notice of this evidence and correct the serious information and education debt for families that has been allowed to build up. Article 24 of the UN Child Rights Convention[69] makes clear that every child has the right to the best possible health. **It is more evidence of safety that is needed here, rather than an insatiable search for more evidence of harm.**

Not all screens are the same

All screen and device use should not be conflated. There is no need for a primary school-aged child to have an internet-enabled smartphone when there are safer alternatives[70] available for travel and communication with family and friends.

Children with medical needs, such as diabetes, may require an internet-enabled smartphone to install their continuous glucose monitoring application. However, this does not mean the device needs to have all the features of a regular smartphone, including social media apps - there are options already available.[71] Instead, it should be regarded as a "medical device" and labeled as such. This classification would allow it to be permitted in schools when medically necessary, regardless of stricter phone regulations in educational settings.

Primary school-aged children and younger teens may need to complete specific schoolwork on a laptop or play games on a console in a supervised area of the family home (not in their bedroom). This does not require them to own a personal smartphone.

Suggested policy changes

to improve parental education and protection of children of early years from potential screen harms.

Significantly change the language and framing of smart screen use for children. Abandon terms such as 'digital health,' 'digital diets' or 'digital nutrition.' These terms are misleading in suggesting digital devices are needed for a healthy childhood. This is not evidenced, and the opposite is now proving to be true. Child health depends on adequate food, water, warmth, shelter and attention to emotional and physical needs, with plenty of indoor and outdoor play. **Digital terminology must not be conflated with child health terminology, particularly for children of early years whilst robust evidence of benefits remains outstanding.**

Move away from pro-tech terminology for children of younger years at Ofcom level to ensure a top-down influence in all related reports. Messages should be factual and tech-neutral. Avoid playful language that is misleading for parents. Terminology such as 'supervised explorers' for 3-4 year olds suggests that it is alright for children to be exploring the internet if a caregiver is present. This is a concern given only half of the parents of this age group said their main approach to online safety was to 'directly supervise' their child and 21% said their main approach was to 'talk to their child.' [72]

Avoid using terms such as 'digital upskilling'[73] in the context of media literacy for this age group when there is no evidence to support the importance or indeed need of this. It is misleading to parents and wrongly implies that children might 'need' screens at this young age in order to complete their learning and development, when the evidence and clinician observations to date suggest the opposite.

Urgently demand Ofsted revise its appraisal process of screens in nurseries that currently marks early years' settings down if digital media provision is not deemed adequate. This is not appropriate with so little evidence of the benefits of these devices for preschoolers, and the evidence to support no screens for children of 0-18 months is robust and increasing.

Cut through confusing messages that conflate issues. A short programme watched on TV with a family member is always better for a child than leaving them on a small device watching 'educational' or child content e.g. YouTube shorts. No toddler should ever be in possession of their own smartphone or have access to social media. Big screens are better, with no screens in bedrooms or at mealtimes. In addition, a visible-to-all health message from the NHS is needed to remind parents/carers of the importance of reading books to children to further their language and cognitive development.

A suggested way forward

Health professionals have seen enough and do not require any more evidence to act. They are seeing the real-time impact of harms in their clinics on a daily basis - and this is across the general population, not at extremes. Their real experience needs to be included in the research that helps shape policy, and this research needs to be useful at ground level, improving the education of clinicians and helping them provide the right advice and support for their patients. The current barriers to a coherent governmental response, such as the idea that restricting usage during the school day or restricting access to some digital areas (social media before 16) will prevent children from coping in a digital world and be unable to transition, need to be evidenced as real rather than theoretical issues. Again, the evidence that restricting some access is particularly harmful for vulnerable populations needs to be evidenced, as the evidence that they are more at risk is increasing. Whilst there may be disagreement over causal links or legislative approaches,[74] everyone agrees that tech companies need to do more. It is also important that any policy developed should appreciate that there are distinct developmental windows[75] of sensitivity to social media in adolescence and how this might shape guidance for parents and teens regarding strategies for safe use.

We have a responsibility to implement the Precautionary Principle - instead of demanding more evidence of harm, we should be demanding evidence of safety by design. As Nature wrote, **finding ways to help young people navigate technology does not have to wait until its consequences are nailed down.**[76] Health Professionals for Safer Screens would support a legislative approach that commands social media platforms establish a child is 16 before allowing them access to social media, with severe penalties for the tech companies should they fail to achieve this. This is not about bans, it is about creating a more appropriate age limit for these platforms and making sure this is honoured in the interest of their safety, health and educational attainment.

We are also calling for a full NHS led public health campaign.

References

[1] Nelson, C. Babies need humans, not screens. Unicef. https://www.unicef.org/parenting/child-development/babies-screen-time
[2] WHO. (2019). Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. https://iris.who.int/bitstream/handle/10665/311664/9789241550536-eng.pdf?sequence=1&isAllowed=y
[3] Hill, D., Ameenuddin, N., Reid Chassiakos, Y., Cross, C., Hutchinson, J., Levine, A., Boyd, R., Mendelson, R., Moreno, M., & Swanson, W. S. (2016). Media and Young Minds. Pediatrics, 138(5). https://publications.aap.org/pediatrics/article/138/5/e20162591/60503/Media-and-Young-Minds?autologincheck=redirected
[4] Pionti, M. (2022). Canadian Paediatric Society. Paediatric Child Health, 28(3), 184-192. https://cps.ca/en/documents/position/screen-time-and-preschool-children
[5] Brushe, M. E., Lynch, J. W., Melhuish, E., Reilly, S., Mittinty, M. N., & Brinkman, S. A. (2023 Apr 8). Objectively measured infant and toddler screen time: Findings from a prospective study. SSM - Population Health, 22. https://doi.org/10.1016/j.ssmph.2023.101395
[6] WHO. (2019). Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. https://iris.who.int/bitstream/handle/10665/311664/9789241550536-eng.pdf?sequence=1&isAllowed=y
[7] Children and parents: Media Use and Attitudes report 2024. (2024). https://www.ofcom.org.uk/media-use-and-attitudes/media-habits-children/children-and-parents-media-use-and-attitudes-report-2024/
[8] Mann, S., Calvin, A., Lenhart, A., & Robb, M. B. (2025). The Common Sense census: Media use by kids zero to eight, 2025. C. S. Media. https://pmc.ncbi.nlm.nih.gov/articles/PMC10122061/#bib1
[9] OFCOM. (2024). OFCOM Child Development and Online Behaviour.
[10] Gath, M., Horwood, L. J., Gillon, G., McNeill, B., & Woodward, L. J. (01/09/2025). Longitudinal associations between screen time and children's language, early educational skills, and peer social functioning - PubMed. Developmental Psychology. https://doi.org/10.1037/dev0001907
[11] Infant Cognitive Development and Screens. (2024). In C. a. S. I. o. D. M. a. C. Development (Ed.).
[12] Hutton, J. S., Dudley, J., DeWitt, T., Horowitz-Kraus, T., Hutton, J. S., Dudley, J., DeWitt, T., & Horowitz-Kraus, T. (2022-11-09). Associations between digital media use and brain surface structural measures in preschool-aged children. Scientific Reports 2022 12:1, 12(1). https://doi.org/10.1038/s41598-022-20922-0
[13] Law, E. C., Han, M. X., Lai, Z., Lim, S., Ong, Z. Y., Ng, V., Gabard-Durnam, L. J., Wilkinson, C. L., Levin, A. R., Rifkin-Graboi, A., Daniel, L. M., Gluckman, P. D., Chong, Y. S., Meaney, M. J., & Nelson, C. A. (2023/03/01). Associations Between Infant Screen Use, Electroencephalography Markers, and Cognitive Outcomes. JAMA Pediatrics, 177(3). https://doi.org/10.1001/jamapediatrics.2022.5674
[14] Liu, H., Chen, X., Huang, M., Yu, X., Gan, Y., Wang, J., Chen, Q., Nie, Z., & Ge, H. (05/11/2023). Screen time and childhood attention deficit hyperactivity disorder: a meta-analysis - PubMed. Reviews on environmental health, 39(4). https://doi.org/10.1515/reveh-2022-0262
[15] Heffler, K. F., Acharya, B., Subedi, K., & Bennett, D. S. (03/01/2024). Early-Life Digital Media Experiences and Development of Atypical Sensory Processing - PubMed. JAMA Pediatrics, 178(3). https://doi.org/10.1001/jamapediatrics.2023.5923
[16] Slobodin, O., Heffler, K. F., & Davidovitch, M. (2019 May). Screen Media and Autism Spectrum Disorder: A Systematic Literature Review - PubMed. Journal of developmental and behavioral pediatrics : JDBP, 40(4). https://doi.org/10.1097/DBP.0000000000000654
[17] Education Select Committee : Screentime: Impacts on Education and Wellbeing. (2024). Houses of Parliament Retrieved from https://committees.parliament.uk/publications/45128/documents/223543/default/
[18] Digital Wellbeing on a Budget. (2023). https://www.internetmatters.org/wp-content/uploads/2023/08/Internet-Matters-Free-school-meals-digital-wellbeing-report-Aug-2023.pdf
[19] Ofcom. Research into risk factors that may lead children to harm online. https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/online-research/keeping-children-safe-online/risk-factors-that-may-put-children-at-harm-online/children-risk-factors-report.pdf?v=328565
[20] Europol. (2025). Intellgence Notification: Violent online communities threaten children https://www.europol.europa.eu/media-press/newsroom/news/intelligence-notification-violent-online-communities-threaten-children
[21] The Common Sense Census: Media Use by Tweens and Teens. (2019). https://www.commonsensemedia.org/sites/default/files/research/report/2019_8-18-infographic_final-release.pdf
[22] Fitzpatrick, C., Pan, P. M., Lemieux, A., Harvey, E., Rocha, F. A., & Garon-Carrier, G. (10/01/2024). Early-Childhood Tablet Use and Outbursts of Anger - PubMed. JAMA Pediatrics, 178(10). https://doi.org/10.1001/jamapediatrics.2024.2511
[23] Fitzpatrick, C., Johnson, A., Laurent, A., Bégin, M., & Harvey, E. (01/10/2024). Do parent media habits contribute to child global development? - PubMed. Frontiers in psychology, 14. https://doi.org/10.3389/fpsyg.2023.1279893
[24] Gath, M., McNeill, B., & Gillon, G. (2023/01/01). Preschoolers' screen time and reduced opportunities for quality interaction: Associations with language development and parent-child closeness. Current Research in Behavioral Sciences, 5. https://doi.org/10.1016/j.crbeha.2023.100140
[25] Gutierrez, S. A., & Ventura, A. K. (2021/03/01). Associations between maternal technology use, perceptions of infant temperament, and indicators of mother-to-infant attachment quality. Early Human Development, 154. https://doi.org/10.1016/j.earlhumdev.2021.105305
[26] Rozenblatt-Perkal, Y., Davidovitch, M., & Gueron-Sela, N. (2022/02/01). Infants' physiological and behavioral reactivity to maternal mobile phone use – An experimental study. Computers in Human Behavior, 127. https://doi.org/10.1016/j.chb.2021.107038
[27] Nagata, J. M., Li, K., Sui, S. S., Talebloo, J., Otmar, C. D., Shao, I. Y., Kiss, O., Ganson, K. T., Testa, A., He, J., & Baker, F. C. (02/04/2025). Associations between media parenting practices and early adolescent consumption of R-rated movies and mature-rated video games - PubMed. BMC pediatrics, 25(1). https://doi.org/10.1186/s12887-024-05367-w
[28] Vanderloo, L. M., Janus, M., Omand, J. A., Keown-Stoneman, C. D. G., Borkhoff, C. M., Duku, E., Mamdani, M., Lebovic, G., Parkin, P. C., Simpson, J. R., Tremblay, M. S., Maguire, J. L., Birken, C. S., Vanderloo, L. M., Janus, M., Omand, J. A., Keown-Stoneman, C. D. G., Borkhoff, C. M., Duku, E.,...Birken, C. S. (2022-02-23). Children's screen use and school readiness at 4-6 years: prospective cohort study. BMC Public Health 2022 22:1, 22(1). https://doi.org/10.1186/s12889-022-12629-8
[29] Kindred Squared School Readiness Survey. (2025). https://kindredsquared.org.uk/wp-content/uploads/2025/01/School-Readiness-Survey-January-2025-Kindred-Squared.pdf
[30] UK, S. a. L. (2024). Getting in early: Speech and language interventions that transform children's lives. https://speechandlanguage.org.uk/wp-content/uploads/2024/08/Getting-in-early-report-FINAL.pdf
[31] Takahashi, I., Obara, T., Ishikuro, M., Murakami, K., Ueno, F., Noda, A., Onuma, T., Shinoda, G., Nishimura, T., Tsuchiya, K. J., & Kuriyama, S. (2023). Screen Time at Age 1 Year and Communication and Problem-Solving Developmental Delay at 2 and 4 Years. JAMA Pediatr, 177(10), 1039-1046. https://doi.org/10.1001/jamapediatrics.2023.3057
[32] Heuvel, M. v. d., Ma, J., Borkhoff, C. M., Koroshegyi, C., Dai, D. W. H., Parkin, P. C., Maguire, J. L., & Birken, C. S. (2018 Nov 13). Mobile Media Device Use is Associated with Expressive Language Delay in 18-Month-Old Children. Journal of Developmental and Behavioral Pediatrics, 40(2). https://doi.org/10.1097/DBP.0000000000000630
[33] Brushe, M. E., Haag, D. G., Melhuish, E. C., Reilly, S., & Gregory, T. (2024 Mar 4). Screen Time and Parent-Child Talk When Children Are Aged 12 to 36 Months. JAMA Pediatrics, 178(4). https://doi.org/10.1001/jamapediatrics.2023.6790
[34] UK, S. a. L. (2024). Getting in early: Speech and language interventions that transform children's lives. https://speechandlanguage.org.uk/wp-content/uploads/2024/08/Getting-in-early-report-FINAL.pdf
[35] RCSLT Workforce and Vacancy Summary. (2024). https://www.rcslt.org/news/rcslt-workforce-and-vacancy-survey/
[36] Meyer, M., Zosh, J. M., McLaren, C., Robb, M., McCaffery, H., Golinkoff, R. M., Hirsh-Pasek, K., & Radesky, J. (2021-10-02). How educational are "educational" apps for young children? App store content analysis using the Four Pillars of Learning framework. Journal of Children and Media. https://doi.org/10.1080/17482798.2021.1882516
[37] THE MONITOR REPORT 2023
Children's media use, purchasing, attitudes and activities. (2023). https://wwc.barnet.gov.uk/sites/default/files/CHILDWISE%20MONITOR%202023%20-%20LONDON%20BOROUGH%20OF%20BARNET.pdf
[38] Team, B. I. (2023). Three remarkable new findings for PISA. https://www.bi.team/blogs/three-remarkable-new-findings-in-pisa-the-worlds-guide-to-how-our-kids-are-learning-or-not/
[39] ParentKind. (2024). Smartphones in School. https://www.parentkind.org.uk/assets/parents-resources/Smartphones-in-Schools.pdf
[40] Beland, L.-P., & Murphy, R. (2015). Ill Communication: Technology, Distraction & Student Performance. C. f. E. Performance. https://cep.lse.ac.uk/pubs/download/dp1350.pdf
[41] Mainsfield, I., Webb, N., & Phillips, S. (2024). Disconnect- Case for smartphone bans in school. P. Exhange.
[42] Goodyear, V. A., Randhawa, A., Adab, P., Al-Janabi, H., Fenton, S., Jones, K., Michail, M., Morrison, B., Patterson, P., Quinlan, J., Sitch, A., Twardochleb, R., Wade, M., & Pallan, M. (2025/04/01). School phone policies and their association with mental wellbeing, phone use, and social media use (SMART Schools): a cross-sectional observational study. The Lancet Regional Health – Europe, 51. https://doi.org/10.1016/j.lanepe.2025.101211
[43] University, B. (2025). School bans alone are not enough to tackle negative impacts of phones and social media https://www.birmingham.ac.uk/news/2025/school-bans-alone-not-enough-to-tackle-negative-impacts-of-phone-and-social-media-use
[44] Global Education Monitoring Report 2023: Technology in Education - A tool on whose terms? (2023). UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000385723
[45] West, M. (2023). An Ed Tech Tragedy. https://www.unesco.org/en/articles/ed-tech-tragedy-educational-technologies-and-school-closures-time-covid-19
[46] Schools: Mobile Phones, (2024). https://hansard.parliament.uk/Lords/2024-11-28/debates/5FD5A1AC-051B-4F9A-82BD-7B0C11205B59/SchoolsMobilePhones
[47] Blakemore, S. J. (2025). What Adolescence gets right (and wrong) about teen boys' brains. The Times. https://www.thetimes.com/life-style/parenting/article/adolescence-netflix-teenager-teen-boys-brains-xd8q07w6f
[48] Ward, J. L., Vázquez-Vázquez, A., Phillips, K., Settle, K., Pilvar, H., Cornaglia, F., Gibson, F., Nicholls, D., Roland, D., Mathews, G., Roberts, H., Viner, R. M., & Hudson, L. D. (2025/02/01). Admission to acute medical wards for mental health concerns among children and young people in England from 2012 to 2022: a cohort study. The Lancet Child & Adolescent Health, 9(2). https://doi.org/10.1016/S2352-4642(24)00333-X
[49] Children's Mental Health Services 2022-23. (2024). https://www.childrenscommissioner.gov.uk/resource/childrens-mental-health-services-2022-23/
[50] Darzi, A. (2024). Independent Investigation of the National Health Service England. Crown. https://assets.publishing.service.gov.uk/media/66f42ae630536cb92748271f/Lord-Darzi-Independent-Investigation-of-the-National-Health-Service-in-England-Updated-25-September.pdf
[51] Searles, M. (2025). English Girls sickest and unhappiest in Europe. The Telegraph. https://www.telegraph.co.uk/news/2025/04/05/england-girls-sickest-unhappiest-in-europe-oecd-study-finds/
[52] Cambridge leads governmental project to understand impact of smartphones and social media on young people. (2025). https://www.cam.ac.uk/research/news/cambridge-leads-governmental-project-to-understand-impact-of-smartphones-and-social-media-on-young
[53] Carter, B., Ahmed, N., Cassidy, O., Pearson, O., Calcia, M., Mackie, C., & Kalk, N. J. (2024-01-01). 'There's more to life than staring at a small screen': a mixed methods cohort study of problematic smartphone use and the relationship to anxiety, depression and sleep in students aged 13–16 years old in the UK. BMJ Ment Health, 27(1). https://doi.org/10.1136/bmjment-2024-301115 , Carter, B., Payne, M., Rees, P., Sohn, S. Y., Brown, J., & Kalk, N. J. (2024). A multi-school study in England, to assess problematic smartphone usage and anxiety and depression. Acta Paediatr, 113(10), 2240-2248. https://doi.org/10.1111/apa.17317
[54] Tiraboschi, G. A., Garon-Carrier, G., Smith, J., & Fitzpatrick, C. (2023/12/01). Adolescent internet use predicts higher levels of generalized and social anxiety symptoms for girls but not boys. Preventive Medicine Reports, 36. https://doi.org/10.1016/j.pmedr.2023.102471
[55] Teenage social media use strongly linked to anxiety and depression. (2024). Financial Times. https://www.ft.com/content/bced2138-366b-448f-ab12-3c068199145a
[56] Hökby, S., Alvarsson, J., Westerlund, J., Carli, V., & Hadlaczky, G. (2 Apr 2025). Adolescents' screen time displaces multiple sleep pathways and elevates depressive symptoms over twelve months. PLOS Global Public Health, 5(4). https://doi.org/10.1371/journal.pgph.0004262
[57] Nagata, J. M., Lee, C. M., Hur, J. O., & Baker, F. C. (undefined). What we know about screen time and social media in early adolescence: a review of findings from the Adolescent Brain Cognitive Development Study. Current Opinion in Pediatrics, undefined(undefined). https://doi.org/10.1097/MOP.0000000000001462
[58] Radesky, J., Hiniker, A., McLaren, C., Akgun, E., Schaller, A., Weeks, H. M., Campbell, S., & Gearhardt, A. N. (2022/06/01). Prevalence and Characteristics of Manipulative Design in Mobile Applications Used by Children. JAMA Network Open, 5(6). https://doi.org/10.1001/jamanetworkopen.2022.17641
[59] Lin, Y., Zhang, X., Huang, Y., Jia, Z., Chen, J., Hou, W., Zhao, L., Wang, G., & Zhu, J. (2022/10/10). Frontiers | Relationships between screen viewing and sleep quality for infants and toddlers in China: A cross-sectional study. Frontiers in Pediatrics, 10. https://doi.org/10.3389/fped.2022.987523
[60] Pickard, H., Chu, P., Essex, C., Goddard, E. J., Baulcombe, K., Carter, B., Bedford, R., & Smith, T. J. (2024). Toddler Screen Use Before Bed and Its Effect on Sleep and Attention: A Randomized Clinical Trial. JAMA Pediatr. https://doi.org/10.1001/jamapediatrics.2024.3997
[61] Fitzpatrick, C., Almeida , M. L., Harvey, E., Garon-Carrier, G., Berrigan, F., & Asbridge, M. (04/18/2022). An examination of bedtime media and excessive screen time by Canadian preschoolers during the COVID-19 pandemic - PubMed. BMC pediatrics, 22(1). https://doi.org/10.1186/s12887-022-03280-8
[62] Nagata, J. M., Singh, G., Yang, J. H., Smith, N., Kiss, O., Ganson, K. T., Testa, A., Jackson, D. B., & Baker, F., C. (2023 Aug). Bedtime screen use behaviors and sleep outcomes: Findings from the Adolescent Brain Cognitive Development (ABCD) Study - PubMed. Sleep health, 9(4). https://doi.org/10.1016/j.sleh.2023.02.005
[63] Carter, B., Rees, P., Hale, L., Bhattacharjee, D., & Paradkar, M. S. (2016/12/01). Use of Screen-Based Media Devices and Sleep Outcomes. JAMA Pediatrics, 170(12). https://doi.org/10.1001/jamapediatrics.2016.2341
[64] Garey, J. Teens and Sleep: the cost of sleep deprivation. https://childmind.org/article/happens-teenagers-dont-get-enough-sleep/
[65] Nagata, J. M., Li, K., Sui, S. S., Talebloo, J., Otmar, C. D., Shao, I. Y., Kiss, O., Ganson, K. T., Testa, A., He, J., & Baker, F. C. (02/04/2025). Associations between media parenting practices and early adolescent consumption of R-rated movies and mature-rated video games - PubMed. BMC pediatrics, 25(1). https://doi.org/10.1186/s12887-024-05367-w
[66] Hökby, S., Alvarsson, J., Westerlund, J., Carli, V., & Hadlaczky, G. (2 Apr 2025). Adolescents' screen time displaces multiple sleep pathways and elevates depressive symptoms over twelve months. PLOS Global Public Health, 5(4). https://doi.org/10.1371/journal.pgph.0004262
[67] Ha, A., Lee, Y. J., Lee, M., Shim, S. R., & Kim, Y. K. (2025/02/03). Digital Screen Time and Myopia. JAMA Network Open, 8(2). https://doi.org/10.1001/jamanetworkopen.2024.60026
[68] Ibid.
[69] A summary of the UN Convention on the rights of the child. UNICEF Retrieved from https://www.unicef.org.uk/wp-content/uploads/2019/10/UNCRC_summary-1_1.pdf
[70] https://www.thelightphone.com; https://www.thebalancephone.com; https://www.hmd.com/en_gb/hmd-fusion-x1
[71] My Life Loop Kids and Teens. My Life Diabetes Care. https://www.mylife-diabetescare.com/en-GB/mylife-loop/kids-teens.html
[72] Children and Parents: Media Use and Attitudes (2023). https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/media-literacy-research/children/childrens-media-use-and-attitudes-2023/childrens-media-use-and-attitudes-report-2023.pdf
[73] A country that works for all young people. https://cdn.prod.website-files.com/65b6b3c3bd2e7d160db2dbc0/66fec552d5159812bc01ff6d_Pre-School%20Report%20Digital.pdf
[74] Goodyear, V. A., James, C., Orben, A., Quennerstedt, M., Schwartz, G., & Pallan, M. (2025-03-27). Approaches to children's smartphone and social media use must go beyond bans. BMJ, 388. https://doi.org/10.1136/bmj-2024-082569
[75] Orben, A., Przybylski, A. K., Blakemore, S. J., & Kievit, R. A. (2022). Windows of developmental sensitivity to social media. Nat Commun, 13(1), 1649. https://doi.org/10.1038/s41467-022-29296-3
[76] Are screens harming teens? What scientists can do to find answers. (2025). Nature, 640, 7-8.

