



A HEALTH BRIEFING ON THE EVIDENCED RISKS OF THE SMARTPHONE

SUMMARY

As Health Professionals, we see the harm smartphones cause children and young people in our clinics daily. 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 facilitated by smartphone use.

Smartphones should be regarded differently than other internet-enabled devices due to significant differences in how children access unsafe or inappropriate content. Additionally, their design is fundamentally 'addictive', and they have omnipresent functionality.

The following risks are now evidenced by an increasing body of research, and crucially, evidence shows that mental health outcomes are worse the earlier a child has a phone.

- **Developmental issues caused by smartphone use**
 - Language and communication
 - Global development
 - Increases in ADHD and Atypical Sensory Processing
 - Emotional and Social Development
 - Mental Health
 - Academic attainment

- **The physical impact of smartphone usage**
 - Physical changes in the brain
 - Eyesight
 - Eating Disorders
 - Obesity
 - Musculoskeletal
 - Sleep

- **The societal impact of smartphone usage**
 - Sextortion and Child Sexual Abuse Material
 - Youth crime, extremism and smartphone/social media use
 - Missed childhood experiences and impeded life chances.

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.

Why distinguish smartphones from the broader digital environment, and why is the Online Safety Act insufficient?

Children and young people have the right to a digital environment that safeguards them from pornographic material, suicide and self-harm content, abusive or hateful material, and any content that promotes violence, dangerous stunts, or harmful activities. Protecting them from online dangers is vital and overdue, and we support the Online Safety Act,¹ which aims to shield children from harmful content on the internet. In principle, we also support calls to strengthen the Online Safety Act to enhance protections for children.² Focusing on measurable harm reduction, increasing accountability for Big Tech, and implementing a statutory code for app stores and operating systems is crucial. These steps are vital for child safety online, and there is widespread agreement that Big Tech must be held accountable for its harmful practices.

While measures to enhance digital safety may improve the environment for computers and other larger devices, they utterly fail to address the serious harms linked to smartphone use. Even if we achieve stronger protections for online content accessed by children, smartphones will continue to pose significant risks that can profoundly impact children emotionally, physically, mentally, and developmentally. The dangers stem from the very nature of the device itself, compounded by societal acceptance and peer pressure surrounding its use. For example, a reduction in explicit content promoting eating disorders will help, but it will not reduce the pressure from relentless images of beautiful people, influencers, advertising and the addictive nature of getting likes for content. It is imperative that we acknowledge and confront these issues head-on.

Smartphones require special attention compared to other internet-enabled devices due to their addictive nature and widespread use, especially among young children. The smartphone extends a hold and influence over a person like no other device does. Its growing ubiquity amongst younger and younger children, accompanied by the rapid acceleration of the product cycle and lack of any risk assessment of harms for its use by children, means that the issues we are seeing now in our teenagers will be significantly increased in our toddlers when they reach their teen years. Children who struggle with self-control and seek social acceptance may become trapped in a cycle of dependency and peer pressure. This is already impacting our health services as children and young people are 24 per cent of the population yet currently only account for 11 per cent of NHS expenditure.³ The need is increasing as child contact with mental health services is up 477% in 8 years- from 96k in 2016 to 458k in 2024.⁴

Addictive by design

Smartphones 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.⁵ The manufacturers and app makers use the fact 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.⁶

Because of this, children are readily becoming addicted to social media and their smartphones, deepening behavioural addictions through smartphone 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. A study by researchers at King’s College London estimated that one in four children and young people use their smartphones in a way that is consistent with a behavioural addiction.⁷ 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.⁸

This is coupled with problematic social media use. Problematic social media usage has increased from 7% in 2018 to 11% in 2022. Girls reported higher levels of problematic use than boys (13% vs 9%). High rates of continuous online contact (online almost all the time throughout the day, connecting to friends and other people). Over a third (36%) of adolescents reported continuous online contact with friends and others, with the highest rates among 15-year-old girls (44%). The UK is higher than average, and in England, 23% of 13-year-old girls and 20% of 11-year-old girls have experienced problematic social media use, up from 11% in 2018.⁹