HEALTH PROFESSIONALS FOR SAFER SCREENS

A CALL FOR CHANGE

A HEALTH BRIEFING ON THE EVIDENCED RISKS OF SCREENS FOR EARLY YEARS CHILDREN

Summary

As Health Professionals, we see the harm that screens cause children and young people daily. This report will focus on children in their early years (ages 0-5). We have a report dedicated to the harms of screens, smartphones and social media usage in school-age children and young adults (ages 6-22) **here**.

While we support the aim of the Online Safety Act and recent calls to strengthen it, this will only partially address the many harms caused and exacerbated by screens.

The World Health Organisation (WHO) recommends no screen time for babies under two years old and no more than one hour of screen time per day for children aged 2–4[1]. The risks of screen use for children in their early years are now evidenced by an increasing body of research, and crucially, evidence shows that outcomes are worse the earlier a child has a phone.[2]

Developmental issues caused by screen use

- Language and communication difficulties
- Delays in global development
- Impacts on symptoms of neurodivergence – Autism, ADHD and sensory processing
- Emotional and social difficulties
- Reduced academic attainment

The physical impact of screen usage

- Physical changes in the brain
- Poor eyesight
- Eating Disorders
- Obesity
- Musculoskeletal
- Sleep difficulties

The societal impact of screen usage

- Addictive by design
- Missed childhood experiences and impeded life chances.
- Technoference
- Parent understanding of screen usage

Our advice as health professionals is that the risks are overwhelming, increasing, and outweigh any benefits. The time has come to launch a public health campaign to communicate these harms to the public and to adopt the precautionary principle for the sake of our children.

Developmental issues caused by screen use

The first five years are crucial to a child's development and are widely referred to as the critical period for growth and maturation. The neuroplasticity of young children's brains means they respond to the stimuli around them to develop and learn. There are increasingly significant harmful impacts when this stimulus is excessive screen use rather than human interaction.[3]

Patricia Kuhl, a leading neuroscientist who runs experiments, quoted in a UNICEF article:

"*What we've discovered is that little babies, under a year old, do not learn from a machine," she says, pointing to several brain scans on a computer. "Even if you show them captivating videos, the difference in learning is extraordinary. You get genius learning from a live human being, and you get zero learning from a machine."*[4]

Figure 1, produced by Ofcom, summarises vital developmental moments in a child's life and how they relate to the digital world.[5]

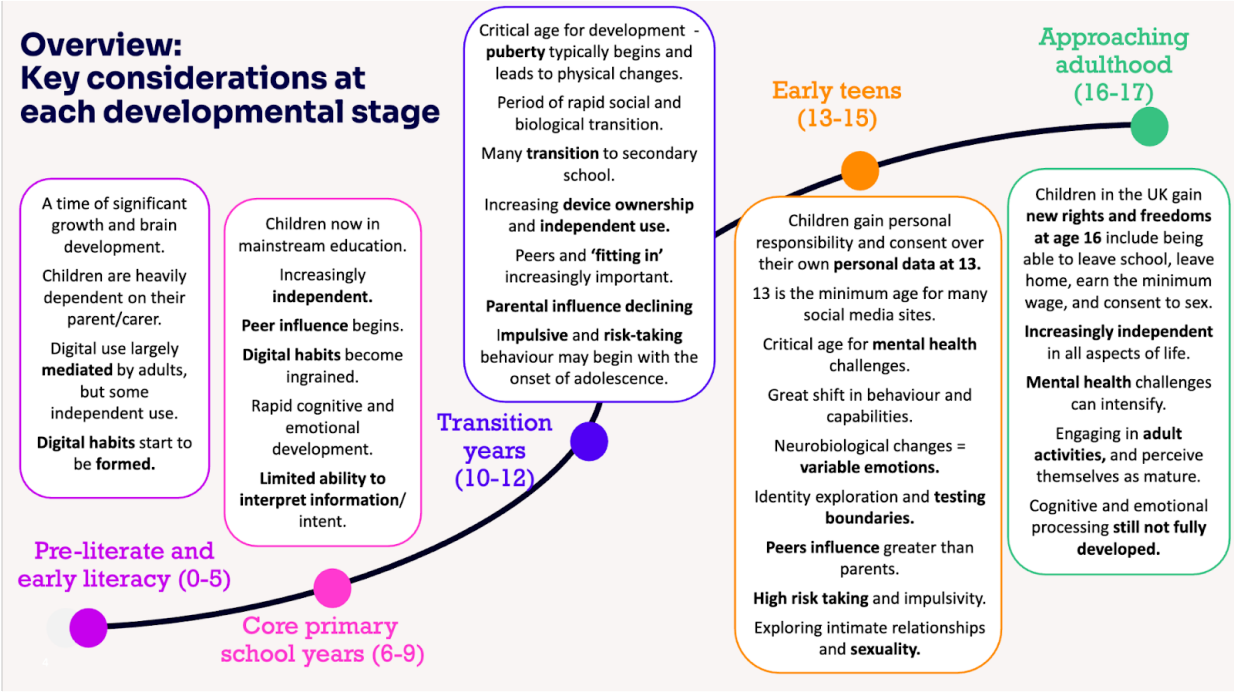


Figure 1

In the following paragraphs, we will discuss many of the important areas of development that are negatively impacted by smart devices and social media.

- **Language and Communication**

There is compelling evidence across many longitudinal studies that greater screen use is associated with lower language skills and developmental delays in communication. [6]

Romeo et al.'s study describes the importance of conversational turns with adults for activating the left inferior frontal area of the brain (Broca's area - associated with speech and language), significantly improving the child's verbal ability. [7] The researchers also found that exposure to conversational turns is independent of socioeconomic status, IQ and adult-child utterances when measuring children's language processing outcomes.[8]

Brushe's study indicated that for every additional minute of screen exposure, parents and children generally talked or vocalised less and engaged in fewer back-and-forth interactions. It showed that 3-year-old children were reported to have an average screen time of 172

minutes, leading to a difference of 100 adult words, 840 vocalisations, and 194 daily conversations compared to if they used screens for the recommended 60 minutes. [9] Studies have shown that the fluency and connectedness of parent-child interactions at 24 months of age predicted children's language outcomes a year later.[10] Children learn new words better from their caregiver when they have their undivided attention, and the evidence states that interruptions due to devices impact children's language learning outcomes.[11] Word learning is most efficient when caregivers respond in a timely manner, expanding the child's use of that word to enrich their language learning environment. Similarly, children need repeated periods of joint attention (where both the child and caregiver attend to the same objects, activities and interaction), which occur less frequently when parents are distracted by screens. [12] Research consistently shows that shared reading boosts vocabulary, while excessive screen time harms vocabulary in 24-month-olds. The positive effects of shared reading on expressive vocabulary are more pronounced in lower SES groups, emphasising its importance in resource-limited settings.[13]

Reduced language skills caused by screen use in pre-school children have been shown to correlate with lower school readiness[14] and continues into adult life (Figure 2). [15]

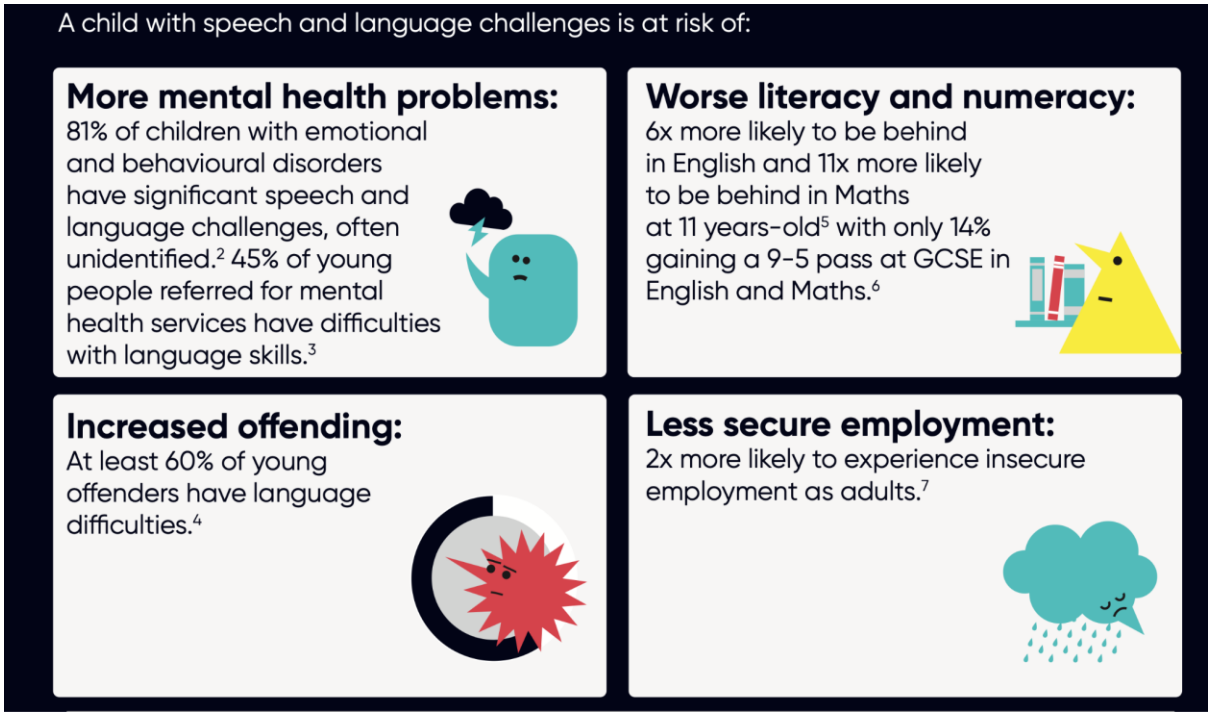


Figure 2

- **Global Development**

There is a higher risk of delays in child global development (communication, cognitive, personal-social, and motor skills) in intensive screen users compared to those with light screen usage.[16] A study from New Zealand discovered that 90 minutes of daily direct screen time at age two was associated with below-average language and educational ability and above-average levels of peer relationship problems at age four and a half.[17] Screen use was shown to be an independent predictor of developmental outcomes in the study, even when individual child and family factors were considered, suggesting that the impact of screen usage is universal.[18] Figure 3 shows the evidenced potential impacts of early screen exposure.[19]

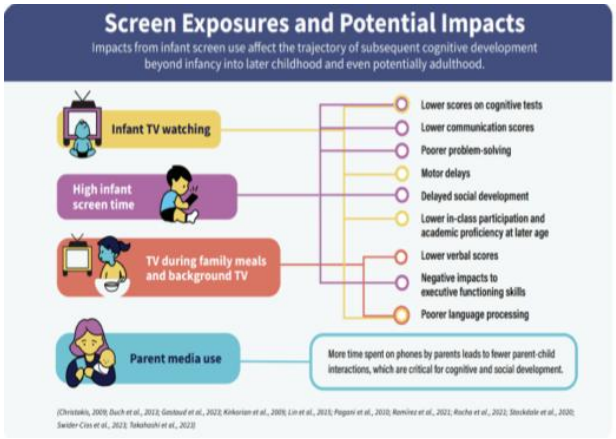


Figure 3

These developmental delays have consequences for school readiness. Studies show that children with higher screen usage are less ready for school, particularly regarding language and cognitive development.[20] This causes issues in accessing the early years curriculum and educational attainment. From Kindred Squared's (2025) survey into school readiness, 54% of teachers reported that children spending more than the recommended time on screens was a contributing factor to school readiness. [21] This demonstrates the risk to negative impacts of early screen use.

Infants lack the cognitive skills required to learn from screens, demonstrating the importance of human interaction for children in their early years to thrive.[22] Experts have described the "video deficit" effect, which explains how young children learn more from 3D than 2D stimuli. [23] [24] Young children can only learn from media by adults using electronic devices to mimic real-life interactions, for example video chats with family, and electronic media, even electronic toys, interfere with learning for very young children. Research has shown that children can imitate actions, demonstrate learning, from television using the corresponding real-word objects.[25] Similarly, children only learn words from television when there is a real-life demonstration and context is provided by an adult not on screen.[26]

- **Impacts on symptoms of neurodivergence – Autism, ADHD and sensory processing**

Meta-analysis of 28 studies has evidenced significant associations between digital media and later ADHD symptoms. [27] A reciprocated association was also found, with some studies showing that ADHD symptoms are related to an increased risk of developing problematic use of digital media. Furthermore, all children are at risk of developing shorter attention spans and ability to focus, not just those with ADHD.[28] The negative impact of screen use on attention in young children has been demonstrated for over 25 years. A study looking at TV viewing in 1997 showed that attention is worsened if the child is exposed to TVs before the age of 3 years old.[29]

When toddlers are used to high levels of sensory stimulation from screens, everything else appears dull or uninteresting in comparison. The child is, therefore, less motivated to explore their environment and seek interactions, missing meaningful learning and development opportunities.

Early-life digital media exposure is associated with atypical sensory processing. Results from a US sample of 1,471 pre-school aged children found that viewing of television or video on any device at 12 months old led to the child being twice as likely to experience low registration (i.e. not readily perceiving sensory stimuli in their surroundings, commonly described as uninterested in their environment and apathetic).[30] This continued for 18-month-old children, who additionally showed increased risk of sensory avoidance if they had had greater screen

exposure. For two-year-old children, greater screen exposure was associated with higher sensory seeking (i.e. actively searching their environment for sensory experiences, commonly described as restless, noisy, and easily bored), sensory sensitivity (i.e. react more quickly and strongly to sensory input, commonly leading to overwhelm), and again avoidance of sensory input. Subsequent studies have since replicated these associations.[31]

Autistic children find it harder to build social and interpersonal skills and overuse of screens can reduce access to critical developmental activities like face-to-face interaction and play, which are essential for building social and communication skills.[32] Studies have shown that autistic children are exposed to more screen time than their typically developing peers or other clinical groups and that the exposure starts at a younger age.[33] Excessive screen time poses unique risks for those with sensory processing needs.[34] It has become increasingly more difficult for nursery staff and early years professionals to identify learning difficulties or neurodivergence in pupils, as they could be masked or replicated by the effects of excessive screen use. [35] Clinicians are now being encouraged to inquire about screen time during early childhood as part of their assessment of a child's development. [36]

- **Emotional and Social Development**

Screens and tablets are often used to keep children calm, but while this may seem effective in the moment, it can hinder the development of children's self-regulation skills in the long term.[37] Studies have shown that the amount of screen time a child has at 3.5 years old can predict the increase in their anger and frustration at 4.5 years old.[38] Furthermore, it may create a pattern where meltdowns become associated with screen time, as using screens can diminish self-control and result in more frequent outbursts.[39] This is particularly important for young children.[40] The earlier children start using electronic devices, the more time they spend on them, the lower their self-regulation skills. [41] [42]

In his book The Anxious Generation, psychologist Jonathan Haidt[43] discusses how children struggle to develop the skills to feel confident around others and approach new social situations. This issue can be partly attributed to school closures during COVID-19, but, as summarised by the 2023 US Surgeon General's Advisory, primarily to the impact of screens and the lack of real-time interactions. [44]

Less than 30% of young people reported that phones helped them learn social skills.[45] Research shows that when parents give their child a screen to watch in an effort to help regulate their emotions, this can hinder the child's ability to interpret facial expressions and develop essential social skills which can imped empathy development.[46] Young children must engage in face-to-face interactions to properly understand non-verbal cues.[47]

The age at which a child first has a screen is correlated with worse mental health outcomes. The younger the age of having a first screen, the worse the mental health that the young adult reports today.[48] Research also shows that changes in screen exposure between the ages of 4.5 and 8 correlate to increased difficulty with peer interactions.[49] Academic attainment

Excessive screen time negatively impacts children's academic achievement by reducing executive function, language development, and social-emotional skills, while also increasing risks of obesity, sleep disorders, and mental health issues.[50] The context of any screen use, for example, parental guidance and engagement, and imposing screen limits can help mitigate these effects and support healthy development.[51]

The physical impact of screen usage

- **Physical changes in the brain**

A study of children aged 3 to 5 suggests that screen time impacts the development of brain areas responsible for visual processing, empathy, attention, complex memory and early reading skills.[52] Research shows that developing brains are more sensitive to experience in the first few years of life than in later years.[53]

Increased screen-based media use has been linked to lower white matter integrity in young children's brains, potentially impacting language, literacy, focus, problem-solving, and motor skills, highlighting the need for further research during early brain development.[54] Individuals with screen dependency tend to have significantly lower white matter integrity in specific areas such as the superior longitudinal fasciculus (SLF), superior corona radiata (SCR), internal capsule, external capsule, sagittal stratum, fornix/stria terminalis, and midbrain structures. [55] These differences in physical structures of the brain particularly affect higher-order cognitive and language skills needed for self-regulation, learning, academic achievement and mental health. [56] [57]

- **Eyesight**

Excessive screen time on smart devices, particularly mobile phones, is linked to a 30% higher risk of developing myopia. Myopia, commonly known as nearsightedness, is a vision condition in which distant objects appear blurry while close objects are seen clearly. It generally worsens over time before stabilising in adulthood. When this screen time is combined with excessive computer use, the risk increases to approximately 80%. This is seen in children as young as three years old as well as into adulthood.[58] The prevalence of myopia in children has grown from 24% in 1990 to 36% in 2023, and this trend is expected to continue.[59]Every additional hour of screen time daily increases myopia risk by 21%. In children already diagnosed with myopia, an extra hour raises the risk of progression by 54%.[60]

- **Obesity**

There is increasing evidence of a strong association of excessive screen usage and an increased risk of obesity.[61] Children with higher screen time are more likely to engage in mindless eating and overeating. [62] Longer screen time can interfere with health-promoting experiences such as physical activity, and children from families with lower annual household incomes are more affected.[63] Children are often sedentary when watching screens, which reduces physical activity and is known to have a positive effect on motor development.[64]

- **Musculoskeletal Disorders**

Children who use screens for more than 60 minutes daily are ten times more likely to develop musculoskeletal disorders than those who do not, especially if young children use devices while lying down.[65] Teachers have observed that children have difficulty developing core strength to sit on a carpet when they arrive at school, due to lying down whilst using screens.[66] The physical health issues that come with the overuse of screens include problems with the text neck, wrist, and back.[67] In a study conducted in the United States, children who engaged in more screen time performed worse on a manual dexterity scale.[68]

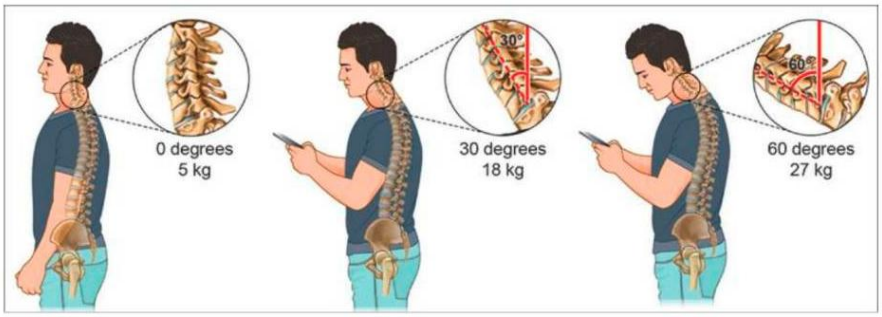


Figure 4

Experts are concerned about hand and wrist weakness, reduced grip, and hand-pinch strength attributed to screen use.[69] Hutton et al discuss how this can be seen in pre-school children for example, in simple letter formation[70]. Young children are starting primary school without adequate finger muscle strength for writing or other activities such as painting, scissors cutting, looping thread, doing up buttons, etc.[71]

- **Sleep issues**

Quality sleep is critical for a child's healthy development and its absence drives untoward behaviour, impaired learning and impedes overall wellness. Screens significantly impact sleep patterns and the ability to fall or stay asleep, which is particularly important for young children during a crucial developmental period.[72]

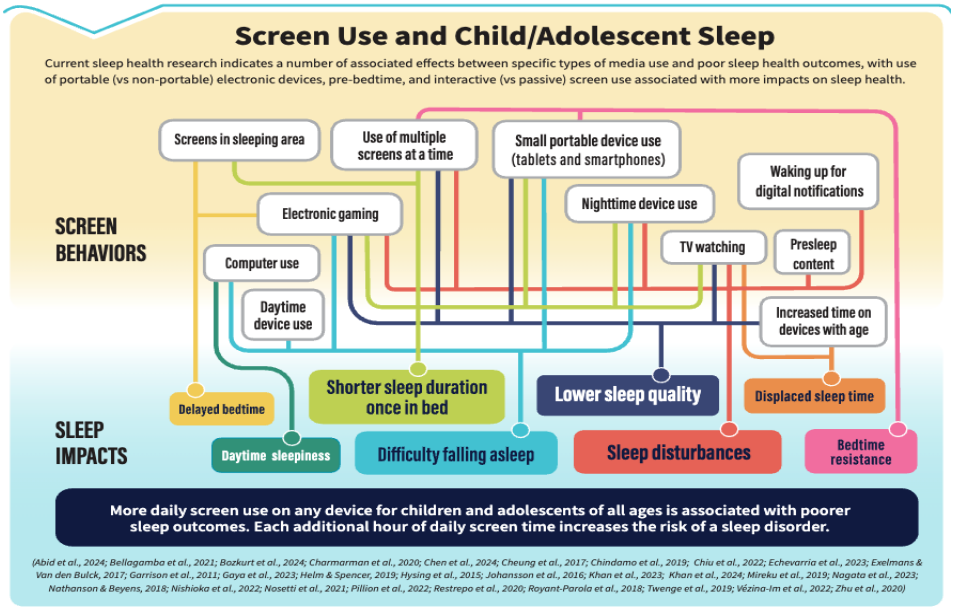


Figure 5

There is a strong and consistent association with bedtime media use and inadequate sleep quantity, poor quality, and excessive daytime sleepiness as shown in Figure 4. [73] [74] Studies have also shown that children who had access to, but did not use, devices at night had comparable sleep disturbance.[75]

The Societal Issues of Screens

- **Addictive by design**

Screens are designed to be addictive. The brilliant colours, sounds, vibrations, better-than-real-life images, swipe mechanisms and the delivery push notifications are all designed to reward us and stimulate the release of dopamine – the same chemical people feel when they fall in love.[76] The manufacturers and app makers use that "younger users, who are particularly sensitive to reinforcement in the form of social reward and have minimal ability to self-regulate effectively," can be habituated to apps like TikTok in less than 35 minutes.[77]

Because of this, children readily become addicted to social media and their screens, deepening behavioural addictions through screen use. If they become unable to access personal devices or decide to stop using them for a period, they will often experience withdrawal-like symptoms.[78] A study by researchers at King's College London estimated that one in four children and young people use their screens in a way that is consistent with a behavioural addiction.[79]

This was defined as a child panicking or becoming upset when a device is unavailable, using the device for uncontrolled lengths of time and being used at the detriment of other enjoyable and developmentally meaningful activities.[80] From 'The National Parent Survey 2024' in the UK, 14% of children spend more than 7 hours on electronic devices, the average being 3 hours and 20 minutes outside of school.[81]

A comprehensive review of screen addiction revealed a wide range of issues, including feelings of insecurity, staying up late at night, strained parent-child relationships, disrupted school relationships, and various psychological problems such as compulsive buying, pathological gambling, low mood, tension, anxiety, leisure boredom, and behavioural issues. The most significant associations were found with hyperactivity, followed by conduct problems and emotional symptoms.[82]

- **Missed childhood experiences and impeded life chances**

Children spend significant amounts of time on their smartphones. This means they spend that time alone rather than with their family and friends and in real-life situations, which prepares them for adulthood (Figure 6).[83] The more time early years children spend on screens is associated with less shared reading, lower language skills, fewer quality interactions with parents, and lower parent-child closeness.[84] Recent research has suggested that playing outdoors can mitigate some of the negative effects of screen time on daily living skills by 20%.[85]

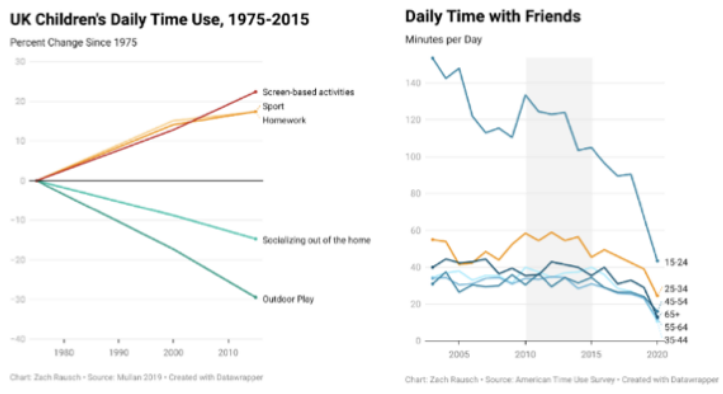


Figure 6

- **Parent understanding of screen usage**

The Kindred Squared School Readiness survey highlights that 43% of parents were unaware of the full range of skills required for a child to be 'ready for school' before their child was 4 years old.[86] Crucial information is being provided to parents too late, or factually incorrect information. An example is recommendations to use screen time to avoid behaviour that challenges when evidence demonstrates that screen time worsens behavioural difficulties.[87]

Research has shown that parents experience confusion about screen time recommendations, and there is a need for more robust educational programs that explicitly explain the risks of screen use and the developmental appropriacy of children using screens.[88] Sociodemographic characteristics such as education level and occupation influence parents' awareness and confidence in their knowledge of the impact of screen use.[89]

Nagata et al. further discuss the lack of sufficient evidence-based guidance from governmental organisations for parents managing their children's screen use.[90] Since screen time is potentially modifiable through parent training and education, studies have shown the need for greater adherence to the recommendations to avoid screen viewing in children younger than 2 years old.[91] [92] Healthcare professionals and parents can work collaboratively together to create 'media plans' to ensure that screen time does not interfere with vital parent-child interactions and is used in a responsible manner for short periods, aligning with WHO recommendations.[93]

- Technoference

"Technoference" is a term for when the use of devices distracts from interpersonal activities.[94] This section will focus on how technoference impacts parent-child interactions. Studies have shown how parental use of devices reduces engagement when their children attempt to initiate interaction and reduces their attunement to their child's needs.[95]

When engrossed using their devices, parents are less aware of children's social and/or behavioural cues and this could lead to more conflict within families.[96] [97] [98] A study concluded that "technoference" was correlated to three key markers of parent-child interactions: parent directiveness (giving a child verbal or non-verbal cues about what the child should do), responsiveness and scaffolding (parent's adjusting behaviour to provide a framework for their child to learn from).[99]

This impacts situations where children are playing in the park, trying new foods and during breastfeeding.[100] [101] When using smartphones and breast-feeding, mothers can take longer to respond to changes in their baby, the mother's feeding posture can be affected, which can cause pain for the mother, and mother-baby communication is different.[102]

[1] World Health Organization. (2019). Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. World Health Organization.

[2] Sapien Labs. (2023). *Age of first smartphone/tablet and mental wellbeing outcomes*. Global Mind Project. https://www.sapienlabs.org

[3] Madigan, S., Browne, D., Racine, N., Mori, C., & Tough, S. (2019). Association Between Screen Time and Children's Performance on a Developmental Screening Test. *JAMA pediatrics*, *173*(3), 244–250. https://doi.org/10.1001/jamapediatrics.2018.5056

[4] Nelson, C. *Babies need humans, not screens*. Unicef. https://www.unicef.org/parenting/child development/babies-screen-time

[5] OFCOM. *OFCOM Child Development and Online Behaviour*.

[6] Brushe ME, Haag DG, Melhuish EC, Reilly S, Gregory T. Screen Time and Parent-Child Talk When Children Are Aged 12 to 36 Months. *JAMA Pediatr.*2024;178(4):369–375. doi:10.1001/jamapediatrics.2023.6790

[7] Romeo, R. R., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., Rowe, M. L., & Gabrieli, J. D. E. (2018). Beyond the 30-Million-Word Gap: Children's Conversational Exposure Is Associated With Language-Related Brain Function. *Psychological science*, *29*(5), 700–710. https://doi.org/10.1177/0956797617742725

[8] Romeo, R. R., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., Rowe, M. L., & Gabrieli, J. D. E. (2018). Beyond the 30-Million-Word Gap: Children's Conversational Exposure Is Associated With Language-Related Brain Function. *Psychological science*, *29*(5), 700–710. https://doi.org/10.1177/0956797617742725

[9] Brushe ME, Haag DG, Melhuish EC, Reilly S, Gregory T. Screen Time and Parent-Child Talk When Children Are Aged 12 to 36 Months. *JAMA Pediatr.*2024;178(4):369–375. doi:10.1001/jamapediatrics.2023.6790

[10] Hirsh-Pasek, K., Adamson, L. B., Bakeman, R., Owen, M. T., Golinkoff, R. M., Pace, A., Yust, P. K., & Suma, K. (2015). The Contribution of Early Communication Quality to Low-Income Children's Language Success. *Psychological science*, *26*(7), 1071–1083. https://doi.org/10.1177/0956797615581493

[11] Reed, J., Hirsh-Pasek, K., & Golinkoff, R. M. (2017). Learning on hold: Cell phones sidetrack parent-child interactions. *Developmental psychology*, *53*(8), 1428–1436. https://doi.org/10.1037/dev0000292

[12] Corkin, M. T., Henderson, A. M. E., Peterson, E. R., Kennedy-Costantini, S., Sharplin, H. S., & Morrison, S. (2021). Associations between technoference, quality of parent-infant interactions, and infants' vocabulary development. *Infant behavior & development*, *64*, 101611.

[13] Rosslund, A., Kartushina, N., & Mayor, J. (2024). Associations between shared book reading, daily screen time and infants' vocabulary size | Journal of Child Language | Cambridge Core. *Journal of Child Language*. https://doi.org/10.1017/S0305000924000291

[14] Gath, M., Horwood, J., Gillon, G., McNeill, B., & Woodward, L. (2025). Longitudinal associations between screen time and children's language, early educational skills, and peer social functioning. *Developmental Psychology.*

[15] UK, S. a. L. (2024). *Getting in early: Speech and language interventions that transform children's lives*. https://speechandlanguage.org.uk/wp-content/uploads/2024/08/Getting-in-early-report-FINAL.pdf

[16] Takahashi, I., Obara, T., Ishikuro, M., Murakami, K., Ueno, F., Noda, A., Onuma, T., Shinoda, G., Nishimura, T., Tsuchiya, K. J., & Kuriyama, S. (2023). Screen Time at Age 1 Year and Communication and Problem-Solving Developmental Delay at 2 and 4 Years. *JAMA pediatrics*, *177*(10), 1039–1046. https://doi.org/10.1001/jamapediatrics.2023.3057

[17] Gath, M., Horwood, J., Gillon, G., McNeill, B., & Woodward, L. (2025). Longitudinal associations between screen time and children's language, early educational skills, and peer social functioning. *Developmental Psychology.*

[18] Gath, M., Horwood, J., Gillon, G., McNeill, B., & Woodward, L. (2025). Longitudinal associations between screen time and children's language, early educational skills, and peer social functioning. *Developmental Psychology.*

[19] *Sleep And Screens*. (2025). Children and Screens. https://www.childrenandscreens.org/wp-content/uploads/2024/12/Sleep-and-Screens-Research-At-A-Glance.pdf

[20] Vanderloo, L.M., Janus, M., Omand, J.A. *et al.* Children's screen use and school readiness at 4-6 years: prospective cohort study. *BMC Public Health* **22**, 382 (2022). https://doi.org/10.1186/s12889-022-12629-8

[21] Kindred Squared. (2025). *School readiness survey 2025*. https://kindredsquared.org.uk/wp-content/uploads/2025/01/School-Readiness-Survey-January-2025-Kindred-Squared.pdf

[22] Richert RA, Robb MB, Fender JG, Wartella E. Word Learning From Baby Videos. *Arch Pediatr Adolesc Med.* 2010;164(5):432–437. doi:10.1001/archpediatrics.2010.24

[23] Barr R. (2010). Transfer of learning between 2D and 3D sources during infancy: Informing theory and practice. *Developmental review : DR*, *30*(2), 128–154. https://doi.org/10.1016/j.dr.2010.03.

[24] Jing, M. and Kirkorian, H.L. (2020). Video Deficit in Children's Early Learning. In The International Encyclopedia of Media Psychology, J. Bulck (Ed.). https://doi.org/10.1002/9781119011071.iemp0239

[25] Barr R. (2010). Transfer of learning between 2D and 3D sources during infancy: Informing theory and practice. *Developmental review : DR*, *30*(2), 128–154. https://doi.org/10.1016/j.dr.2010.03.

[26] Jing, M. and Kirkorian, H.L. (2020). Video Deficit in Children's Early Learning. In The International Encyclopedia of Media Psychology, J. Bulck (Ed.). https://doi.org/10.1002/9781119011071.iemp0239

[27] Thorell, L. B., Burén, J., Ström Wiman, J., Sandberg, D., & Nutley, S. B. (2024). Longitudinal associations between digital media use and ADHD symptoms in children and adolescents: a systematic literature review. *European child & adolescent psychiatry*, *33*(8), 2503–2526. https://doi.org/10.1007/s00787-022-02130-3

[28] Santos, R. M. S., Mendes, C. G., Marques Miranda, D., & Romano-Silva, M. A. (2022). The Association between Screen Time and Attention in Children: A Systematic Review. *Developmental neuropsychology*, *47*(4), 175–192. https://doi.org/10.1080/87565641.2022.2064863

[29] Zimmerman, F. J., & Christakis, D. A. (2007). Associations between content types of early media exposure and subsequent attentional problems. *Pediatrics, 120*(5), 986–992. https://doi.org/10.1542/peds.2006-3322

[30] Heffler, K. F., Acharya, B., Subedi, K., & Bennett, D. S. (2024). Early-Life Digital Media Experiences and Development of Atypical Sensory Processing. *JAMA pediatrics*, *178*(3), 266–273. https://doi.org/10.1001/jamapediatrics.2023.5923

[31] Gillioz, E., Gentaz, E., Lejeune, F., Gillioz, E., Gentaz, E., & Lejeune, F. (2025-04-02). Screen habits and effects on sensory profiles in 6- to 36-month-old toddlers. *Pediatric Research 2025*. https://doi.org/10.1038/s41390-025-04024-x

[32] Brey, E., & Shutts, K. (2015). Children use nonverbal cues to make inferences about social power. *Child development*, *86*(1), 276–286. https://doi.org/10.1111/cdev.12334

[33] Slobodin, O., Heffler, K. F., & Davidovitch, M. (2019). Screen Media and Autism Spectrum Disorder: A Systematic Literature Review. *Journal of developmental and behavioral pediatrics : JDBP*, *40*(4), 303–311. https://doi.org/10.1097/DBP.0000000000000654

[34] Heffler, K. F., Acharya, B., Subedi, K., & Bennett, D. S. (2024). Early-Life Digital Media Experiences and Development of Atypical Sensory Processing. *JAMA pediatrics*, *178*(3), 266–273. https://doi.org/10.1001/jamapediatrics.2023.5923

[35] Written evidence submitted by The Association of School and College Leaders (ASCL) to Screen time: impacts on education and wellbeing (2024). Education Committee https://committees.parliament.uk/writtenevidence/125548/pdf/

[36] Lin P, Wu WT, Guo YL. Screen Time Before 2 Years of Age and Risk of Autism at 12 Years of Age. *JAMA Pediatr.* 2025;179(1):90–91. doi:10.1001/jamapediatrics.2024.4432

[37] Radesky, J. S., Kaciroti, N., Weeks, H. M., Schaller, A., & Miller, A. L. (2023). Longitudinal Associations Between Use of Mobile Devices for Calming and Emotional Reactivity and Executive Functioning in Children Aged 3 to 5 Years. *JAMA pediatrics*, *177*(1), 62–70. https://doi.org/10.1001/jamapediatrics.2022.4793

[38] Fitzpatrick, C., Binet, MA., Harvey, E. *et al.* Preschooler screen time and temperamental anger/frustration during the COVID-19 pandemic. *Pediatr Res* **94**, 820–825 (2023). https://doi.org/10.1038/s41390-023-02485-6

[39] Fitzpatrick, C., Binet, MA., Harvey, E. *et al.* Preschooler screen time and temperamental anger/frustration during the COVID-19 pandemic. *Pediatr Res* **94**, 820–825 (2023). https://doi.org/10.1038/s41390-023-02485-6

[40] Konok, V., Binet, M. A., Korom, Á., Pogány, Á., Miklósi, Á., & Fitzpatrick, C. (2024). Cure for tantrums? Longitudinal associations between parental digital emotion regulation and children's self-regulatory skills. *Frontiers in child and adolescent psychiatry*, *3*, 1276154.

[41] Konok, V., Binet, M. A., Korom, Á., Pogány, Á., Miklósi, Á., & Fitzpatrick, C. (2024). Cure for tantrums? Longitudinal associations between parental digital emotion regulation and children's self-regulatory skills. *Frontiers in child and adolescent psychiatry*, *3*, 1276154.

[42] Lawrence, A. C., Narayan, M. S., & Choe, D. E. (2020). Association of Young Children's Use of Mobile Devices With Their Self-regulation. *JAMA pediatrics*, *174*(8), 793–795. https://doi.org/10.1001/jamapediatrics.2020.0129

[43] Haidt, J. (2024). *The Anxious Generation*. Penguin Press.

[44] US Department of Health and Human Services. Social media and youth mental health: the surgeon general's advisory. 22 May 2023. https://www.hhs.gov/sites/default/files/sg-youth-mental-health-social-media-advisory.pdf

[45] Anderson, M., Park, E., & Faverio, M. (2024). *How Teens and Parents Approach Screen Time*. Pew Research. Retrieved 22/10/2024 from https://www.pewresearch.org/internet/2024/03/11/how-teens and-parents-approach-screen-time/

[46] Coyne, S. M., Reschke, P. J., Stockdale, L., Gale, M., Shawcroft, J., Gentile, D. A., Brown, M., Ashby, S., Siufanua, M., & Ober, M. (2023). Silencing screaming with screens: The longitudinal relationship between media emotion regulation processes and children's emotional reactivity, emotional knowledge, and empathy. *Emotion (Washington, D.C.)*, *23*(8), 2194–2204. https://doi.org/10.1037/emo0001222

[47] Brey, E., & Shutts, K. (2015). Children use nonverbal cues to make inferences about social power. *Child development*, *86*(1), 276–286. https://doi.org/10.1111/cdev.12334

[48] Haapala, E. A., Leppänen, M. H., Kosola, S., Appelqvist-Schmidlechner, K., Kraav, S. L., Jussila, J. J., Tolmunen, T., Lubans, D. R., Eloranta, A. M., Schwab, U., & Lakka, T. A. (2025). Childhood Lifestyle Behaviors and Mental Health Symptoms in Adolescence. *JAMA network open*, *8*(2), e2460012. https://doi.org/10.1001/jamanetworkopen.2024.60012

[49] Gath, M., Horwood, J., Gillon, G., McNeill, B., & Woodward, L. (2025). Longitudinal associations between screen time and children's language, early educational skills, and peer social functioning. *Developmental Psychology.*

[50] Muppalla, S. K., Vuppalapati, 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), e40608. https://doi.org/10.7759/cureus.40608

[51] Yang, S., Saïd, M., Peyre, H., Ramus, F., Taine, M., Law, E. C., Dufourg, M. N., Heude, B., Charles, M. A., & Bernard, J. Y. (2024). Associations of screen use with cognitive development in early childhood: the ELFE birth cohort. *Journal of child psychology and psychiatry, and allied disciplines*, *65*(5), 680–693. https://doi.org/10.1111/jcpp.13887

[52] Hutton, J. S., Dudley, J., DeWitt, T., & Horowitz-Kraus, T. (2022). Associations between digital media use and brain surface structural measures in preschool-aged children. *Scientific Reports, 12*, Article 19095. https://doi.org/10.1038/s41598-022-20922-0Researcher+3UT Southwestern+3cris.techni

[53] Tierney, A. L., & Nelson, C. A., 3rd (2009). Brain Development and the Role of Experience in the Early Years. *Zero to three*, *30*(2), 9–13.