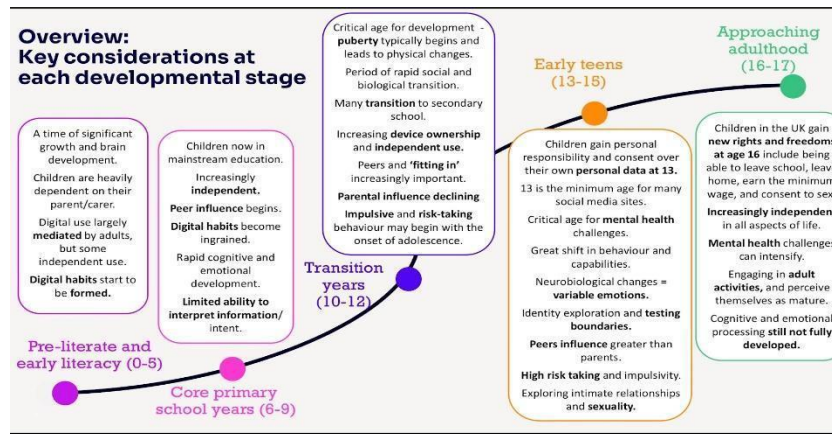
A comprehensive review of smartphone addiction revealed a wide range of issues, including feelings of insecurity, staying up late at night, strained parent-child relationships, disrupted school relationships, and various psychological problems such as compulsive buying, pathological gambling, low mood, tension, anxiety, leisure boredom, and behavioural issues. The most significant associations were found with hyperactivity, followed by conduct problems and emotional symptoms.¹⁰

Developmental issues caused by smartphone use

The neuroplasticity of young children’s brains means they respond to the stimuli around them to develop and learn. When this stimulus is excessive smartphone use rather than human interaction, there are increasingly significant harmful impacts.

Patricia Kuhl is one of the world’s leading brain scientists and runs experiments with more than 4,000 babies annually. *“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.”*¹¹

The chart on the next page, produced by Ofcom, summarises vital developmental moments in a child’s life and how they relate to the digital world.¹²



Significant and evidenced concerns impact children's and young people's development at different stages, as described in the following paragraphs.

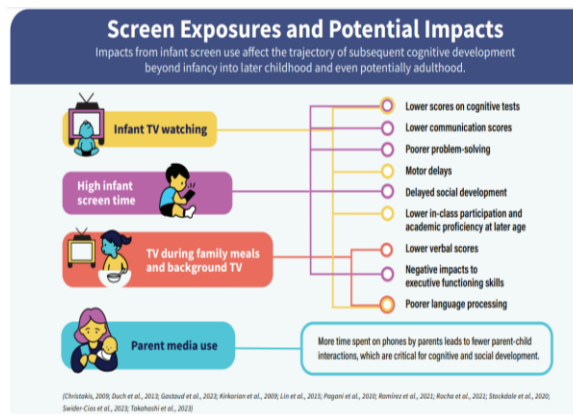
- **Language and Communication**

There is compelling evidence across many longitudinal studies that greater screen use is associated with lower language skills and developmental delays in communication.¹³ For three-year-olds, every minute of screen time significantly alters their daily interactions. They hear seven fewer adult words, speak five fewer words themselves, and engage in one fewer conversation each day. The average three-year-old's screen time usage means they miss 1,100 adult words, 840 vocalisations, and 194 daily conversations.¹⁴

This is relevant to more than just the early years. Screen use adversely affects language skills and causes social problems in young adolescents.¹⁵

- **Global Development**

There is a higher risk of delays in child global development (communication, cognitive, personal-social, and motor skills) for intensive screen users compared to those with light screen usage. The risks of delays were not moderated by parent education, child sex, or temperament, suggesting that the impact of screen usage is universal.¹⁶