[54] Hutton, J. S., Dudley, J., Horowitz-Kraus, T., DeWitt, T., & Holland, S. K. (2020). Associations Between Screen-Based Media Use and Brain White Matter Integrity in Preschool-Aged Children. *JAMA pediatrics*, *174*(1), e193869. https://doi.org/10.1001/jamapediatrics.2019.3869

[55] Hu, Y., Long, X., Lyu, H., Zhou, Y., & Chen, J. (2017). Alterations in White Matter Integrity in Young Adults with Smartphone Dependence. *Frontiers in human neuroscience*, *11*, 532. https://doi.org/10.3389/fnhum.2017.00532

[56] Hutton, J. S., Dudley, J., DeWitt, T., & Horowitz-Kraus, T. (2022). Associations between digital media use and brain surface structural measures in preschool-aged children. *Scientific Reports, 12*, Article 19095. https://doi.org/10.1038/s41598-022-20922-0Researcher+3UT Southwestern+3cris.techni

[57] Law, E. C., Han, M. X., Lai, Z., Lim, S., Ong, Z. Y., Ng, V., Gabard-Durnam, L. J., Wilkinson, C. L., Levin, A. R., Rifkin-Graboi, A., Daniel, L. M., Gluckman, P. D., Chong, Y. S., Meaney, M. J., & Nelson, C. A. (2023). Associations Between Infant Screen Use, Electroencephalography Markers, and Cognitive Outcomes. *JAMA pediatrics*, *177*(3), 311–318. https://doi.org/10.1001/jamapediatrics.2022.5674

[58] Foreman, J., Salim, A. T., Praveen, A., Fonseka, D., Ting, D. S. W., Guang He, M., Bourne, R. R. A., Crowston, J., Wong, T. Y., & Dirani, M. (2021). Association between digital smart device use and myopia: a systematic review and meta-analysis. *The Lancet. Digital health*, *3*(12), e806–e818. https://doi.org/10.1016/S2589-7500(21)00135-7

[59] Liang, J., Pu, Y., Chen, J., Liu, M., Ouyang, B., Jin, Z., Ge, W., Wu, Z., Yang, X., Qin, C., Wang, C., Huang, S., Jiang, N., Hu, L., Zhang, Y., Gui, Z., Pu, X., Huang, S., & Chen, Y. (2025). Global prevalence, trend and projection of myopia in children and adolescents from 1990 to 2050: a comprehensive systematic review and meta-analysis. *The British journal of ophthalmology*, *109*(3), 362–371. https://doi.org/10.1136/bjo-2024-325427

[60] Ha, A., Lee, Y. J., Lee, M., Shim, S. R., & Kim, Y. K. (2025/02/03). Digital Screen Time and Myopia. *JAMA Network Open*, *8*(2). https://doi.org/10.1001/jamanetworkopen.2024.60026

[61] Hashemi, L., Ghasemi, M., Schlichting, D., Pirouzi, M., Grant, C. & Swinburn, B. (2024). Prospective relationship between family screen time rules, obesogenic behaviours, and childhood obesity. European Journal of Public Health, 35(1), pp. 114-120. doi: 10.1093/eurpub/ckae169

[62] JM, N., P, I., J, C., FC, B., K, P. G., AK, G., SB, M., K, B.-D., & KT, G. (2021 May). Contemporary screen time modalities among children 9-10 years old and binge-eating disorder at one-year follow-up: A prospective cohort study - PubMed. *The International journal of eating disorders*, *54*(5). https://doi.org/10.1002/eat.23489

[63] Kerai, S., Almas, A., Guhn, M. *et al.* Screen time and developmental health: results from an early childhood study in Canada. *BMC Public Health* **22**, 310 (2022). https://doi.org/10.1186/s12889-022-12701-3

[64] Webster, E. K., Martin, C. K., & Staiano, A. E. (2019 Mar). Fundamental motor skills, screen-time, and physical activity in preschoolers - PubMed. *Journal of sport and health science*, *8*(2). https://doi.org/10.1016/j.jshs.2018.11.006

[65] Mongkonkansai, J., Veerasakul, S., Tamrin, S. B. M., & Madardam, U. (2022). Predictors of Musculoskeletal Pain among Primary School Students Using Smartphones in Nakhon Si Thammarat, Thailand. *International journal of environmental research and public health*, *19*(17), 10530. https://doi.org/10.3390/ijerph191710530

[66] Kindred Squared. (2025). *School readiness survey 2025*. https://kindredsquared.org.uk/wp-content/uploads/2025/01/School-Readiness-Survey-January-2025-Kindred-Squared.pdf

[67] Manganello, J.A., McKenzie, L.B., Stavrinos, D., Straker, L. (2025). Screen Use, Physical Injuries, and Orthopedic Health. In: Christakis, D.A., Hale, L. (eds) Handbook of Children and Screens. Springer, Cham. https://doi.org/10.1007/978-3-031-69362-5_15

[68] Webster, E. K., Martin, C. K., & Staiano, A. E. (2019). Fundamental motor skills, screen-time, and physical activity in preschoolers. *Journal of sport and health science*, *8*(2), 114–121. https://doi.org/10.1016/j.jshs.2018.11.006

[69] Radwan, N. L., Ibrahim, M. M., & Mahmoud, W. S. E. (2020 Jan). Evaluating hand performance and strength in children with high rates of smartphone usage: an observational study - PubMed. *Journal of Physical Therapy Science*, *32*(1). https://doi.org/10.1589/jpts.32.65

[70] Hutton, J. S., Dudley, J., DeWitt, T., & Horowitz-Kraus, T. (2022). Associations between digital media use and brain surface structural measures in preschool-aged children. *Scientific Reports, 12*, Article 19095. https://doi.org/10.1038/s41598-022-20922-0Researcher+3UT Southwestern+3cris.techni

[71] Written evidence submitted by Sue Smits and Mark Stewart to Screen time: impacts on education and wellbeing (2024). Education Committee. https://committees.parliament.uk/writtenevidence/126359/pdf/

[72] Pickard H, Chu P, Essex C, et al. Toddler Screen Use Before Bed and Its Effect on Sleep and Attention: A Randomized Clinical Trial. *JAMA Pediatr.*2024;178(12):1270–1279. doi:10.1001/jamapediatrics.2024.3997

[73] Fitzpatrick, C., Almeida, M. L., Harvey, E., Garon-Carrier, G., Berrigan, F., & Asbridge, M. (2022). An examination of bedtime media and excessive screen time by Canadian preschoolers during the COVID-19 pandemic. *BMC pediatrics*, *22*(1), 212. https://doi.org/10.1186/s12887-022-03280-8

[74]

[75] Carter B, Rees P, Hale L, Bhattacharjee D, Paradkar MS. Association Between Portable Screen-Based Media Device Access or Use and Sleep Outcomes: A Systematic Review and Meta-analysis. *JAMA Pediatr.* 2016;170(12):1202–1208. doi:10.1001/jamapediatrics.2016.2341

[76] Westbrook, A., Ghosh, A., van den Bosch, R., Määttä, J. I., Hofmans, L., & Cools, R. (2021). Striatal dopamine synthesis capacity reflects smartphone social activity. *iScience*, *24*(5), 102497. https://doi.org/10.1016/j.isci.2021.102497

[77] Sellman, M. (2024, 14/10/2024). TikTok can become addictive in less than 35 minutes, documents show. *The Times*. https://www.thetimes.com/uk/technology-uk/article/tiktok-app-addictive-minutes mhmdwxf2f

[78] Muppalla, S. K., Vuppalapati, 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), e40608. https://doi.org/10.7759/cureus.40608

[79] Sohn, S.Y., Rees, P., Wildridge, B. *et al.* Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: a systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry* **19**, 356 (2019). https://doi.org/10.1186/s12888-019-2350-x

[80] House of Commons Education Committee (2024) Screen time: impacts on education and wellbeing. https://committees.parliament.uk/publications/45128/documents/223543/default/

[81] ParentKind. (2024). *The National Parent Survey*.

[82] Sahu, M., Gandhi, S., & Sharma, M. K. (2019). Mobile Phone Addiction Among Children and Adolescents: A Systematic Review. *Journal of addictions nursing*, *30*(4), 261–268. https://doi.org/10.1097/JAN.0000000000000309

[83] Haidt, J. (2024). *The Anxious Generation*. Penguin Press.

[84] Gath, M., McNeill, B., & Gillon, G. (2023). Preschoolers' screen time and reduced opportunities for quality interaction: Associations with language development and parent-child closeness. *Current Research in Behavioral Sciences, 5,* 100140

[85] Sugiyama, M., Tsuchiya, K. J., Okubo, Y., Rahman, M. S., Uchiyama, S., Harada, T., Iwabuchi, T., Okumura, A., Nakayasu, C., Amma, Y., Suzuki, H., Takahashi, N., Kinsella-Kammerer, B., Nomura, Y., Itoh, H., & Nishimura, T. (2023). Outdoor Play as a Mitigating Factor in the Association Between Screen Time for Young Children and Neurodevelopmental Outcomes. *JAMA pediatrics*, *177*(3), 303–310. https://doi.org/10.1001/jamapediatrics.2022.5356

[86] Kindred Squared. (2025). *School readiness survey 2025*. https://kindredsquared.org.uk/wp-content/uploads/2025/01/School-Readiness-Survey-January-2025-Kindred-Squared.pdf

[87] Alrahili, N., Almarshad, N. A., Alturki, R. Y., Alothaim, J. S., Altameem, R. M., Alghufaili, M. A., Alghamdi, A. A., & Alageel, A. A. (2021). The Association Between Screen Time Exposure and Autism Spectrum Disorder-Like Symptoms in Children. *Cureus*, *13*(10), e18787. https://doi.org/10.7759/cureus.18787

[88] Chong, S.C., Teo, W.Z. & Shorey, S. Exploring the perception of parents on children's screentime: a systematic review and meta-synthesis of qualitative studies. *Pediatr Res* **94**, 915–925 (2023). https://doi.org/10.1038/s41390-023-02555-9

[89] Alkalash, S. H., Alshamrani, F. A., Alharthi, S. A., Alzubaidi, M. A., Alqarehi, R. M., Bazaid, A. A., & Asiri, B. (2023). Parents' Knowledge On, Attitude Toward, and Practice of Screen Time Exposure Regulation of Their Children Under Six Years of Age in Western Region, Saudi Arabia. *Cureus*, *15*(11), e49464. https://doi.org/10.7759/cureus.49464

[90] Nagata, J.M., Paul, A., Yen, F. *et al.* Associations between media parenting practices and early adolescent screen use. *Pediatr Res* **97**, 403–410 (2025). https://doi.org/10.1038/s41390-024-03243-y

[91] Heffler, K. F., Acharya, B., Subedi, K., & Bennett, D. S. (2024). Early-Life Digital Media Experiences and Development of Atypical Sensory Processing. *JAMA pediatrics*, *178*(3), 266–273. https://doi.org/10.1001/jamapediatrics.2023.5923

[92] World Health Organization. (2019). Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. World Health Organization.

[93] Madigan, S., Browne, D., Racine, N., Mori, C., & Tough, S. (2019). Association Between Screen Time and Children's Performance on a Developmental Screening Test. *JAMA pediatrics*, *173*(3), 244–250. https://doi.org/10.1001/jamapediatrics.2018.5056

[94] Corkin, M. T., Henderson, A. M. E., Peterson, E. R., Kennedy-Costantini, S., Sharplin, H. S., & Morrison, S. (2021). Associations between technoference, quality of parent-infant interactions, and infants' vocabulary development. *Infant behavior & development*, *64*, 101611. https://doi.org/10.1016/j.infbeh.2021.101611

[95] Corkin, M. T., Henderson, A. M. E., Peterson, E. R., Kennedy-Costantini, S., Sharplin, H. S., & Morrison, S. (2021). Associations between technoference, quality of parent-infant interactions, and infants' vocabulary development. *Infant behavior & development*, *64*, 101611. https://doi.org/10.1016/j.infbeh.2021.101611

[96] Corkin, M. T., Henderson, A. M. E., Peterson, E. R., Kennedy-Costantini, S., Sharplin, H. S., & Morrison, S. (2021). Associations between technoference, quality of parent-infant interactions, and infants' vocabulary development. *Infant behavior & development*, *64*, 101611. https://doi.org/10.1016/j.infbeh.2021.101611

[97] Nakamura, T. (2015). The action of looking at a mobile phone display as nonverbal behavior/communication: A theoretical perspective. *Comput. Hum. Behav., 43*, 68-75.

[98] Radesky, J. S., Kistin, C. J., Zuckerman, B., Nitzberg, K., Gross, J., Kaplan-Sanoff, M., Augustyn, M., & Silverstein, M. (2014). Patterns of mobile device use by caregivers and children during meals in fast food restaurants. *Pediatrics*, *133*(4), e843–e849. https://doi.org/10.1542/peds.2013-3703

[99] Corkin, M. T., Henderson, A. M. E., Peterson, E. R., Kennedy-Costantini, S., Sharplin, H. S., & Morrison, S. (2021). Associations between technoference, quality of parent-infant interactions, and infants' vocabulary development. *Infant behavior & development*, *64*, 101611. https://doi.org/10.1016/j.infbeh.2021.101611

[100] Golen, R. B., & Ventura, A. K. (2015). Mindless feeding: Is maternal distraction during bottle-feeding associated with overfeeding?. *Appetite*, *91*, 385–392. https://doi.org/10.1016/j.appet.2015.04.078

[101] Hiniker, A., Sobel, K., Suh, H., Sung, Y., Lee, C.P., & Kientz, J.A. (2015). Texting while Parenting: How Adults Use Mobile Phones while Caring for Children at the Playground. *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*.

[102] Nakagawa, H., Yoshida, S., Ohnishi, A., Terada, T., Funato, H., & Tsukamoto, M. (2019). Effect of using smartphone during breast-feeding. In *Adjunct proceedings of the 2019 ACM international joint conference on pervasive and ubiquitous computing and proceedings of the 2019 ACM international symposium on wearable computers (UbiComp/ISWC '19 Adjunct)* (pp. 1190–1193). Association for Computing Machinery. https://doi.org/10.1145/3341162.3344840

HEALTH PROFESSIONALS FOR SAFER SCREENS

SAFER USE- SAFER DEVICES

A HEALTH BRIEFING ON THE EVIDENCED RISKS OF SMART DEVICES AND SOCIAL MEDIA IN SCHOOL-AGE CHILDREN: SUMMARY

As health professionals, we frequently observe the harm that smart devices, such as smartphones and iPads, and social media inflict on school-age children in our clinics. Unlike other internet-enabled devices, smart devices pose unique risks, particularly in how children access unsafe or inappropriate content through social media and various websites. The design of both smart devices and social media is inherently addictive, making it difficult for children to resist usage due to their still-developing impulse control and rational thinking. This is a rapidly changing area with new products and features added to existing products with no regulatory oversight. For example, the Royal Society for Public Health's (RSPH) report[1] into childhood social media use in 2017 did not include "TikTok", which by 2023 had become the second most popular site used by UK children (53%).[2]

An ever-growing body of research highlights the numerous harms associated with smart device and social media use. We have categorised these harms into broad areas, though it is important to recognise that they overlap and impact not only the child but also their family and community. This document focuses on school-age children and young adults (ages 6 - 22). For information specifically on the effects of screen use in early childhood, please refer to our dedicated report here.

- **Developmental Impact**
  - Addictive by design
  - Emotional and social development
  - Mental health
  - Academic achievement
  - ADHD & ADHD-related behaviours
  - Atypical Sensory Processing
  - Autism Spectrum Condition
- **Physical Impact**
  - Changes in brain structure
  - Eyesight
  - Eating Disorders
  - Chronic diseases
  - Musculoskeletal Disorders
  - Sleep Disorders
- **External Harms**
  - Cyberbullying
  - Viral social media challenges
  - Child sexual exploitation, abuse, and the production and distribution of child sexual abuse material (CSAM)
  - Youth crime and extremism
  - Financial sextortion
  - Targeted advertising of addictive substances and early childhood experimentation

Our advice as health professionals is that the risks are overwhelming, increasing, and outweigh any benefits. It is imperative that we initiate a public health campaign to raise awareness about these harms and to adopt the **precautionary principle for the safety of our children**.

Developmental Impact

Each developmental stage has unique vulnerabilities that are negatively affected using smart devices and social media. Children's brains demonstrate tremendous neuroplasticity and rapid growth which is shaped by their interactions and stimuli in the world around them. The quality, source and content of those stimuli is incredibly important for children to reach developmental milestones. Unfortunately, there are many harms to normal development when smart devices and social media supplant real-world, human interaction.

The chart (Figure 1), produced by Ofcom, highlights key developmental milestones in a child's life and their relationship with the digital world.[3] In the following paragraphs, we will explore several crucial areas of development that are negatively affected by smart devices and social media.

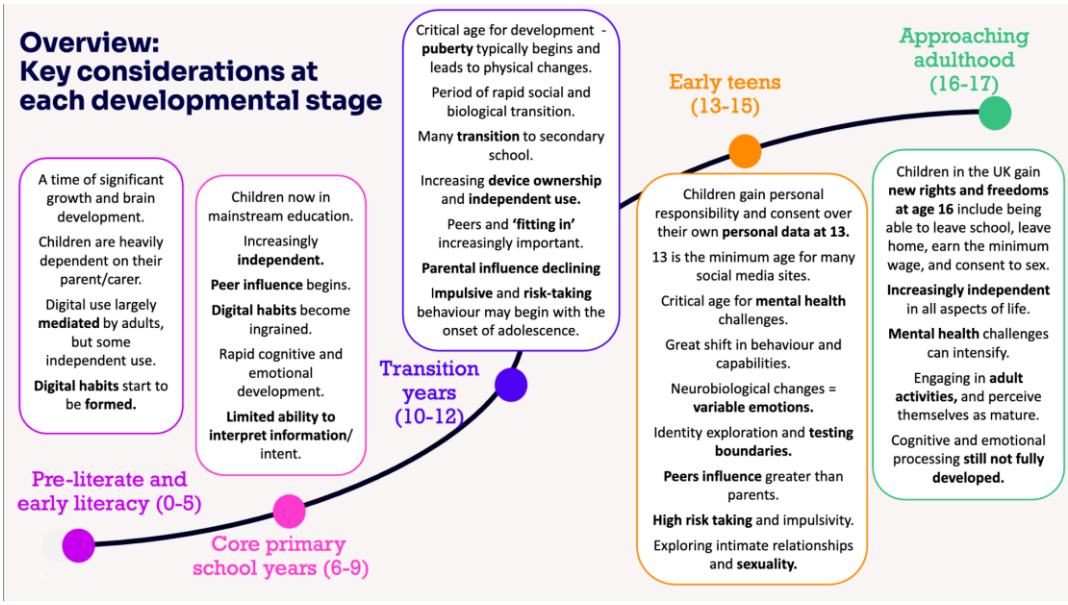


Figure 1

- **Addictive by design**

Smart devices and social media are designed to be addictive. Smart device features – brilliant colours, sounds, vibrations, filtered images, swipe mechanisms, push notifications – are designed to reward us and stimulate the release of dopamine – the same chemical people feel when they fall in love.[4] The manufacturers and app makers use that "younger users, who are particularly sensitive to reinforcement in the form of social reward and have minimal ability to self-regulate effectively," can be habituated to apps like TikTok in less than 35 minutes.[5] They use techniques such as streaks, popularised by Snapchat, to keep adolescents in their apps and returning to their apps.[6]

Since smart devices and social media are relatively new technologies, the clinical community has needed time to study and diagnose this previously non-existent behavioural addiction in children. Researchers have identified a number of behavioural addictive disorders namely Problematic Social Media Use (PSMU) and Social Media Use Disorder (SMUD).[7] This mimics symptoms found in other addictive disorders such as inability to control usage, prioritisation of usage over other responsibilities, continued use despite negative consequences and withdrawal symptoms.

Children are particularly drawn to smart devices. Smart devices and social media quickly pacify uncomfortable emotions, offering an escape from sorrow, stress, and reality. This mirrors other forms of addiction, where a substance (e.g. drugs) or behaviour (e.g. gambling) serves as an unhealthy coping mechanism. These behaviours may provide short-term relief but ultimately

result in significant long-term harm.[8]

Throughout the world and in the UK, our children are behaviourally addicted to smart devices and social media. A study by researchers at King's College London estimated that one in four children and young people use their smart devices in a way that is consistent with a behavioural addiction.[9] In the UK, 14% of children spend more than 7 hours on electronic devices, the average being 3 hours and 20 minutes outside of school.[10] The WHO Health Behaviour in School-Aged Children (HBSC) study (Figure 2) surveyed children between the ages of 11-15 in Europe, central Asia and Canada during 2021-2022 and found that in the UK, *90% of the children were at least active users* defined as using social media daily, *45% were at least intense users* defined as having using social media almost all of the time throughout the day and approximately *14% qualified as having problematic addictive-like social media use.*[11]

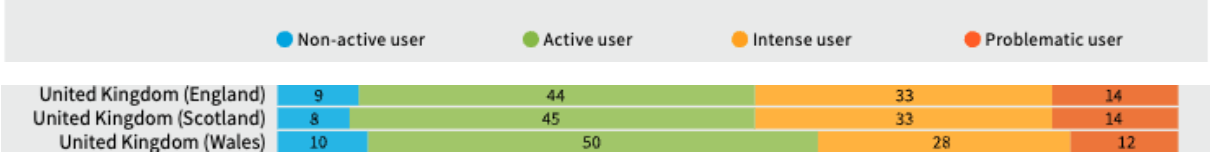


Figure 2

All children using smart devices and social media are at risk for the various harms outlined below. While these harms are often dose-dependent, meaning children with behavioural addictions may be more susceptible, it is important to emphasise that negative effects also occur with low levels of exposure. Similar to other addictions research shows that the earlier a child is exposed to smart devices the greater the risk of dependence.[12]

- **Emotional and Social Development**

Smart devices and social media usage increasingly replace face-to-face interaction with digital substitutes, which can hinder a child's emotional and social development, leading to feelings of social isolation.[13] During school years, children are developmentally driven to seek social connections and learn from their peers.[14] Face-to-face, in-person social connectivity is crucial for health and well-being and is far superior to digital communication. [15] [16]

Research has shown that face-to-face interactions play a crucial role in mental health, helping children develop social awareness through cues such as body language, tone of voice, eye contact, clothing, and physical distance.[17] [18] [19] Emotional skills like empathy are cultivated through repeated, real-world interactions, allowing children to see how their actions impact others. [20]

Dr. Vivek Murthy, the US Surgeon General, has noted that children are struggling to develop the social skills needed to feel confident around others and navigate new situations. While this issue is partly attributed to school closures, Dr. Murthy primarily points to the impact of screens and the lack of real-time interactions.[21] In fact, fewer than 30% of young people reported that their phones helped them learn good social skills.[22]

Children in the UK are falling behind their international peers in socio-emotional skills, which are essential for regulating emotions and decision-making. A report by the National Foundation for Educational Research (NFER) found that England ranks among the bottom ten of 31 countries assessed in PISA 2022 for these skills, including curiosity, perseverance, emotional control, stress resistance, empathy, and cooperation.[23] This is concerning, as socio-emotional skills are strong predictors of success in academics, work, and life.[24] [25]

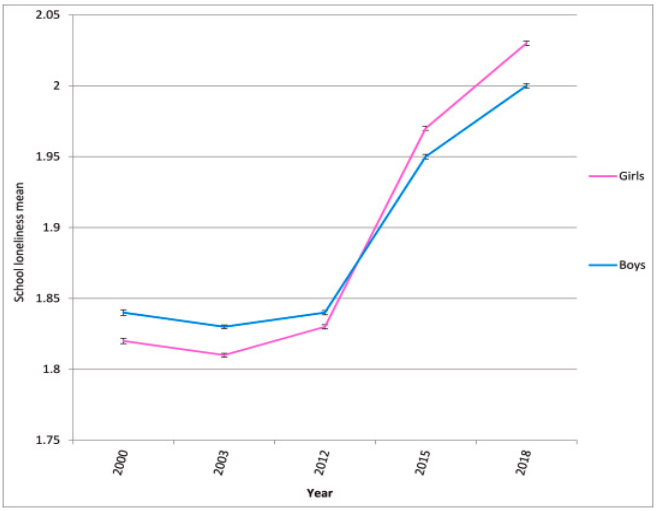


Figure 3

At the same time, children in the UK and around the world are experiencing rising levels of loneliness. [26] [27] School loneliness, which is defined as feeling disconnected or isolated from peers and the school environment—even when surrounded by others—has been linked to low well-being and depression during adolescence.[28] The PISA data also shows that between 2012 and 2018, the number of adolescents reporting school loneliness doubled, a trend strongly associated with high smart device and internet use (Figure 3).