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. This causes issues for reception teaching and educational attainment.^{18 19}

- ***Increases in ADHD and Atypical Sensory Processing***

Early-life digital media exposure is associated with atypical sensory processing.²⁰ Longitudinal studies have shown that frequent use of digital media, especially social media, is associated with a modest but statistically significant increase in the likelihood of developing ADHD symptoms.²¹ Additionally, among boys, spending more time in front of screens at the age of 1 year was significantly associated with autism spectrum disorder at the age of 3 years.²²

- ***Emotional and Social Development***

Smartphones and tablets are often used to keep children calm, but while this may work in the short term, it could hinder the development of their self-regulation skills in the long run. This can lead to difficulties in controlling their behaviour and managing anger. Furthermore, it may create a pattern where tantrums become associated with screen time, as using screens can diminish self-control and result in more frequent outbursts. This is particularly important for very young children;²³ the earlier they start using electronic devices and the more time they spend on them, the lower their self-regulation skills are likely to be.²⁴

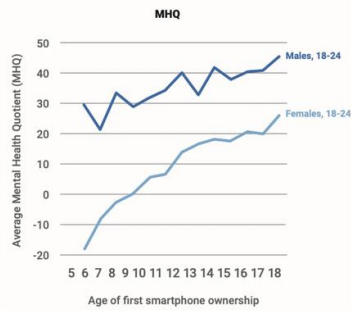
Dr Vivek Murthy, the US Surgeon General, has addressed how children are struggling to develop the skills needed to feel confident around others and to approach new situations. He attributes this issue partly to school closures but primarily to the impact of screens and the lack of real-time interactions.²⁵ In fact, less than 30% of young people reported that phones helped them learn good social skills.²⁶

Research indicates that excessive screen time can hinder young children's ability to interpret facial expressions and develop essential social skills, which in turn can impede empathy development. It is crucial for young children to engage in face-to-face interactions to properly understand non-verbal cues.²⁷

- ***Mental Health***

The mental health of our children and young people has deteriorated in the last decade,²⁸ and there is increasingly clear evidence that links smartphone usage as a major contributor to this decline.

Problematic smartphone use (PSU) is linked to youth mental health, with nearly half of 13–16-year-olds with PSU reporting symptoms of anxiety (44.4 per cent) compared to 26.4 per cent without PSU and over half of 13-16-year-olds with PSU reported symptoms of depression (55.6 per cent) compared to 35.8 per cent without PSU.²⁹ 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.³⁰ And a recent study highlighted the difference between smartphone usage and general screen time. They found that where excessive smartphone usage was associated with anxiety or depression, screen time was not.³¹

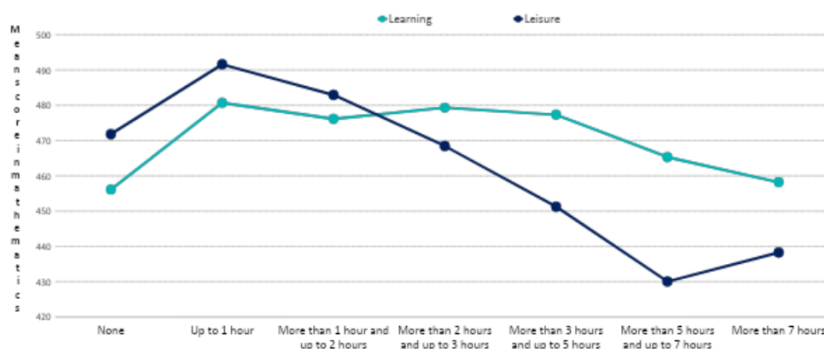


The age at which a child first has a smartphone is correlated with worse mental health outcomes. The younger the age of having a first smartphone, the worse the mental health that the young adult reports today.³² It has been shown that girls with high usage of the internet at 15 are more likely to have 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.³³