- **Mental Health**

The mental health of our children and young people has deteriorated in the last decade,[29] and there is increasingly clear evidence that links smart device usage as a major contributor to this decline.

Problematic smart device use (PSU) is linked to youth mental health, with nearly half of 13 to 16- year-olds with PSU reporting symptoms of anxiety (44.4%) compared to 26.4% without PSU and over half of 13-16-year-olds with PSU reported symptoms of depression (55.6 %) compared to 35.8 % without PSU.[30] This was confirmed by the ongoing BrainWaves work, which found a linear relationship between higher rates of anxiety and depression and time spent networking on social media sites.[31] Problematic social media use was associated with lower general life satisfaction and all psychosomatic complaints, with the strongest association for having a bad mood or feeling irritated.[32] A recent study highlighted the distinction between smart device usage and overall screen time. It found that excessive use of smart devices was linked to anxiety or depression, whereas general screen time was not.[33]

A recent randomised control trial of 125 healthy students found that the intervention group reduced their daily screentime to less than 2 hours for a 3-week period. During that period, significant post-intervention effects of small to medium size were observed on well-being, depressive symptoms, sleep quality, and stress. Significant group differences were found post-intervention for depressive symptoms, sleep quality, and stress. When the intervention was removed, screentime increased, and the well-being markers returned to their previous levels. The researchers say that the results suggest a causal relationship, rather than a merely correlative one, between daily smartphone screen time and mental health.[34]

The age at which a child first has a smart device is correlated with worse mental health outcomes. The younger the age of having a first smart device, the worse the mental health that the young adult reports today (Figure 4). [35] It has been shown that girls with high usage of the internet at 15 are more likely to have anxiety issues at 17. The evidence indicates that this is not bidirectional – it is not that girls with higher anxiety are drawn to the internet, but that higher internet usage leads to higher levels of anxiety.[36]

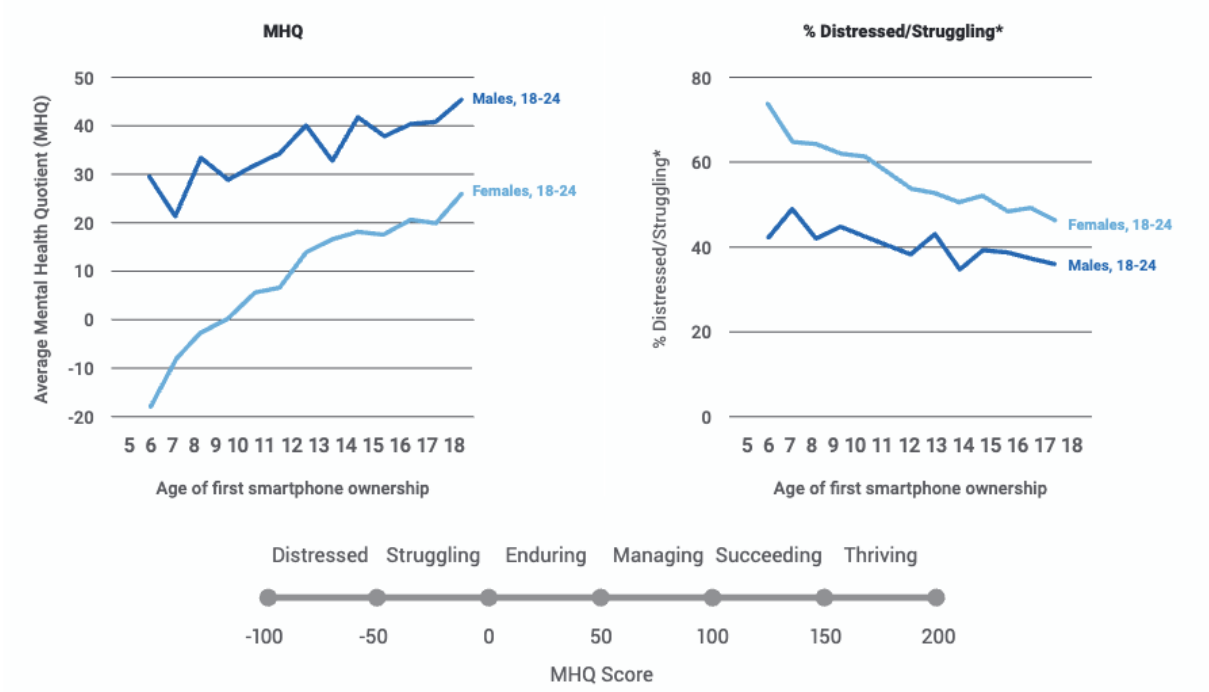


Figure 4

Suicide and self-harm are the most extreme manifestations of mental health struggles, often triggered by negative interactions, events, and exposure to harmful content on social media platforms. [37] Over the past decade, there has been an increase in youth suicide attempts, deaths by suicide, and non-suicidal self-injury. Nearly half of the rise in annual suicide-related behaviours between 2009 (17%) and 2017 (21%) can be attributed to the growing use of digital media.[38] [39]

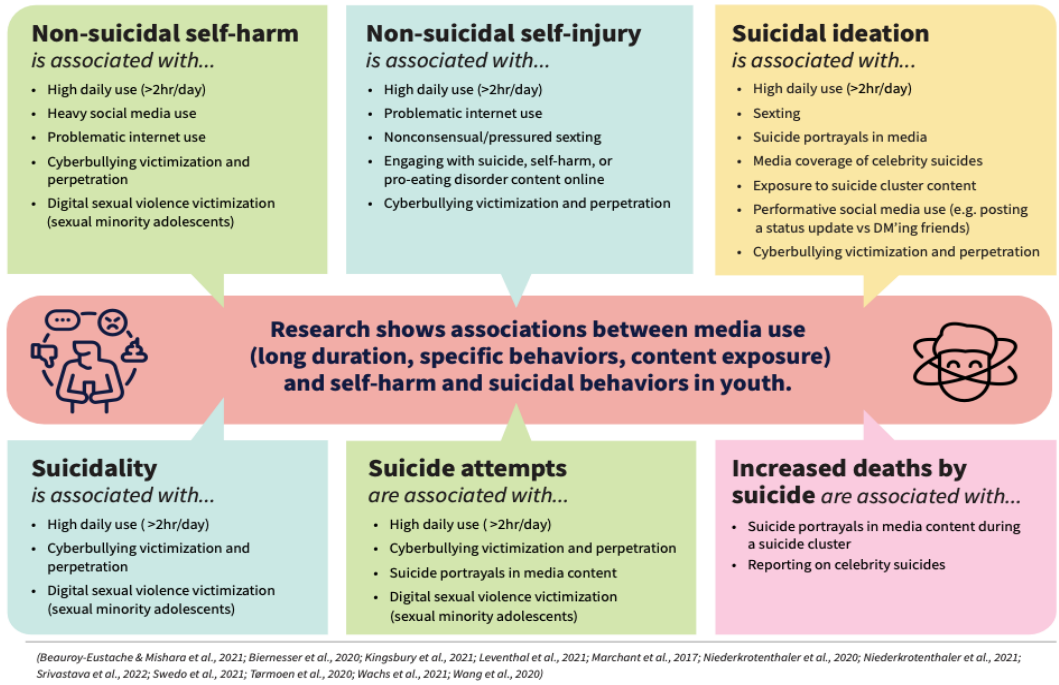


Figure 5

- **Academic achievement**

Smart device use in school-aged children is linked to lower language and maths scores.[40] [41] The PISA (Programme for International Student Assessment), a global evaluation conducted every three years with 15-year-olds, has shown a steady decline in scores across all subjects,

including reading, mathematics, and science (Figure 6). [42] The impact of smart devices and social media on academic performance is multifactorial, involving digital distractions, the loss of paper-and-pen learning methods, and altered brain development.[43]

Digital distractions in the classroom are detrimental to the educational attainment of many children. A comprehensive study involving nearly 150,000 students from 16 countries has demonstrated that increased smart device usage during study sessions significantly undermines learning and academic achievement. [44] The mere presence of a smart device can siphon away limited cognitive resources, leaving fewer available for critical tasks and impairing cognitive performance. Experimental results illustrate that individuals achieve lower test scores when their phones are in the room than when they are left elsewhere. [45] [46]

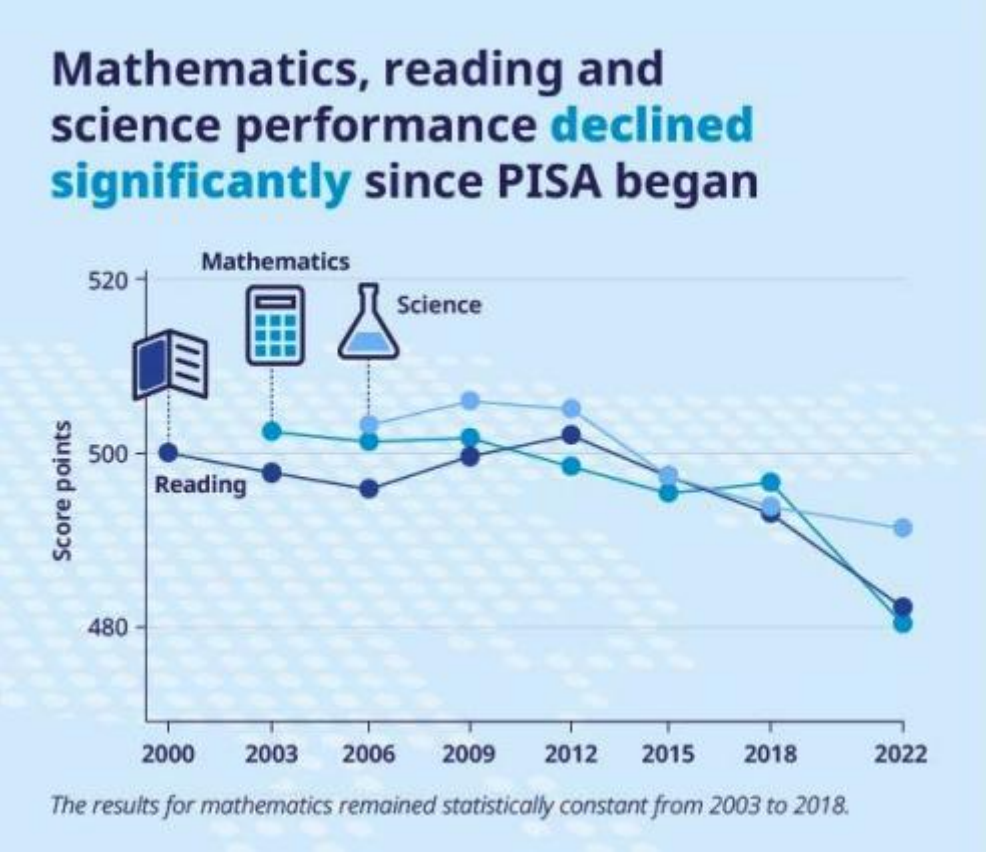


Figure 6

In addition to digital distractions, the medium through which information is delivered—whether print or digital—also affects learning outcomes. Studies have shown that school-age children demonstrate deeper reading and better comprehension of printed text, whereas they exhibit shallower reading and poorer comprehension of digital text. [47] [48] Furthermore, daily use of digital devices in the classroom is inversely related to reading comprehension scores.[49]

Evidence suggests that handwriting on paper is a more effective learning modality than digital devices. The physical act of handwriting promotes better memorisation of new words.[50] Writing by hand increases information retention, retrieval, and memory storage by engaging more brain activity. The key factor appears to be the tactile and spatial properties of writing on paper. A study found that participants who wrote notes by hand retained information better than those who typed on a laptop, even when the handwritten notes were fewer in number. [51] Handwriting encourages a stronger conceptual understanding, forcing students to process and summarise information rather than merely transcribing it verbatim. Since handwriting is slower and more deliberate, students must actively engage with the material, enhancing their learning.

- **ADHD & ADHD-related Behaviours**

The link between media use and ADHD-related behaviours was confirmed over 10 years ago when a meta-analysis of 45 empirical studies (including 12 longitudinal studies), analysed a combined sample of over 155,000 participants aged 0-18.[52] It concluded a moderate positive association between media use and attention challenges. This tells us that as media use increases for children, so do their attention challenges. Small positive associations were also found between media use and overall ADHD-related behaviours, as well as impulsivity more narrowly.) Boys were found to be more susceptible to the effects of media use on ADHD-related behaviours than girls. The data analysed here was based on TV and video gaming in a largely pre-smartphone era.

A 2019 study also included child use of computers, tablets, and mobile phones. A measurement of 2,232 five-year-old children showed that having more than two hours per day of screen time was significantly associated with ADHD behaviours (7.7-fold increased risk).[53] These children were 5.9 times more likely to show clinically significant attention problems. These results held when adjusting for parenting stress.

Looking at school-aged children and teens, there is a significant positive correlation between time spent with electronic media and attention problems.[54] Participants with ADHD were shown to use screen-based media for an average of 4.5 hours on a school day, which was nearly two hours more than their peers without ADHD symptoms.

The most recent systematic review, which focused on 28 studies published within the last 10 years, showed reciprocal associations between digital media and ADHD symptoms.[55] Children with ADHD symptoms appear more vulnerable to developing high or problematic use of digital media. Later severity of ADHD symptoms is also linked with the amount of digital media use.

- **Atypical Sensory Processing**

A child's sensory functioning impacts all areas of life. Research has recently started to look at how this may differ with screen use. Young children have been the main focus to date, with clear evidence of associations between screen use and sensory challenges.

Results from a US sample of 1,471 pre-school aged children found that viewing of television or video on any device at 12 months old led to the child being twice as likely to experience low registration (i.e. not readily perceiving sensory stimuli in their surroundings, commonly described as uninterested in their environment and apathetic).[56] This continued for 18-month-old children, who additionally showed increased risk of sensory avoidance if they had had greater screen exposure. For two-year-old children, greater screen exposure was associated with higher sensory seeking (i.e., actively searching their environment for sensory experiences, commonly described as restless, noisy, and easily bored), sensory sensitivity (i.e. react more quickly and strongly to sensory input, commonly leading to overwhelm), and again avoidance of sensory input. Subsequent studies have since replicated these associations.[57]

The association between screen exposure and sensory difficulties continues with age. Three-year-olds show higher sensory seeking, which is associated with greater direct and background screen use.[58]

When toddlers are used to high levels of sensory stimulation from screens, everything else appears dull or uninteresting in comparison. The child is, therefore, less motivated to explore their environment and seek interactions, missing important learning and development opportunities.

Looking at adolescents with typical development and well-being, moderate positive associations have been found between smartphone use and low registration, sensory sensitivity, sensation seeking, and sensation avoiding, as shown in Figure 7. This tells us that as an adolescent's smartphone use increases, so do their sensory challenges in these four areas.[59]

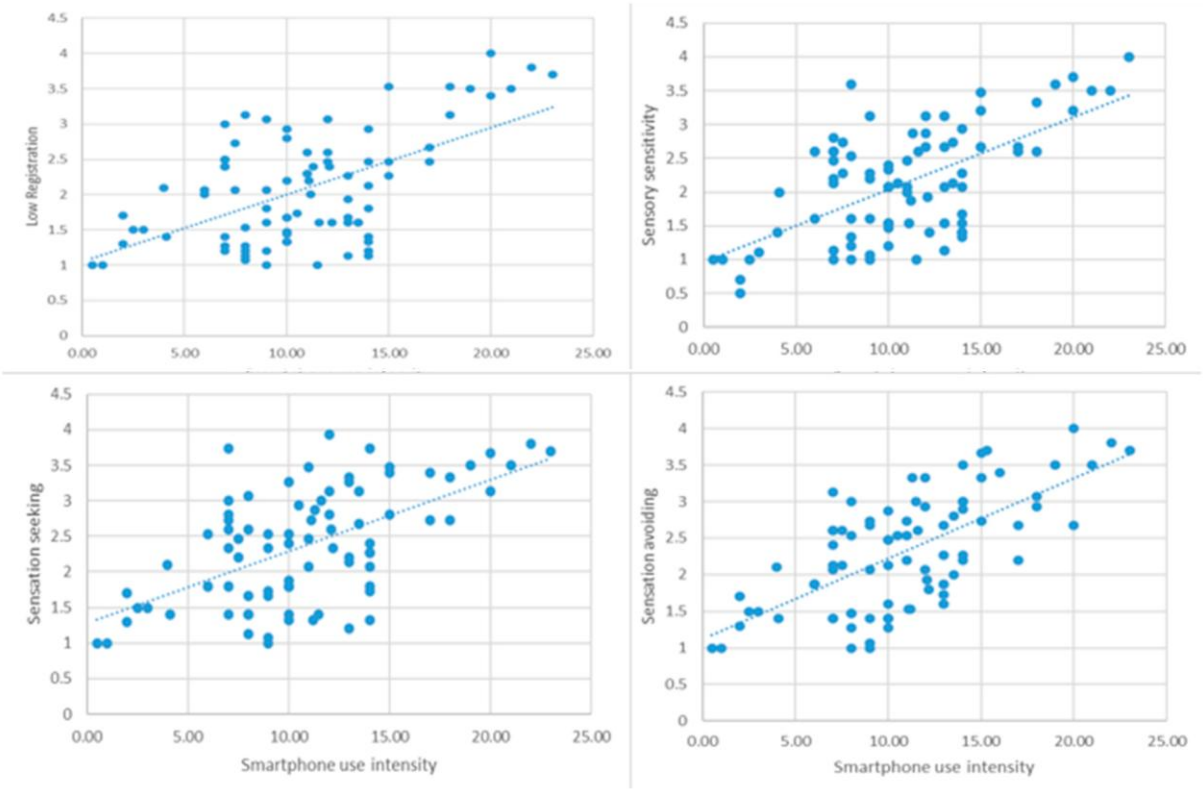


Figure 7

- **Autism Spectrum Disorder**

Research has shown that autistic children and adolescents are exposed to more screen time than neurotypical peers and typically use screens from a younger age. [60] [61] Due to their high screen time usage, autistic children experience adverse effects such as increased sedentary behaviour, sleep difficulties, attentional deficits and reduced parent-child reciprocal interaction. [62] Thus, there is clear evidence that screen time recommendations should be adapted individually to support parents and autistic children in using screens safely.[63]

Overuse of screens can reduce access to face-to-face interaction, turn-taking in conversations and observing real-life social scenarios, which are essential for building communication skills and encouraging perspective-taking.[64] These are areas of difficulty for many autistic children and young people, which are exacerbated by screen time. Studies have shown that reducing screen time and increasing social engagement in families and peers show significantly positive outcomes for autistic children.[65]

It has become increasingly more difficult for school staff to identify learning difficulties or neurodivergence in pupils, as they could be masked or replicated by the effects of excessive screen use.[66]

Physical Impact

- **Changes in the brain structure**

Increasing research shows that problematic smart device, internet and social media usage can physically change the brain in several ways.

White matter is vital for processing information in the body, as it connects different regions that send and receive signals. It is important for our ability to focus, learn, solve problems, and maintain balance while walking. Individuals with smart device dependency tend to have significantly lower white matter integrity in specific areas such as the superior longitudinal

fasciculus (SLF), superior corona radiata (SCR), internal capsule, external capsule, sagittal stratum, fornix/stria terminalis, and midbrain structures.[67]

Moreover, young people with smart device addictions have been found to have concerning changes in specific neurotransmitters. GABA is the main inhibitory neurotransmitter, which slows down brain signals, and glutamate (the main component in Glx) is the major excitatory neurotransmitter. Studies have shown increased GABA levels in subjects with internet and smart device addiction, and this may be associated with the downregulation of anterior cingulate cortex functions, including impulsiveness control during the decision-making process under conditions of risk. These raised GABA levels disrupt the balance with the excitatory neurotransmitter Glx. Changes in these neurotransmitters can lead to drowsiness, anxiety, and depression, as well as affect vision and motor control.[68]

A longitudinal study showed that adolescents who habitually checked social media had divergent brain development, shown on fMRI scanning, compared to those who reported lower smart device engagement.[69] These changes in neural sensitivity to the anticipation of social feedback were important brain networks associated with emotional salience, motivation, and cognitive control. These changes could have significant long-term impacts on psychological adjustment to social situations and again show how the smart device is the perfect facilitator of 'habitual checking behaviours', which we increasingly realise to be harmful and are changing the function and development of adolescent brains.

- **Eyesight**

Excessive smart device usage is linked to the high rates of myopia and astigmatism in children.[70] The prevalence of myopia in children has grown from 24% in 1990 to 36% in 2023, and this trend is expected to continue.[71] While smart devices are linked to a 30% higher risk of developing myopia, when this is combined with excessive computer use, the risk increases to approximately 80%. [72] [73]Every additional hour of screen time daily increases myopia risk by 21%. In children already diagnosed with myopia, an extra hour raises the risk of progression by 54%.[74]

- **Eating Disorders**

The prevalence and economic burden of eating disorders in the UK have significantly increased over the past decade. NHS Digital has reported a substantial rise in eating disorders among children and young people of both sexes between 2017 and 2023. [75] Using the Developmental and Wellbeing Assessment (DAWBA) tool, a 2023 study found that 75% of young women and 50% of young men aged 16 to 25 reported experiencing eating disorder symptoms. [76] In 2020, the social and economic costs associated with eating disorders in the UK were estimated to be between £7.5 billion and £11.2 billion.[77]

Social media, problematic smart device usage and eating disorders.

Social media contributes to the exacerbation and development of eating disorder symptoms through perpetuating unrealistic body standards, acting as a platform for aggressive marketing by the food and diet industry, [78] [79] and through targeted algorithms that show harmful content, including "toxic eating disorder" content.[80]

A recent UCL study corroborated the link between social media and eating disorders. Lead author Alexandra Dane writes, "Through the lens of social media, someone else can always look better, skinnier, or prettier… The outcome is a population of young people at risk of corroded body image, gaping discrepancies between their actual and 'polished' online selves, and an increased likelihood of engaging in compensatory disordered eating behaviours".[81]

A large longitudinal study of 9- to 14-year-olds found that increased total screen time, social media use, and problematic screen use were associated with a higher prevalence of eating disorder symptoms in early adolescence. Each additional hour of total screen time and social media use was linked to higher odds of fear of weight gain, self-worth being tied to weight,

compensatory behaviours to prevent weight gain, binge eating, and distress related to binge eating two years later. Furthermore, both problematic social media and smart device use were associated with higher odds of all eating disorder symptoms. The link between problematic internet use and increased eating disorder symptoms, as well as body dissatisfaction, was observed across all genders.[82]

Interestingly, one study found that increased eating disorder symptoms and body dissatisfaction were linked to total phone usage rather than Instagram use specifically. [83]This suggests that phone usage, beyond just social media exposure, may contribute to eating disorder symptoms. Indirect effects, such as sleep deprivation or reduced in-person socialisation, could play a role in this association. Additionally, problematic phone use in this population may also be connected to using fitness trackers and dieting apps.