- **Academic attainment**

There is increasing real-life and experimental evidence that smartphones adversely affect the cognitive skills vital for academic success. A comprehensive study involving nearly 150,000 students from 16 countries has conclusively demonstrated that increased smartphone usage during study sessions significantly undermines learning and academic achievement.³⁴

Time spent on digital devices at school and mathematics performance [OECD, 2023]



Since the rise of smartphones and social media in 2012, PISA (Programme for International Student Assessment) scores have steadily declined, with lower maths scores directly correlating with heightened smartphone usage.^{35 36} This provides undeniable evidence to support what parents and teachers have long known: digital distractions are detrimental to the educational attainment of many children. The mere presence of a smartphone can siphon away limited cognitive resources, leaving fewer available for critical tasks, thus impairing cognitive performance. Experimental results illustrate that individuals achieve lower test scores when their phones are in the room than those who leave them elsewhere.^{37 38}

The physical impact of smartphone usage

Many physical issues are associated with excessive screen time, mainly smartphone usage, which is the predominant usage among children and young people.

- ***Physical changes in the brain***

Increasing research shows that problematic smartphone, internet and social media usage can physically change the brain in several ways. The impact of these changes in the long term for cognitive development and use is not known.

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 smartphone 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.³⁹

Moreover, young people with smartphone 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 smartphone addiction, and this may be associated with the down-regulation 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.⁴⁰

Internet addiction has also been shown to impact several neural networks that influence an adolescent's behaviour and development. There was a mix of increases/decreases in functional connectivity, which led to subsequent behavioural changes associated with the mechanisms relating to the areas of cognitive control, reward valuation, motor coordination, and the development of the adolescent brain.⁴¹

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 smartphone engagement.⁴² 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 smartphone 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 screen time on smart devices, particularly mobile phones, is linked to a 30% higher risk of developing myopia. When this screen time is combined with excessive computer use, the risk increases to approximately 80%.^{43 44} The prevalence of myopia in children has grown from 24% in 1990 to 36% in 2023, and this trend is expected to continue.⁴⁵

Prevalence and economic costs of eating disorders

Data from NHS Digital has indicated a substantial increase in eating disorders amongst children and young people of both sexes from 2017 to 2023.⁴⁶ Using the Developmental and Wellbeing Assessment (DAWBA) tool, it was found in 2023 that **75% of young women** and **50% of young men** between 16 and 25 reported eating disorder symptoms. The prevalence of eating disorder symptoms increased with age and BMI. Although the prevalence of eating disorders was already increasing before the COVID-19 pandemic, this caused a further surge, particularly in young women. For example, Trafford and colleagues found a 32-42% rise amongst young women aged 13-19 during the first two years of the pandemic in the UK.⁴⁷ The causes of this surge are unclear, but theories suggest a multitude of factors including stress, social disruption, weight-loss campaigns and an increase in social media use.⁴⁸

In 2020, the UK's social and economic costs related to eating disorders were estimated between £7.5-11.2 billion—a figure likely to have risen given the increasing prevalence post-pandemic. There is a significant treatment gap; in 2022–23, secondary care Children and Young People's Eating Disorder Services (CED-CYP) received 12,864 referrals equating to 3.6% of the estimated population with an eating disorder.⁴⁹ Given the peak age category of onset is between 12-25 across the eating disorders, early intervention and targeted prevention efforts for this age group have been recommended by experts in the field in order to address this high economic burden.⁵⁰

Social media, problematic smartphone usage and eating disorders

There is increasing evidence of the link between problematic smartphone usage, social media 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 dieting industry,^{51 52} and through targeted algorithms that show harmful content, including “toxic eating disorder” content.⁵³

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”*.⁵⁴

A separate, large longitudinal study of 9-14-year-olds showed that greater total screen time, social media use, and problematic screen use are associated with more eating disorder symptoms in early adolescence.⁵⁵ Each additional hour of total screen time and social media use was associated with higher odds of fear of weight gain, self-worth tied to weight, compensatory behaviours to prevent weight gain, binge eating, and distress with binge eating two years later. Both problematic social media and mobile phone use were associated with higher odds of all eating disorder symptoms. The association between problematic internet use and increased eating disorder symptoms and body dissatisfaction is not moderated by gender, i.e., it occurs in all genders.⁵⁶