Importantly, there is evidence that young people with eating disorders are more likely to be shown harmful content by social media algorithms. A new study specifically examining TikTok algorithms found that young people with eating disorders about those without eating disorders were 142% more likely to see an exercise video as the next video in their feed, 146% more likely to see an appearance-oriented video, 335% more likely to see a dieting video, and 4343% more likely to see a "toxic eating disorder" video.[84] A "toxic eating disorder" video is a video that directly encourages disordered eating behaviours (e.g., "thinspo" or "proANA" videos). The extent of the exposure to such videos was much higher than the extent to which users "liked" the videos, suggesting that other metrics of passive usage (e.g., lingering on a video, rewatching a video), rather than direct engagement, are used by social media companies to increase exposure to such videos in this population. In the same study, participants with eating disorders reported they had much more difficulty in stopping themselves from using TikTok despite finding these videos directly harmful.

Social Media, body image and commercial pressure

The pressure of social media, the constant recording of life and the comparative culture have led to increased body image concerns and cosmetic surgery. Heavy use of these platforms, especially amongst young women, increases the likelihood of girls aspiring to cosmetic surgery as a solution to perceived body image issues. [85] Almost three-quarters of teenage girls think that social media creates more pressure for people to look a certain way, and this is now echoed in boys, with 52% of boys saying that influencers on social media create pressure to use cosmetic procedures to change their appearance. Globally, 34% of men and 31% of boys have stopped themselves from eating, binge eating, or skipping meals to achieve their ideal appearance. 27% have adopted unsafe exercise behaviours, such as exercising more than their body can handle.[86] The skin care routines and trends popularised on social media drive younger children and teens to use complicated and expensive skincare products, which are not suitable for their skin and can cause long-term damage.[87] Acne rates among young people in the UK were among the highest globally. There was a steady increase in cases of 0.27% a year on average over three decades. By 2021, 14.6% of adolescents and young people were diagnosed with acne – a 7.4% increase from 1990.[88] It has been suggested that this is partly due to inappropriate skincare routines.[89]

- ## Chronic diseases

There is growing evidence of a strong association between screen time, including smart device use, and childhood chronic diseases as shown in Figure 8. [90] [91] [92] A large prospective study involving 7,105 adolescents found that each additional hour of screen time per day was linked to an increased risk of obesity and diabetes. These conditions, typically seen in adults, when onset in childhood, elevate the risk of other chronic illnesses such as hypertension, liver disease, psychological issues, and poor overall health in adulthood. [93] [94] [95] The proportion of adolescents living with overweight or obesity in England has increased by 50% from 2008-2010 (22%) to 2021-2023 (33%).[96]

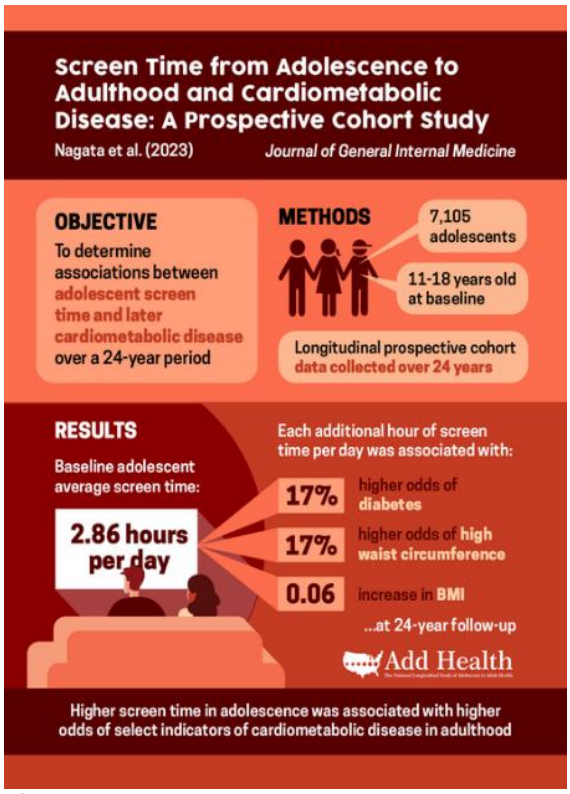


Figure 8

- **Musculoskeletal disorders**

When standing upright, the average adult human head exerts a force of 5kg on the spine. However, when it is leaning forward (as shown in Figure 9), looking at a phone, the force exerted can reach up to 48kg. This leads to increased tension headaches, muscle spasms and other neck and muscle problems.[97] This is the equivalent of a seven-year-old child draped around the neck. This has led to an increase in children and adults with tension headaches, muscle spasms and bone spurs.

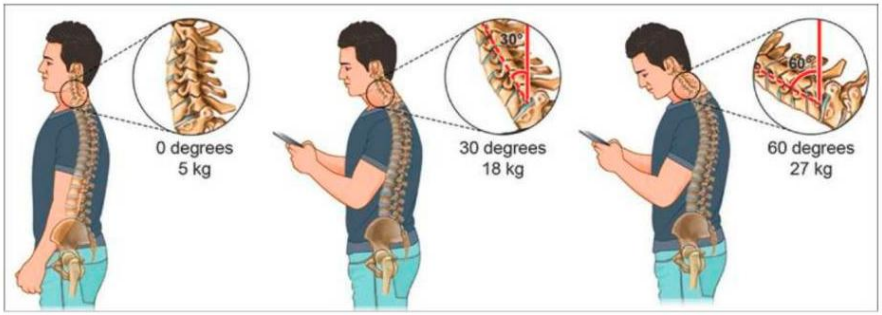


Figure 9

Children and young people who use smart devices for more than 60 minutes daily are ten times more likely to develop musculoskeletal symptoms than those who don't. It is even higher for those who use it lying down. [98] The physical health issues that come with the overuse of smart devices include problems with the text neck, wrist, and back. [99]

- **Sleep issues**

Quality sleep is critical for a child's healthy development, and its absence drives untoward behaviour, impaired learning and impedes overall wellness. Smart devices displace sleep, distorting sleep patterns and impacting the ability to fall or stay asleep. Unsurprisingly, there

is a strong and consistent association with bedtime media use and inadequate sleep quantity, poor quality, and excessive daytime sleepiness (Figures 10 and 11).[100]

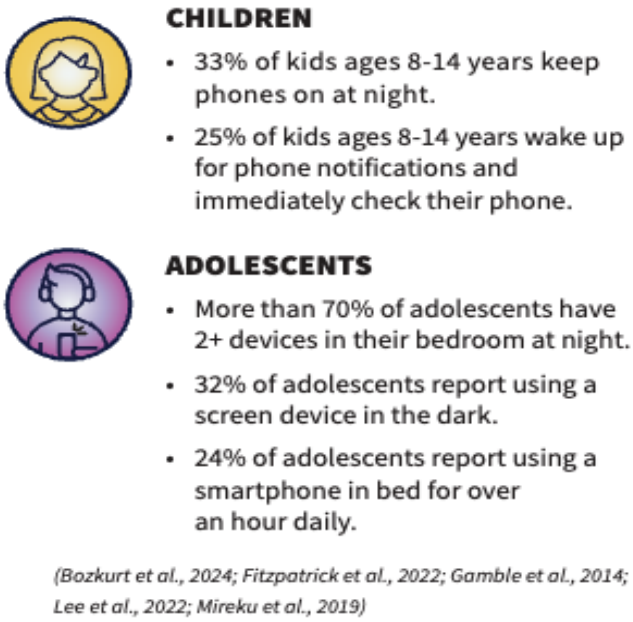


Figure 10

This is true for all ages, from pre-schoolers to adolescents. [101] [102] [103] A recent randomised controlled trial of 4810 children aged 12 to 16 who attended 55 different schools found that girls' screentime displaced sleep and was associated with increased symptoms of depression over nine months. [104]

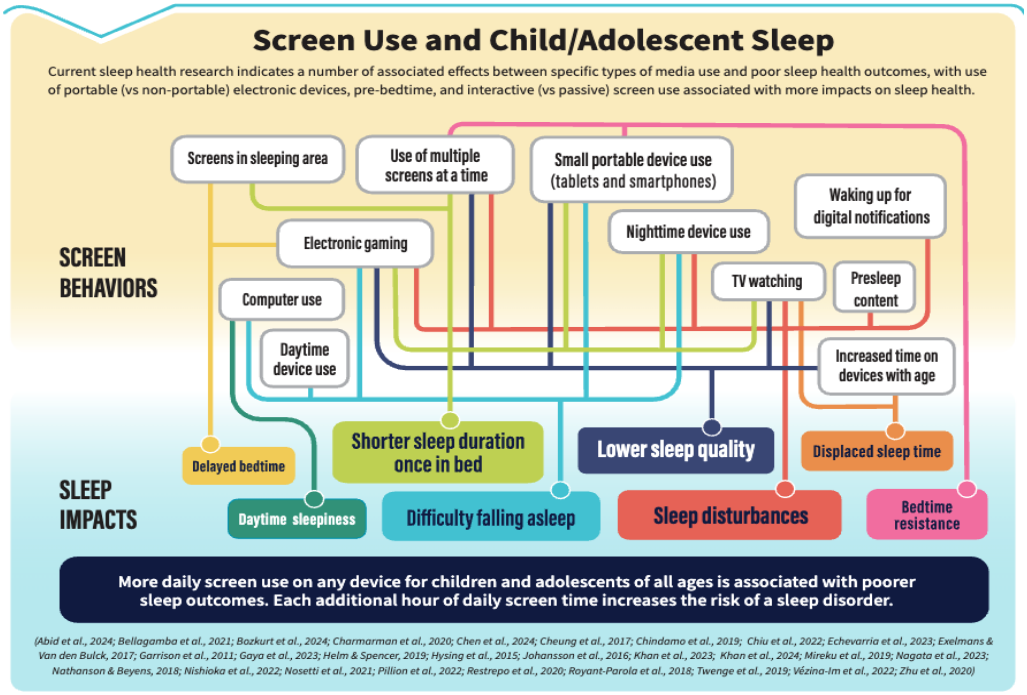


Figure 11

External Harms

- **Cyberbullying**

Cyberbullying is the use of digital platforms—such as social media, messaging apps, online forums, or gaming communities—to harass, intimidate, humiliate, or threaten others. It can

take many forms, including spreading rumours, sharing private information without consent, sending hurtful messages, or engaging in persistent online harassment. Unlike traditional bullying, cyberbullying can occur at any time, from anywhere, and can be ongoing, as children remain connected on social media long after school hours. The prevalence of cyberbullying is highest among adolescents, and its short- and long-term consequences include poor mental and physical health, as well as reduced academic performance (Figure 12).[105] [106]

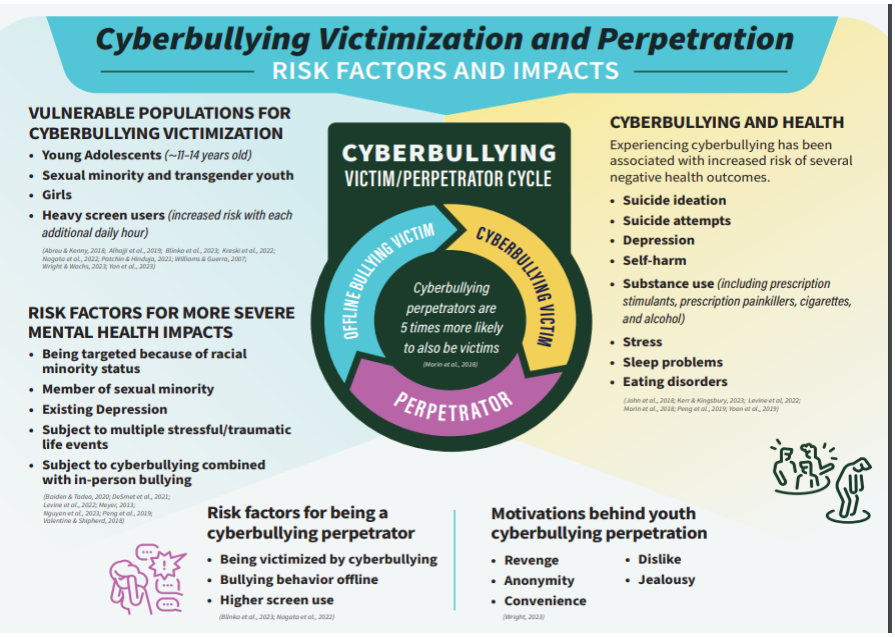


Figure 12

- **Viral social media challenges**

Social media challenges (SMCs) are an ongoing concern as some are extreme and pose serious dangers. While many challenges are relatively innocuous, some like the blackout challenge have led to unintentional deaths internationally and in the UK. [107] School-aged children are particularly vulnerable due to their developmental stage, which makes them more susceptible to social pressure. This increased vulnerability heightens their risk of engaging in risky behaviour and being influenced by how these challenges are portrayed in the media.

SMCs rely on user-generated content, typically in the form of videos or images shared on platforms like TikTok. Their design encourages sharing, using platform algorithms and features like hashtags to maximize visibility and engagement. [108] These algorithms can amplify harmful challenges while built-in reward systems and content recommendations further drive participation. [109]

- **Child sexual exploitation, abuse, and the production and distribution of child sexual abuse material (CSAM)**

When children have access to a camera, a messaging app, and the internet, there is a severe risk of child sexual abuse material. The ubiquity and size of the smart device have significantly added to this. In a sizeable UK-based survey, a quarter of those aged 12-17 surveyed said they had received an unwanted sexual photo or video. In this age group, these unwanted photos came more often from a stranger than from someone they knew. The mean average age at which respondents surveyed received their first sexual image from someone was 14.[110]

Sending and receiving a sext is illegal for under-18s in the UK. Whilst we know that this is unlikely to result in a criminal conviction for most children, there is increasing anecdotal evidence of police involvement in schools for these sorts of crimes. Regardless of conviction rates, these significant police involvements in schools are alarming and traumatic for students and their families. [111]

The rapid growth of access to a smart device and the ability of children to film themselves easily in privacy has led to an exponential increase of self-generated Child Sexual Abuse Material (CSAM) – images and videos – generated and shared by children themselves – with 92% of content removed containing "self-generated" child sexual abuse material. It continues to increase, and the number of children involved is getting younger, including children aged 7-10 in 2023, up 65% from 2022 (104,282 in 2023 vs 63,057 in 2022).[112]

- **Youth crime and extremism**

Nearly 40% of robberies in London were for mobile phones in 2023.[113] In 2020, 500 children were mugged a day in the UK - almost all for their mobile phones.[114]

At least 27,000 children, with as many as 4,000 in London alone, are believed to be trapped in county lines across the UK. Smart devices are critical to this epidemic of child criminal exploitation, which is being fuelled by gangs who use social media to target, groom, coerce, and track the movements of vulnerable children online as young as 11. Between 2017 and 2022, online grooming crimes surged by 82%, with 73% involving platforms like Snapchat, Facebook, Instagram, and WhatsApp.[115]

Nearly one in five people arrested for terrorism-related offences in the past year were children aged under 18. These included some as young as 12 or 13 who were being investigated by police because of their potential involvement in terrorism. They account for 18.9% of arrests [116] compared to 2.4% a decade ago. The Met Police attribute this rise to social media, saying, “You have the combination of the overt social media and then the closed messaging apps ……. We would never have seen 12-year-olds and 13-year-olds exposed to the things they are now exposed to. Social media, messaging apps, and connectivity are impacting homes, communities, and, as we have seen over the summer, the streets.” Over half of the 7,000 people referred to counter-terrorism police are children, including primary school age.[117]

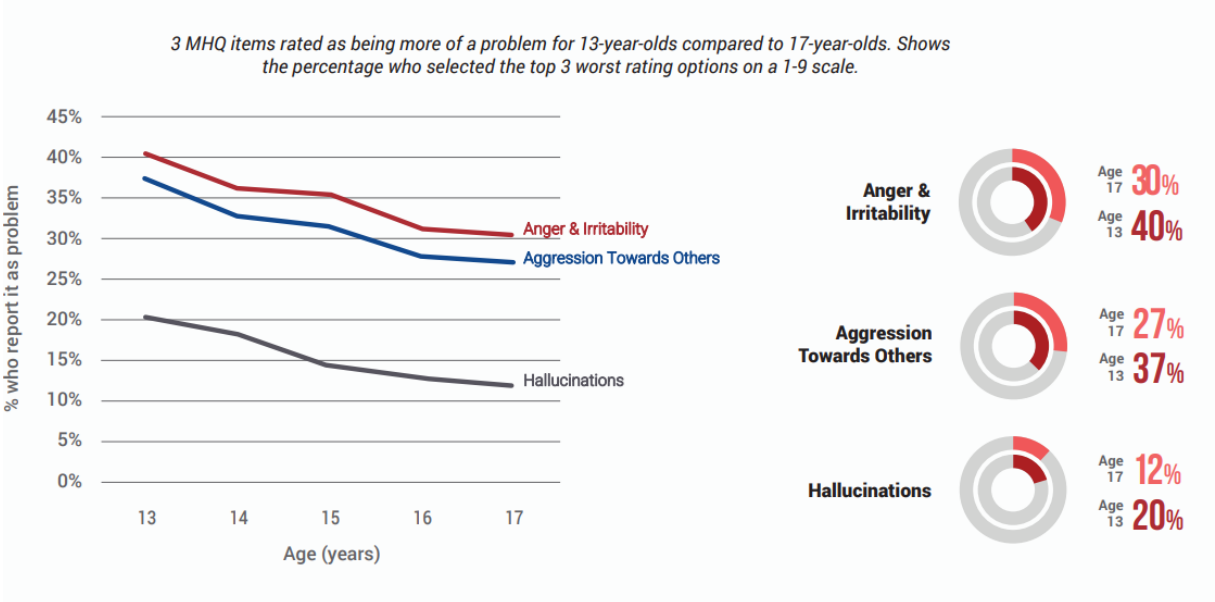


Figure 13

The earlier a child is given a smart device, the higher the likelihood that they report aggression, anger or even hallucinations. It is mainly an issue in younger teenagers, although the numbers in 17-year-olds are high (Figures 13 and 14).[118] [119] The viewing of violent content online goes beyond the screen. 80% of teens who encounter weapons-related content on social media say it makes them feel less safe in their local communities, with 68% of viewers less likely to venture outside and 39% admitting to being more likely to carry a weapon. Over 2/3rds of teens who perpetrated violence in the past year say that social media played a role in their behaviour.[120] The vast majority of teenage violence trials have online viewing of violence or radicalisation within them; examples are Blundells, Brianna Ghey and Olly Stephens, to name a small selection.

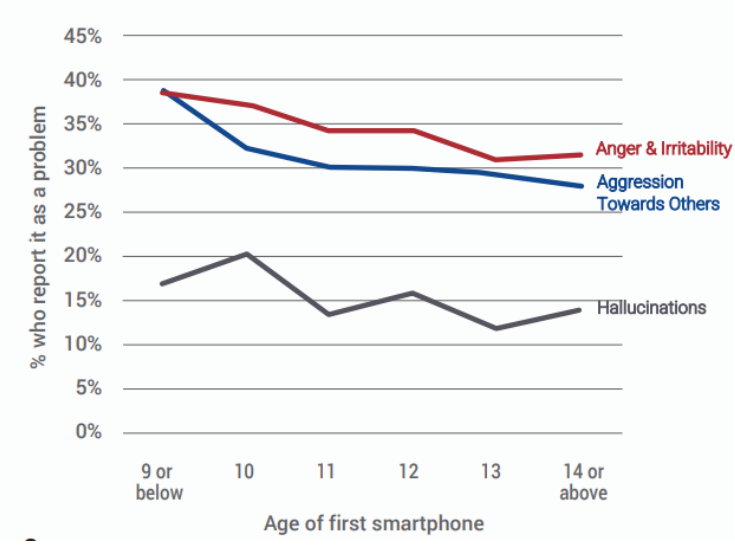


Figure 14

Europol warning about the rise of online cult communities dedicated to extremely violent child abuse

The phenomenon of violent online exploitation, specifically pressuring young people to join cult communities, has grown significantly in recent years. The emergence of a variety of groups leveraging digital platforms which normalise acts of extreme cruelty, extort victims and radicalise individuals into performing acts of violent extremism poses a serious threat to public safety. Their primary targets are minors and vulnerable youth, who are identified and groomed on mainstream online platforms and manipulated through psychological coercion. Through this coercion, the perpetrators enforce compliance and control the victims. Online extortion group members employ various tactics to perpetrate their criminal activities.

On social media, perpetrators analyse social media behaviour and deliberately target minors who already show some indication of vulnerability, and as they would be easier targets to groom and manipulate. The most preferred targets are particularly vulnerable minors between 8 and 17 years old, especially LGBTQ+, racial minorities and those struggling with mental health issues, such as depression and suicidal ideation. Online communities for self-help or support dedicated to individuals impacted by those issues have also been identified as fertile ground for identifying new victims. In some cases, perpetrators infiltrate these online mental health support communities to identify and recruit vulnerable young people.[121]

Incelosphere promoting violent and hateful ideology

The term “incel,” short for “involuntary celibate,” refers to predominantly male online communities that blame women for their members’ personal struggles and promote hateful and violent ideologies. These often include support for rape, paedophilia, homophobia, violence, racism, misogyny, antisemitism, self-harm, and suicide (Figures 15 and 16).[122]

A comprehensive study of the largest incel forum, based on traffic data, revealed its international reach, with the UK ranking second only to the USA in visitor numbers. As of 2022, the forum received 2.6 million monthly visits, had 136,000 YouTube subscribers, and amassed 24.2 million YouTube video views. Many forum members are under 18, and despite a stated minimum age of 15, there is no age verification process.

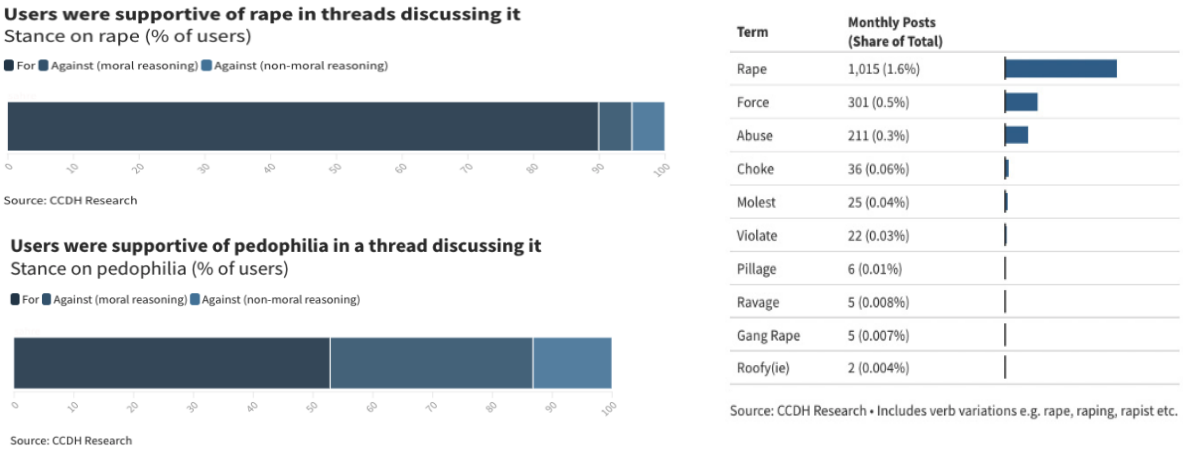


Figure 16

- **Financial sextortion**

Smart devices and social media platforms provide dangerous, private connectivity between children and perpetrators of financial sextortion. Financial sextortion is a form of online extortion in which scammers or criminals threaten to expose sexually explicit images (often nudes or semi-nudes), videos, or messages unless the victim pays them money. It combines elements of sextortion (coercion through intimate content) and financial fraud. Although many victims do not report these crimes, current data shows a sharp rise in financial sextortion cases. Reports to the US National Center for Missing & Exploited Children (NCMEC) doubled from the previous year, reaching 26,718 cases in 2023. In response, the UK's National Crime Agency issued an alert in 2024 to raise awareness and address the growing threat.

While all school-age children are vulnerable to this crime, a large proportion of victims are teenage boys aged 14-17. The threats often involve the risk of exposing intimate images to the victim's social network, leading to the perceived devastating impact on their lives. The consequences for victims are severe, including the spread of images, ongoing harassment even after payment, and significant mental health effects such as depression, anxiety, and thoughts of self-harm. In some cases, perpetrators encourage victims to harm themselves, and tragically, some children have taken their own lives in response to the pressure. [123] [124] [125] [126] These crimes are initiated on social media platforms, where criminals have direct access to children. They are often carried out on these platforms or secondary destinations like WhatsApp, iMessage, and FaceTime (Figure 17).[127]

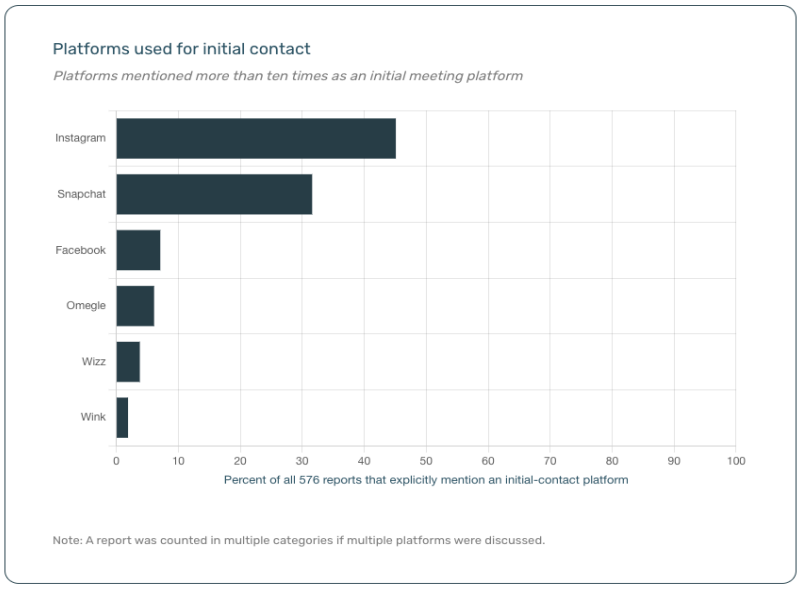


Figure 17

- **Exposure to targeted marketing by corporations and criminal networks**

Social media companies generate profit through their sophisticated, personalized marketing, which provides corporations and criminal networks direct access to children. These companies target young audiences with addictive products such as alcohol, tobacco, and weapons, while criminal networks exploit the platforms to sell illicit drugs. [128] [129] [130]

Social media has significantly expanded the reach of criminal drug networks, particularly among teenagers and young adults. [131] Numerous studies in the UK have shown that gangs, both in urban and rural areas, view social media platforms as essential tools for drug trafficking and gang recruitment. [132] [133]In a survey of 16 to 24-year-olds, one in four reported seeing illicit substances advertised on social media. Commonly advertised drugs include cannabis, cocaine, MDMA, and Xanax, and these promotions often occur on popular platforms like Snapchat, Instagram, and Facebook. [134]

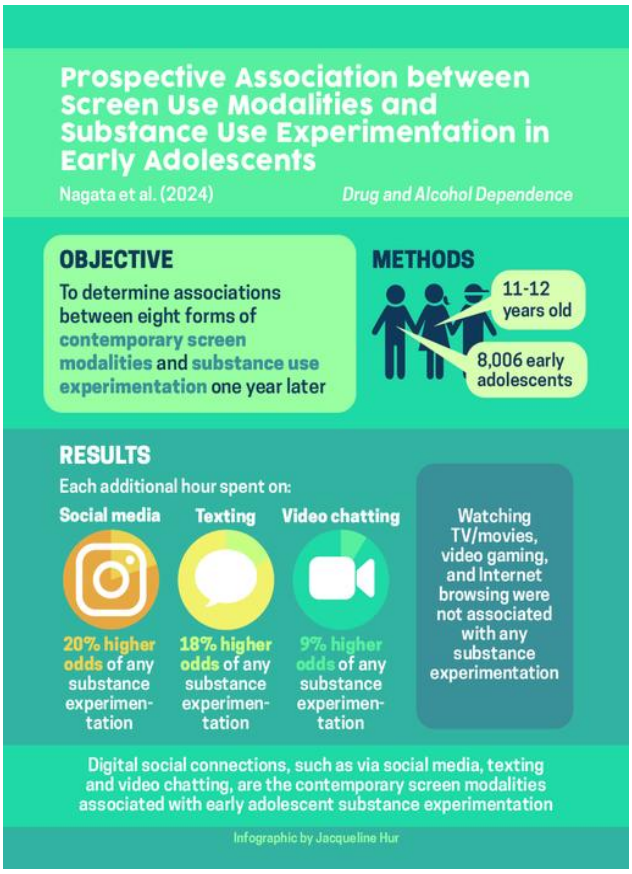


Figure 18

"*social media has normalised drugs amongst young people, with social media's algorithmic functions more likely to recommend similar accounts, further exposing young people to illicit substances online."*[135]

Pervasive child-targeted advertising of addictive substances on smart devices and social media is linked to early childhood experimentation with illicit drugs (Figure 18). [136] This is particularly concerning given the neuroplasticity of the school-age child's brain, which makes it especially vulnerable to developing substance addictions. This vulnerability is a key reason why advertising addictive substances to children has been regulated in traditional advertising media.

Restoring Childhood and Empowering Future Generations

The pervasive use of smart devices among children is not just a shift in habits—it is a loss of childhood experiences and a barrier to future opportunities. As screen time replaces crucial real-world interactions, young children miss essential developmental experiences.

Recent findings paint a concerning picture: by ages 7 to 8, children are already spending nearly three hours per day on their phones outside of school, a figure that rises to an alarming five hours by ages 15 to 16. Almost 40% of parents report that screen time disrupts family life.[137]

"The overwhelming weight of evidence submitted to us suggests that the harms of screen time and social media use significantly outweigh the benefits for young children…Government needs to do more across departments to protect them from addiction, online harms and the mental health impacts of extensive use of devices". [138]

- Education Select Committee report

This growing issue demands urgent intervention. Safeguarding children's well-being calls for a collaborative effort from policymakers, educators, families, and health professionals to create a healthy environment in which children can thrive, protected from the harms of smart devices and social media.

[1]*Status of Mind*. (2017). https://www.rsph.org.uk/static/uploaded/d125b27c-0b62-41c5-a2c0155a8887cd01.pdf

[2] *Children and Parents: Media Use and Attitudes*. (2023). https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/media-literacy-research/children/childrens-media-use-and-attitudes-2023/childrens-media-use-and-attitudes-report-2023.pdf

[3] OFCOM. (2024). *OFCOM Child Development and Online Behaviour*.

[4] Westbrook, A., Ghosh, A., Bosch, R. v. d., Määttä, J. I., Hofmans, L., & Cools, R. (2021/05/21). Striatal dopamine synthesis capacity reflects smartphone social activity. iScience, 24(5). https://doi.org/10.1016/j.isci.2021.102497

[5] Sellman, M. (2024, 14/10/2024). TikTok can become addictive in less than 35 minutes, documents show. *The Times*. https://www.thetimes.com/uk/technology-uk/article/tiktok-app-addictive-minutes-mhmdwxf2f

[6] Griffiths, M. D. (2018). Adolescent social networking: How do social media operators facilitate habitual use? *Education and Health*, *36.3*, 66-69.

[7] Paschke, K., Austermann, M. I., & Thomasius, R. (2021/04/22). Frontiers | ICD-11-Based Assessment of Social Media Use Disorder in Adolescents: Development and Validation of the Social Media Use Disorder Scale for Adolescents. *Frontiers in Psychiatry*, *12*. https://doi.org/10.3389/fpsyt.2021.661483

[8] Alter, A. (2017). *Irresitible: Why you are addicted to technology and how to set yourself free*. Vintage.

[9] Sohn, S. Y., Rees, P., Wildridge, B., Kalk, N. J., & Carter, B. (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: a systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry*, *19*(1), 356. https://doi.org/10.1186/s12888-019-2350-x

[10] ParentKind. (2024). *The National Parent Survey*.

[11]Boniel-Nissim, M., Marino, C., Galeotti, T., Blinka, L., Ozolina, K., Craig, W., & al., e. (2024). *A focus on adolescent social media use and gaming in Europe, central Asia and Canada. Health Behaviour in School-aged Children international report from the 2021/2022 survey.* https://hbsc.org/

[12] *Age of First Smartphone and Mental Health Outcomes*. (2023). S. Lab. https://sapienlabs.org/wp-content/uploads/2023/05/Sapien-Labs-Age-of-First-Smartphone-and-Mental-Wellbeing-Outcomes.pdf

[13] Ibid.

[14] Blakemore, S.-J. (2020). *Inventing Ourselves*. Penguin.

[15] Brown, E. G., Gallagher, S., & Creaven, A. M. (2018 May). Loneliness and acute stress reactivity: A systematic review of psychophysiological studies - PubMed. *Psychophysiology*, *55*(5). https://doi.org/10.1111/psyp.13031

[16] Kiesler, S. S., J.
McGuire T.W. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist*, *39*(10). https://doi.org/10.1037/0003-066X.39.10.1123

[17] Kiesler, S., Siegel, J., & T.W., M. Ibid.

[18] Porges, S. W. (2001). The polyvagal theory: Phylogenetic substrates of a social nervous system. *International Journal of Psychophysiology*, *42*(2). https://doi.org/10.1016/S0167-8760(01)00162-3

[19] Porges, S. W. (2003). Social engagement and attachment: a phylogenetic perspective - PubMed. *Annals of the New York Academy of Sciences*, *1008*(1). https://doi.org/10.1196/annals.1301.004

[20] Alter, A. (2017). *Irresitible: Why you are addicted to technology and how to set yourself free*. Vintage.

[21] Chatterjee, D. R. (2024). Interview with the US Surgeon General Dr Vivek Murthy In *Feel Better Live Better*.
https://www.youtube.com/watch?v=9mbeWRsHsO4&list=PLwAWbIQiqJ0D2gn5UJBPSOzvLROyqSl7f

[22] Anderson, M., Park, E., & Faverio, M. (2024). *How Teens and Parents Approach Screen Time*. Pew Research. Retrieved 22/10/2024 from https://www.pewresearch.org/internet/2024/03/11/how-teens-and-parents-approach-screen-time/

[23] Lucas, M., Bocock, L., Del Pozo Seura, J. M., & J., H. (2025). *International Comparisons: Implications for England of research on highperforming education systems. Summary report* (The Skills Imperative, Issue. NFER.

[24] Kashefpakdel, E., & Ravenscroft, T. (2021). *Essential Skills and Their Impact on Education*. Retrieved 01 from www.skillsbuilder.org/file/essential=skills-and-theirimpact-on-education-outcomes

[25] Heckman, J. J., & Kautz, T. (2012/08/01). Hard evidence on soft skills. *Labour Economics*, *19*(4). https://doi.org/10.1016/j.labeco.2012.05.014

[26] Twenge, J. M., Haidt, J., Blake, A. B., McAllister, C., Lemon, H., & Le Roy, A. (2021 Dec). Worldwide increases in adolescent loneliness - PubMed. *Journal of adolescence*, *93*(1). https://doi.org/10.1016/j.adolescence.2021.06.006

[27] Handbook of Children and Screens. https://doi.org/10.1007/978-3-031-69362-5
[28] Arslan, G. (2021). School belongingness, well-being, and mental health among adolescents: Exploring the role of loneliness. *Australian Journal of Psychology*, *73*(1). https://doi.org/10.1080/00049530.2021.1904499
[29] *Mental Health of Children and Young People in England, 2023 - wave 4 follow up to the 2017*. (2023). Retrieved from https://digital.nhs.uk/data-and-information/publications/statistical/mental-health-of-children-and-young-people-in-england/2023-wave-4-follow-up#
[30]Bye, A., Carter, B., Leightley, D., Trevillion, K., Liakata, M., Branthonne-Foster, S., Cross, S., Zenasni, Z., Carr, E., Williamson, G., Vega Viyuela, A., & Dutta, R. (2024). Cohort profile: The Social media, smartphone use and Self-harm in Young People (3S-YP) study-A prospective, observational cohort study of young people in contact with mental health services. *PLoS One*, *19*(5), e0299059. https://doi.org/10.1371/journal.pone.0299059
[31] Hayward, E., & Sellman, M. (2024). The link between heavy social media use and teenage anxiety. *The Times*. https://www.thetimes.com/article/0611df1a-e349-46e3-a4fe-6f4c1a4cc9c6?shareToken=ccb8f5493521225b85cfef695c87eb7f
[32] Vonk, L., Putrik, P., van Amelsvoort, T., Vanluydt, E., Delespaul, P., Levels, M., & Huijts, T. (01/20/2025). Likes, Shares, and Symptoms: The Hidden Toll of Early Adolescents' Social Media Use on Well-Being - PubMed. *International Journal of Environmental Research and Public Health*, *22*(1). https://doi.org/10.3390/ijerph22010131
[33] Carter, B., Payne, M., Rees, P., Sohn, S. Y., Brown, J., & Kalk, N. J. (2024). A multi-school study in England, to assess problematic smartphone usage and anxiety and depression. *Acta Paediatr*, *113*(10), 2240-2248. https://doi.org/10.1111/apa.17317
[34] Pieh, C., Humer, E., Hoenigl, A. et al. . (2025). Smartphone screen time reduction improves mental health: a randomized controlled trial. *BMC Med*, *23*(107). https://doi.org/10.1186/s12916-025-03944-z
[35] *Age of First Smartphone and Mental Health Outcomes*. (2023). S. Lab. https://sapienlabs.org/wp-content/uploads/2023/05/Sapien-Labs-Age-of-First-Smartphone-and-Mental-Wellbeing-Outcomes.pdf
[36] Tiraboschi, G. A., Garon-Carrier, G., Smith, J., & Fitzpatrick, C. (2023/12/01). Adolescent internet use predicts higher levels of generalized and social anxiety symptoms for girls but not boys. *Preventive Medicine Reports*, *36*. https://doi.org/10.1016/j.pmedr.2023.102471
[37] Screens, C. a. (2025). https://www.childrenandscreens.org/learn-explore/research/suicide-self-harm-and-digital-media-use/
[38] Ibid.
[39] Leventhal, A. M., Cho, J., Keyes, K. M., Zink, J., Riehm, K. E., Zhang, Y., & Ketema, E. (2021 Jul 15). Digital media use and suicidal behavior in U.S. adolescents, 2009–2017. *Preventive Medicine Reports*, *23*. https://doi.org/10.1016/j.pmedr.2021.101497
[40] *Learning time and disciplinary climate*. (2023). O. f. E. C.-o. a. Development. https://www.oecd.org/en/topics/sub-issues/learning-time-and-disciplinary-climate.html
[41] Acebedo. L, Buil-Legaz. L, Adrover-Roig, D., & Aguilar-Mediavilla, E. (12/09/2020). Impact of the Use of Media Devices within the Family Context on the Language of Preteens - PubMed. *Children (Basel, Switzerland)*, *7*(12). https://doi.org/10.3390/children7120281
[42] *Learning time and disciplinary climate*. (2023). O. f. E. C.-o. a. Development. https://www.oecd.org/en/topics/sub-issues/learning-time-and-disciplinary-climate.html
[43] Horowitz-Kraus, T., & Hutton, J. S. (2018 Apr). Brain connectivity in children is increased by the time they spend reading books and decreased by the length of exposure to screen-based media - PubMed. *Acta paediatrica (Oslo, Norway : 1992)*, *107*(4). https://doi.org/10.1111/apa.14176
[44] Sunday, O. J., Adesope, O. O., & Maarhuis, P. L. (2021/08/01). The effects of smartphone addiction on learning: A meta-analysis. *Computers in Human Behavior Reports*, *4*. https://doi.org/10.1016/j.chbr.2021.100114
[45] Böttger, T., Poschik, M., & Zierer, K. (2023 Sep 11). Does the Brain Drain Effect Really Exist? A Meta-Analysis. *Behavioral Sciences*, *13*(9). https://doi.org/10.3390/bs13090751
[46] Ward, A. F., Duke, K., Gneezy, A., & Bos, M. W. (2017-04-01). Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity. *Journal of the Association for Consumer Research*, *2*(2). https://doi.org/10.1086/691462
[47] Froud, K., Levinson, L., Maddox, C., & Smith, P. (22 May 2024). Middle-schoolers' reading and lexical-semantic processing depth in response to digital and print media: An N400 study. *PLoS One*, *19*(5). https://doi.org/10.1371/journal.pone.0290807
[48] Vargas. C, Altamura. L, Blanco-Gandía, M. C., Gil, L., Mañá, A., Montagud, S., & Salmerón, L. (2024 Mar). Print and digital reading habits and comprehension in children with and without special education needs - PubMed. *Research in developmental disabilities*, *146*. https://doi.org/10.1016/j.ridd.2024.104675

[49] Salmerón, L., Vargas, C., Delgado, P., & Baron, N. (2023). Relation between digital tool practices in the language arts classroom and reading comprehension scores - PubMed. *Reading and writing*, *36*(1). https://doi.org/10.1007/s11145-022-10295-1

[50] Ihara, A. S., Nakajima, K., Kake, A., Ishimaru, K., Osugi, K., & Naruse, Y. (2021/06/10). Frontiers | Advantage of Handwriting Over Typing on Learning Words: Evidence From an N400 Event-Related Potential Index. *Frontiers in Human Neuroscience*, *15*. https://doi.org/10.3389/fnhum.2021.679191

[51] Goode, R. W., Godoy, S. M., Wolfe, H., Olson, K., Agbozo, B., Mueller, A., Noem, T., Malian, H., Peat, C. M., Watson, H., Thornton, L. M., Gwira, R., & Bulik, C. M. (2023 Jan). Perceptions and experiences with eating disorder treatment in the first year of COVID-19: A longitudinal qualitative analysis - PubMed. *The International journal of eating disorders*, *56*(1). https://doi.org/10.1002/eat.23888

[52] Nikkelen, S. W., Valkenburg, P. M., Huizinga, M., & Bushman, B. J. (2014 Sep). Media use and ADHD-related behaviors in children and adolescents: A meta-analysis - PubMed. *Developmental Psychology*, *50*(9). https://doi.org/10.1037/a0037318

[53] Tamana, S. K., Ezeugwu, V., Chikuma, J., Lefebvre, D. L., Azad, M. B., Moraes, T. J., Subbarao, P., Becker, A. B., Turvey, S. E., Sears, M. R., Dick, B. D., Carson, V., Rasmussen, C., Pei, J., & Mandhane, P. J. (04/17/2019). Screen-time is associated with inattention problems in preschoolers: Results from the CHILD birth cohort study - PubMed. *PLoS One*, *14*(4). https://doi.org/10.1371/journal.pone.0213995

[54] Thoma, V. K., Schulz-Zhecheva, Y., Oser, C., Fleischhaker, C., Biscaldi, M., & Klein, C. (2020 Feb). Media Use, Sleep Quality, and ADHD Symptoms in a Community Sample and a Sample of ADHD Patients Aged 8 to 18 Years - PubMed. *Journal of attention disorders*, *24*(4). https://doi.org/10.1177/1087054718802014

[55] Thorell, L. B., Burén, J., Ström Wiman, J., Sandberg, D., & Nutley, S. B. (2024 Aug). Longitudinal associations between digital media use and ADHD symptoms in children and adolescents: a systematic literature review - PubMed. *European child & adolescent psychiatry*, *33*(8). https://doi.org/10.1007/s00787-022-02130-3

[56] Heffler, K. F., Acharya, B., Subedi, K., & Bennett, D. S. (03/01/2024). Early-Life Digital Media Experiences and Development of Atypical Sensory Processing - PubMed. *JAMA Pediatrics*, *178*(3). https://doi.org/10.1001/jamapediatrics.2023.5923

[57] Gillioz, E., Gentaz, E., & Lejeune, F. (2025-04-02). Screen habits and effects on sensory profiles in 6- to 36-month-old toddlers. *Pediatric Research 2025*. https://doi.org/10.1038/s41390-025-04024-x

[58] Ibid.