Interestingly, one study found that increased eating disorder symptoms and body dissatisfaction were associated with total phone usage rather than Instagram usage specifically,⁵⁷ suggesting that phone usage besides social media exposure in itself contributes to eating disorder symptoms. It may be that there are indirect effects of smartphone usage on eating disorder symptoms, through, for example, sleep deprivation or lesser time socialising

“in-person”. Similarly, problematic phone usage in this population may also be related to the use of fitness trackers and dieting apps.

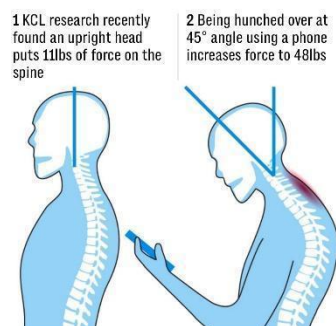
The pressure of social media, the constant recording of life and the comparative culture have led to increased body image concerns and cosmetic surgery. Heavy use of these platforms, especially amongst young women, increases the likelihood of girls aspiring to cosmetic surgery as a solution to perceived body image issues.⁵⁸ 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.⁵⁹

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 in relation to 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.⁶⁰ 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.

- **Obesity**

There is increasing evidence of a strong association between screen time, including smartphones, and childhood obesity.^{61 62 63}

- **Musculoskeletal issues**



Research among adults has shown that the human head weighs 5kg when upright. However, when it is at a 45-degree angle—the angle many smartphone users position their heads at—it is 48kg.⁶⁴ This is the equivalent of a seven-year-old child draped around the neck. This has led to an increase in adults with tension headaches, muscle spasms and bone spurs.

Children and young people who use smartphones 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.⁶⁵ The physical health issues that come with the overuse of smartphones include problems with the text neck, wrist, and back.⁶⁶

- ***Sleep issues***

Quality sleep is critical for a child's healthy development and its absence drives untoward behaviour, impaired learning and impedes overall wellness. Smartphones significantly impact sleep patterns and the ability to fall or stay asleep. This is true for all ages, from pre-schoolers to adolescents.^{67 68 69}

There is a strong and consistent association with bedtime media use and inadequate sleep quantity, poor quality, and excessive daytime sleepiness. Studies have also shown that children who had access to (but did not use) media devices at night had comparable sleep disturbance.⁷⁰

The Societal Issues of Smartphones

- **Sextortion and 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 smartphone have significantly added to this. The OSA does not have any mechanism to protect children from 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 14.⁷¹

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.⁷²

The rapid growth of access to a smartphone 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).⁷³

- **Youth crime, extremism and smartphone/social media use**

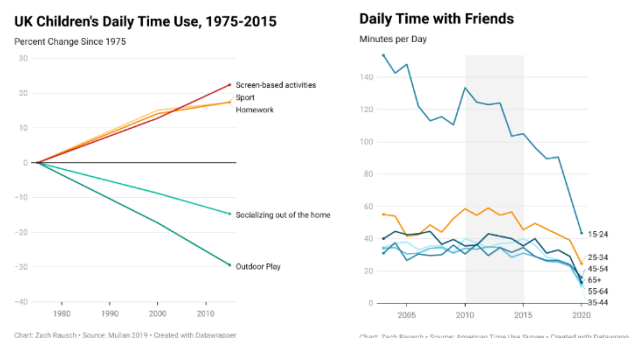
Nearly 40% of robberies in London were for mobile phones in 2023.⁷⁴ In 2020, 500 children were mugged a day in the UK - almost all for their mobile phones.⁷⁵

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. Smartphones 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.⁷⁶

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 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 kinds of things they are now exposed to. Social media, messaging apps, that connectivity, is really impacting homes, in communities and, as we have seen over the summer, on the streets.*” Over half of the 7,000 people referred to counter-terrorism police are children, including primary school age.⁷⁷

- **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 friends and in real-life situations. The increase in online time detracts from spending time with family and friends, which means fewer children are experiencing the critical building blocks to prepare them for adulthood.