[59] Fabio, R. A., & Suriano, R. (2024-12-21). The Role of Smartphone Use in Sensory Processing: Differences Between Adolescents with ADHD and Typical Development. *International Journal of Environmental Research and Public Health 2024, Vol. 21, Page 1705*, *21*(12). https://doi.org/10.3390/ijerph21121705

[60] Slobodin, O., Heffler, K. F., & Davidovitch, M. (2019 May). Screen Media and Autism Spectrum Disorder: A Systematic Literature Review - PubMed. *Journal of developmental and behavioral pediatrics : JDBP*, *40*(4). https://doi.org/10.1097/DBP.0000000000000654

[61] Dahlgren, A., Sjöblom, L., Eke, H., Bonn, S. E., & Trolle Lagerros, Y. (07/09/2021). Screen time and physical activity in children and adolescents aged 10-15 years - PubMed. *PLoS One*, *16*(7). https://doi.org/10.1371/journal.pone.0254255

[62] Berard, M., Peries, M., Loubersac, J., Picot, M.-C., Bernard, J. Y., Munir, K., & Baghdadli, A. (2022/12/01). Frontiers | Screen time and associated risks in children and adolescents with autism spectrum disorders during a discrete COVID-19 lockdown period. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.1026191

[63] Ibid.

[64] Shutts, K., Brey, E. L., Dornbusch, L. A., Slywotzky, N., & Olson, K. R. (2 Mar 2016). Children Use Wealth Cues to Evaluate Others. *PLoS One*, *11*(3). https://doi.org/10.1371/journal.pone.0149360

[65] Khan, M., & Dalwai, S. (2024-08-01). 6554 Study on impact of screen-time reduction and focused social interaction in children with features of autism spectrum disorder (ASD) via an online program. *Archives of Disease in Childhood*, *109*(Suppl 1). https://doi.org/10.1136/archdischild-2024-rcpch.445

[66] *Written evidence submitted by the Association of School and College Leaders*. (2023). (Education Select Committee: Screen Time: Impacts on Education and Well Being, Issue. A. o. S. a. C. Leaders.

[67] Hu, Y., Long, X., Lyu, H., Zhou, Y., & Chen, J. (2017/11/02). Frontiers | Alterations in White Matter Integrity in Young Adults with Smartphone Dependence. *Frontiers in Human Neuroscience*, *11*. https://doi.org/10.3389/fnhum.2017.00532

[68] Seo, H. S., Jeong, E.-K., Choi, S., Kwon, Y., Park, H.-J., & Kim, I. (2020-07-01). Changes of Neurotransmitters in Youth with Internet and Smartphone Addiction: A Comparison with Healthy

Controls and Changes after Cognitive Behavioral Therapy. *American Journal of Neuroradiology*, *41*(7). https://doi.org/10.3174/ajnr.A6632

[69] Maza, M. T., Fox, K. A., Kwon, S.-J., Flannery, J. E., Lindquist, K. A., Prinstein, M. J., & Telzer, E. H. (2023/02/01). Association of Habitual Checking Behaviors on Social Media With Functional Brain Development. *JAMA Pediatrics*, *177*(2). https://doi.org/10.1001/jamapediatrics.2022.4924

[70] Harrington, S., & O'Dwyer, V. (2023 May). The association between time spent on screens and reading with myopia, premyopia and ocular biometric and anthropometric measures in 6- to 7-year-old schoolchildren in Ireland - PubMed. *Ophthalmic & physiological optics : the journal of the British College of Ophthalmic Opticians (Optometrists)*, *43*(3). https://doi.org/10.1111/opo.13116

[71] Liang, J., Pu, Y., Chen, J., Liu, M., Ouyang, B., Jin, Z., Ge, W., Wu, Z., Yang, X., Qin, C., Wang, C., Huang, S., Jiang, N., Hu, L., Zhang, Y., Gui, Z., Pu, X., Huang, S., & Chen, Y. (2024-09-24). Global prevalence, trend and projection of myopia in children and adolescents from 1990 to 2050: a comprehensive systematic review and meta-analysis. *British Journal of Ophthalmology*. https://doi.org/10.1136/bjo-2024-325427

[72] Foreman, J., Salim, A. T., Praveen, A., Fonseka, D., Ting, D. S. W., He, M. G., Bourne, R. R. A., Crowston, J., Wong, T. Y., & Dirani, M. (2021/12/01). Association between digital smart device use and myopia: a systematic review and meta-analysis. *The Lancet Digital Health*, *3*(12). https://doi.org/10.1016/S2589-7500(21)00135-7

[73] *Screen time linked to risk of myopia in young people*. (2021, 7/10/2021). https://www.aru.ac.uk/news/screen-time-linked-to-risk-of-myopia-in-young-people

[74]Ha, A., Lee, Y. J., Lee, M., Shim, S. R., & Kim, Y. K. (2025/02/03). Digital Screen Time and Myopia. *JAMA Network Open*, *8*(2). https://doi.org/10.1001/jamanetworkopen.2024.60026

[75] *Mental Health of Children and Young People in England, 2023 - wave 4 follow up to the 2017*. (2023). Retrieved from https://digital.nhs.uk/data-and-information/publications/statistical/mental-health-of-children-and-young-people-in-england/2023-wave-4-follow-up#

[76] Trafford, A. M., Carr, M. J., Ashcroft, D. M., Chew-Graham, C. A., Cockcroft, E., Cybulski, L., Garavini, E., Garg, S., Kabir, T., Kapur, N., Temple, R. K., Webb, R. T., & Mok, P. L. H. (2023). Temporal trends in eating disorder and self-harm incidence rates among adolescents and young adults in the UK in the 2 years since onset of the COVID-19 pandemic: a population-based study. *The Lancet Child & Adolescent Health*, *7*(8), 544-554. https://doi.org/10.1016/s2352-4642(23)00126-8

[77] Hope Virgo, E. H., Eleanor Mitchell et al. (2021). *The Cost of Eating Disorders in the UK*. M. a. G. C. f. E. D. The Hearts. https://www.pslhub.org/learn/patient-safety-in-health-and-care/mental-health/eating-disorders/the-cost-of-eating-disorders-in-the-uk-2019-and-2020-24-september-2021-r5242/

[78] Jiménez-Marín, G., Elías Zambrano, R., Galiano-Coronil, A., & Ravina-Ripoll, R. (07/14/2020). Food and Beverage Advertising Aimed at Spanish Children Issued through Mobile Devices: A Study from a Social Marketing and Happiness Management Perspective - PubMed. *International Journal of Environmental Research and Public Health*, *17*(14). https://doi.org/10.3390/ijerph17145056

[79] Matos, J. d. P., Rodrigues, M. B., Duarte, C. K., & Horta, P. M. (2023 Feb 17). A Scoping Review of Observational Studies on Food and Beverage Advertising on Social Media: A Public Health Perspective. *International Journal of Environmental Research and Public Health*, *20*(4). https://doi.org/10.3390/ijerph20043615

[80] Griffiths, S., Harris, E. A., Whitehead, G., Angelopoulos, F., Stone, B., Grey, W., & Dennis, S. (2024/12/01). Does TikTok contribute to eating disorders? A comparison of the TikTok algorithms belonging to individuals with eating disorders versus healthy controls. *Body Image*, *51*. https://doi.org/10.1016/j.bodyim.2024.101807

[81] Dane, A., & Bhatia, K. (22 Mar 2023). The social media diet: A scoping review to investigate the association between social media, body image and eating disorders amongst young people. *PLOS Global Public Health*, *3*(3). https://doi.org/10.1371/journal.pgph.0001091

[82] Chu, J., Ganson, K. T., Testa, A., Al-Shoaibi, A. A. A., Jackson, D. B., Rodgers, R. F., He, J., Baker, F. C., & Nagata, J. M. (09/04/2024). Screen time, problematic screen use, and eating disorder symptoms among early adolescents: findings from the Adolescent Brain Cognitive Development (ABCD) Study - PubMed. *Eating and weight disorders : EWD*, *29*(1). https://doi.org/10.1007/s40519-024-01685-1

[83] Rozgonjuk, D., Ignell, J., Mech, F., Rothermund, E., Gündel, H., Montag, C., Rozgonjuk, D., Ignell, J., Mech, F., Rothermund, E., Gündel, H., & Montag, C. (2023-09-04). Smartphone and Instagram use, body dissatisfaction, and eating disorders: investigating the associations using self-report and tracked data. *Journal of Eating Disorders 2023 11:1*, *11*(1). https://doi.org/10.1186/s40337-023-00865-1

[84] Griffiths, S., Harris, E. A., Whitehead, G., Angelopoulos, F., Stone, B., Grey, W., & Dennis, S. (2024/12/01). Does TikTok contribute to eating disorders? A comparison of the TikTok algorithms belonging to individuals with eating disorders versus healthy controls. *Body Image*, *51*. https://doi.org/10.1016/j.bodyim.2024.101807

[85] Ateq, K., Alhajji, M., & Alhusseini, N. (2024/03/08). Frontiers | The association between use of social media and the development of body dysmorphic disorder and attitudes toward cosmetic surgeries: a national survey. *Frontiers in Public Health*, *12*. https://doi.org/10.3389/fpubh.2024.1324092

[86] Slaughter-Acey, J., Khala, A., & Dhillon, M. (2024). *Dove : The Real State of Beauty: A Global Report*. https://www.dove.com/uk/stories/campaigns/global-state-of-beauty.html

[87] Rackham, A. (2024). *Growing skincare use by children is dangerous, say dermatologists*. BBC. Retrieved 18/04/2025 from https://www.bbc.co.uk/news/health-67993618

[88] Zhu, Z., Zhong, X., Luo, Z., Liu, M., Zhang, H., Zheng, H., & Li, J. (2025/01/24). Global, regional and national burdens of acne vulgaris in adolescents and young adults aged 10–24 years from 1990 to 2021: a trend analysis. *British Journal of Dermatology*, *192*(2). https://doi.org/10.1093/bjd/ljae352

[89] Eccles, L. D., M. (2024). Why British teenagers have such bad acne — and how to treat it. *The Times*. https://www.thetimes.com/uk/healthcare/article/british-teenagers-acne-how-to-treat-spots-pdnfclwm3

[90] Brodersen, K., Hammami, N., & Katapally, T. R. (2023 Feb 3). Is excessive smartphone use associated with weight status and self-rated health among youth? A smart platform study. *BMC Public Health*, *23*(1). https://doi.org/10.1186/s12889-023-15037-8

[91] Haghjoo, P., Siri, G., Soleimani, E., Farhangi, M. A., & Alesaeidi, S. (06/28/2022). Screen time increases overweight and obesity risk among adolescents: a systematic review and dose-response meta-analysis - PubMed. *BMC primary care*, *23*(1). https://doi.org/10.1186/s12875-022-01761-4

[92] Robinson, T. N., Banda, J. A., Hale, L., Lu, A. S., Fleming-Milici, F., Calvert, S. L., & Wartella, E. (2017/11/01). Screen Media Exposure and Obesity in Children and Adolescents. *Pediatrics*, *140*(Supplement_2). https://doi.org/10.1542/peds.2016-1758K

[93] Morrison, J. A., Glueck, C. J., & Wang, P. (2012 Apr). Childhood risk factors predict cardiovascular disease, impaired fasting glucose plus type 2 diabetes mellitus, and high blood pressure 26 years later at a mean age of 38 years: the Princeton-lipid research clinics follow-up study - PubMed. *Metabolism: clinical and experimental*, *61*(4). https://doi.org/10.1016/j.metabol.2011.08.010

[94] Twig, G., Yaniv, G., Levine, H., Leiba, A., Goldberger, N., Derazne, E., Ben-Ami, S. D., Tzur, D., Afek, A., Shamiss, A., Haklai, Z., & Kark, J. D. (06/23/2016). Body-Mass Index in 2.3 Million Adolescents and Cardiovascular Death in Adulthood - PubMed. *The New England journal of medicine*, *374*(25). https://doi.org/10.1056/NEJMoa1503840

[95] Li, M., Zhao, R., Dang, X., Xu, X., Chen, R., Chen, Y., Zhang, Y., Zhao, Z., & Wu, D. (2024). Causal Relationships Between Screen Use, Reading, and Brain Development in Early Adolescents. *Advanced Science*, *11*(11). https://doi.org/10.1002/advs.202307540

[96] *Study estimates proportion of adolescents living with overweight and obesity in England has increased by 50% between 2008 and 2023*. (2025). https://www.bristol.ac.uk/news/2025/april/weight--adolescents-study.html

[97] David, D., Giannini, C., Chiarelli, F., & Mohn, A. (2021). Text Neck Syndrome in Children and Adolescents. *International journal of environmental research and public health*, *18*(4), 1565. https://doi.org/10.3390/ijerph18041565

[98] Mongkonkansai, J., Veerasakul, S., Tamrin, S. B. M., & Madardam, U. (2022). Predictors of Musculoskeletal Pain among Primary School Students Using Smartphones in Nakhon Si Thammarat, Thailand. *Int J Environ Res Public Health*, *19*(17). https://doi.org/10.3390/ijerph191710530

[99] Lee, M., Hong, Y., Lee, S., Won, J., Yang, J., Park, S., Chang, K.-T., & Hong, Y. (2015 Jun 30). The effects of smartphone use on upper extremity muscle activity and pain threshold. *Journal of Physical Therapy Science*, *27*(6). https://doi.org/10.1589/jpts.27.1743

[100] *Sleep And Screens*. (2025). Children and Screens. https://www.childrenandscreens.org/wp-content/uploads/2024/12/Sleep-and-Screens-Research-At-A-Glance.pdf

[101] Pickard, H., Chu, P., Essex, C., Goddard, E. J., Baulcombe, K., Carter, B., Bedford, R., & Smith, T. J. (2024). Toddler Screen Use Before Bed and Its Effect on Sleep and Attention: A Randomized Clinical Trial. *JAMA Pediatr*. https://doi.org/10.1001/jamapediatrics.2024.3997

[102] Nagata, J. M., Singh, G., Yang, J. H., Smith, N., Kiss, O., Ganson, K. T., Testa, A., Jackson, D. B., & Baker, F., C. (2023 Aug). Bedtime screen use behaviors and sleep outcomes: Findings from the Adolescent Brain Cognitive Development (ABCD) Study - PubMed. *Sleep health*, *9*(4). https://doi.org/10.1016/j.sleh.2023.02.005

[103] Fitzpatrick, C., Almeida , M. L., Harvey, E., Garon-Carrier, G., Berrigan, F., & Asbridge, M. (04/18/2022). An examination of bedtime media and excessive screen time by Canadian preschoolers during the COVID-19 pandemic - PubMed. *BMC pediatrics*, *22*(1). https://doi.org/10.1186/s12887-022-03280-8

[104] Hökby, S., Alvarsson, J., Westerlund, J., Carli, V., & Hadlaczky, G. (2 Apr 2025). Adolescents' screen time displaces multiple sleep pathways and elevates depressive symptoms over twelve months. *PLOS Global Public Health*, *5*(4). https://doi.org/10.1371/journal.pgph.0004262

[105] Li, J., Ha, A., Rui, F., Zou, B., Yang, H., Xue, Q., Hu, X., Xu, Y., Henry, L., Barakat, M., Stave, C. D., Shi, J., Wu, C., Cheung, R., & Nguyen, M. H. (2022 Aug). Meta-analysis: global prevalence, trend and forecasting of non-alcoholic fatty liver disease in children and adolescents, 2000-2021 - PubMed. *Alimentary pharmacology & therapeutics*, *56*(3). https://doi.org/10.1111/apt.17096
[106] *Cyberbullying and Children*. (2025). Children and Screens. https://www.childrenandscreens.org/learn-explore/research/cyberbullying-and-children/
[107] McMahon, L., & Fraser, G. (2025). *TikTok sued by parents of UK teens after alleged challenge deaths*. BBC. https://www.bbc.co.uk/news/articles/c0lz2x60w46o.amp
[108] Nikolinakou, A., & King, K. W. (2018). Viral video ads: Emotional triggers and social media virality. *Psychology & Marketing*, *35*(10). https://doi.org/10.1002/mar.21129
[109] Kobilke, L., & Markiewitz, A. (2024). Understanding Youth Participation in Social Media Challenges: A Scoping Review of Definitions, Typologies, and Theoretical Perspectives. *Computers in Human Behavior Reports*, *157*, 1-4. https://doi.org/10.1016/j.chb.2024.108265
[110] ESET. (2024). *ESET UK Research reveals teenage sexting epidemic – with almost three-quarters of U18s regretting sharing intimate photos and videos online* https://www.eset.com/uk/about/newsroom/press-releases/eset-uk-think-twice-sexting-epidemic/
[111] Police, A. a. S. (2024). *Child self-generated indecent imagery*. Retrieved from https://www.avonandsomerset.police.uk/crime-prevention-advice/sexting/
[112] *Annual Report*. (2024). https://www.iwf.org.uk/annual-report-2023/trends-and-data/self-generated-child-sex-abuse/
[113] Dodd, V. (2023, 9.8.2023). Nearly two-fifths of robberies in London last year were for mobile phones. *The Guardian*. https://www.theguardian.com/uk-news/2023/aug/09/nearly-two-fifths-of-robberies-in-london-last-year-were-for-mobile-phones
[114] Hymas, C. (2019, 31/12/2019). Child victims of mobile phone theft not reporting crimes to police 'amid fears of retaliation'. *The Telegraph*. https://www.telegraph.co.uk/news/2019/12/31/child-victims-mobile-phone-theft-not-reporting-crimes-police/
[115] Unseen. (2024). *#LikestoLines: Protect your child from county lines online exploitation*. https://www.unseenuk.org/likes-to-lines-county-lines-online-exploitation/
[116] *The Youth Mind: Rising aggression and anger*. (2025). https://sapienlabs.org/wp-content/uploads/2025/01/Sapien-Labs-Report-The-Youth-Mind-Rising-aggression-and-anger-1.pdf
[117] Hymas, C. (2024, 29/09/2024). Children under 10 being reported to counter-terror police. *The Telegraph*. https://www.telegraph.co.uk/news/2024/09/29/children-under-10-being-reported-to-counter-terror-police/
[118] *Age of First Smartphone and Mental Health Outcomes*. (2023). S. Lab. https://sapienlabs.org/wp-content/uploads/2023/05/Sapien-Labs-Age-of-First-Smartphone-and-Mental-Wellbeing-Outcomes.pdf
[119] Ibid.
[120] Ibid.
[121] Europol. (2025). *Intellgence Notification: Violent online communities threaten children* https://www.europol.europa.eu/media-press/newsroom/news/intelligence-notification-violent-online-communities-threaten-children
[122] *The Incelosphere: Exposing pathways into incel communities and the harms they pose to women and children*. (2022). https://counterhate.com/research/incelosphere/
[123] Thorn. (2024). *Trends in Financial Sextortion: An investigation of sextortion reports in NCMEC CyberTipline data*. https://www.thorn.org/research/library/financial-sextortion/
[124] O'Malley, R. L., & Smith, K. (2024-07-21). Suicidal Ideation Among Male Victim-Survivors of Financial Sextortion. *Victims & Offenders*. https://doi.org/10.1080/15564886.2024.2379818
[125] O'Malley, R. L., & O'Malley, R. L. (2023-7). Short-Term and Long-Term Impacts of Financial Sextortion on Victim's Mental Well-Being. *Journal of Interpersonal Violence*, *38*(13-14). https://doi.org/10.1177/08862605231156416 , O'Malley, R. L., & Smith, K. (2024-07-21). Suicidal Ideation Among Male Victim-Survivors of Financial Sextortion. *Victims & Offenders*. https://doi.org/10.1080/15564886.2024.2379818
[126] Crawford, A., Smith, T., Ohaka, C., & Idara, M. (2024). *Stop terrorising children with sextortion, say parents*. BBC. https://www.bbc.co.uk/news/articles/cz6jywx37dlo
[127] Thorn. (2024). *Trends in Financial Sextortion: An investigation of sextortion reports in NCMEC CyberTipline data*. https://www.thorn.org/research/library/financial-sextortion/
[128] Handbook of Children and Screens. https://doi.org/10.1007/978-3-031-69362-5
[129] Solotaroff, P. (2024, 16/6/2024). Inside Snap Chats Teen Opioid Crisis. *Rolling Stone*. https://www.rollingstone.com/culture/culture-features/inside-snapchat-teenage-opioid-crisis-1235036691/
[130] Thorn. (2024). *Trends in Financial Sextortion: An investigation of sextortion reports in NCMEC CyberTipline data*. https://www.thorn.org/research/library/financial-sextortion/
[131] Ibid.

[132] McCulloch, L., & Furlong, S. (2019). *DM for Details: Selling drugs in the age of social media*. https://idpc.net/publications/2019/09/dm-for-details-selling-drugs-in-the-age-of-social-media

[133] Moyle, L., Childs, A., Coomber, R., & Barratt, M. J. (2019 Jan). #Drugsforsale: An exploration of the use of social media and encrypted messaging apps to supply and access drugs - PubMed. *The International journal on drug policy*, *63*. https://doi.org/10.1016/j.drugpo.2018.08.005

[134] McCulloch, L., & Furlong, S. (2019). *DM for Details: Selling drugs in the age of social media*. https://idpc.net/publications/2019/09/dm-for-details-selling-drugs-in-the-age-of-social-media

[135] Warburton, J., & Warburton, J. (2024-09-30). Drugs, Gangs, and Social Media in Provincial England. *European Journal on Criminal Policy and Research 2024*. https://doi.org/10.1007/s10610-024-09606-9

[136] Nagata, J. M., Shim, J., Low, P., Ganson, K. T., Testa, A., He, J., Santos, G. M., Brindis, C. D., Baker, F. C., & Shao, I. Y. (01/01/2025). Prospective association between screen use modalities and substance use experimentation in early adolescents - PubMed. *Drug and alcohol dependence*, *266*. https://doi.org/10.1016/j.drugalcdep.2024.112504

[137] ParentKind. (2024). *The National Parent Survey*.

[138] *Education Select Committee : Screentime: Impacts on Education and Wellbeing*. (2024). Houses of Parliament Retrieved from https://committees.parliament.uk/publications/45128/documents/223543/default/