A recent Education Select Committee report on screen time and children provided sobering data on smartphone addiction: even at ages 7 to 8, children are losing nearly 3 hours per day to their phones, i.e. outside of classroom time, by 15 to 16 that, increases to a staggering 5 hours per day.⁷⁸ Almost 40% of parents say their children miss family time due to time spent on their devices.⁷⁹

The report commented, “*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”.⁸⁰

* * *

Who are the Health Professionals for Safer Screens?

Health Professionals for Safer Screens (HPFSS) is a fast-growing group of health and healthcare professionals founded by Dr Becky Foljambe earlier this year. Dr Foljambe is an NHS GP and passionate campaigner for safer device use among children. Our members include Consultant Child Psychiatrists, Consultant Paediatricians, GPs, Nurses, Public Health Consultants, Social Workers, Dieticians, Speech and Language Therapists, Child Psychologists, and Psychotherapists. We work with leading academic researchers across the globe to understand the harms.

HPFSS’s position is that many health professionals in this country require no further evidence of the harmful impacts of these devices for children. The group is calling for the government to act based on the 'precautionary principle', to urgently introduce a regulatory framework for internet-enabled devices for children under 16 and to launch a public health campaign around these devices to better inform parents and protect children.

Dr Becky Foljambe says, “*Health professionals have stayed quiet for too long on this issue, and it is time to change this. If a device or its addictive use is being evidenced as causing harm to our children, then it is our job as doctors to act to prevent this and educate for the safer use and supply of these devices in the same way as we would for alcohol and smoking. This is a modern-day impediment to the healthy development of our young, especially the most vulnerable. It is now our moral responsibility to change things for the better.*”

¹ *Online Safety Act: explainer.* (2024). Crown Publishing Retrieved from <https://www.gov.uk/government/publications/online-safety-act-explainer/online-safety-act-explainer>

² *Five commitments that will transform children’s online safety and well-being.* (2024). Molly Rose Foundation. Retrieved 30/10 from <https://mollyrosefoundation.org/wp-content/uploads/2024/05/MRF-Manifesto.pdf>

³ 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>

⁴ Digital, N. (2023). *Mental Health of Children and Young People in England, 2023 - wave 4 follow up to the 2017.* 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#>

⁵ 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>

⁶ 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-minute-smhmdwxf2f>

⁷ 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>

⁸ ParentKind. (2024). *The National Parent Survey*.

⁹ M, B.-N., C, M., T, G., L, B., K, O., W, C., & 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/>

¹⁰ 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>

¹¹ Nelson, C. *Babies need humans, not screens*. Unicef. <https://www.unicef.org/parenting/child-development/babies-screen-time>

¹² OFCOM. *OFCOM Child Development and Online Behaviour*.

¹³ 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>

¹⁴ 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>

¹⁵ 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>

¹⁶ MA, B., M, C., J, R. C., L, S. P., G, G.-C., & C, F. (2024 May-Jun). Preschooler Screen Time During the Pandemic Is Prospectively Associated With Lower Achievement of Developmental Milestones - PubMed. *Journal of developmental and behavioral pediatrics : JDBP*, 45(3).

<https://doi.org/10.1097/DBP.0000000000001263>

¹⁷ Infant Cognitive Development and Screens. (2024). In C. a. S. I. o. D. M. a. C. Development (Ed.).

¹⁸ 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. (2022). Children's screen use and school readiness at 4-6 years: prospective cohort study. *BMC Public Health*, 22(1). <https://doi.org/10.1186/s12889-022-12629-8>

¹⁹ Screens, C. a. (2024). Infant Cognitive Development and Screens. In I. o. D. M. a. C. Development (Ed.).

²⁰ KF, H., B, A., K, S., & DS, B. (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>

²¹ Ra, C. K., Cho, J., Stone, M. D., Cerda, J. D. L., Goldenson, N. I., Moroney, E., Tung, I., Lee, S. S., & Leventhal, A. M. (2018/07/17). Digital Media Use and ADHD in Adolescents. *JAMA*, 320(3).

<https://doi.org/10.1001/jama.2018.8931>

²² M, K., R, K., R, S., S, H., S, O., T, O., Y, A., K, M., H, Y., & Z, Y. (04/01/2022). Association Between Screen Time Exposure in Children at 1 Year of Age and Autism Spectrum Disorder at 3 Years of Age: The Japan Environment and Children's Study - PubMed. *JAMA Pediatrics*, 176(4).

<https://doi.org/10.1001/jamapediatrics.2021.5778>

²³ 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. <https://doi.org/10.3389/frcha.2024.1276154>

²⁴ AC, L., MS, N., & DE, C. (08/01/2020). Association of Young Children's Use of Mobile Devices With Their Self-regulation - PubMed. *JAMA Pediatrics*, 174(8). <https://doi.org/10.1001/jamapediatrics.2020.0129>

²⁵ (OSG), O. o. t. S. G. (2023). *Social Media and Youth Mental Health: The U.S. Surgeon General's Advisory*. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/37721985/>, 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=PLwAWbIQiqJ0D2gn5UJBPSOzvLROyqSt7f>

²⁶ 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/>

-
- ²⁷ Nelson, C. *Babies need humans, not screens*. Unicef. <https://www.unicef.org/parenting/child-development/babies-screen-time>
- ²⁸ Digital, N. (2023). *Mental Health of Children and Young People in England, 2023 - wave 4 follow up to the 2017*. 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#>
- ²⁹ Bye, A., Carter, B., Leightley, D., Trevillion, K., Liakata, M., Branthonne-Foster, S., Williamson, G., Zenasni, Z., & Dutta, R. (2023). Observational prospective study of social media, smartphone use and self-harm in a clinical sample of young people: study protocol. *BMJ Open*, *13*(2), e069748. <https://doi.org/10.1136/bmjopen-2022-069748>
- ³⁰ 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>
- ³¹ 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>
- ³² *Age of First Smartphone and Mental Health Outcomes*. (2023). S. Lab. <https://sapienlabs.org/wp-content/uploads/2023/05/Sapient-Labs-Age-of-First-Smartphone-and-Mental-Wellbeing-Outcomes.pdf>
- ³³ 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>
- ³⁴ 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>
- ³⁵ Development, O. f. E. C.-o. a. (2023). *Learning time and disciplinary climate*. <https://www.oecd.org/en/topics/sub-issues/learning-time-and-disciplinary-climate.html>
- ³⁶ Skills, O.-D. f. E. a. (2023). *Programme for International Student Assessment*. <https://www.oecd.org/en/about/programmes/pisa.html>
- ³⁷ 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>
- ³⁸ 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>
- ³⁹ 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>
- ⁴⁰ 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>
- ⁴¹ Chang, M. L. Y., & Lee, I. O. (4 Jun 2024). Functional connectivity changes in the brain of adolescents with internet addiction: A systematic literature review of imaging studies. *PLOS Mental Health*, *1*(1). <https://doi.org/10.1371/journal.pmen.0000022>
- ⁴² 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>
- ⁴³ 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](https://doi.org/10.1016/S2589-7500(21)00135-7)
- ⁴⁴ University, A. R. (2021, 7/10/2021). *Screen time linked to risk of myopia in young people* <https://www.aru.ac.uk/news/screen-time-linked-to-risk-of-myopia-in-young-people>
- ⁴⁵ 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>

⁴⁶ Digital, N. (2023). *Mental Health of Children and Young People in England, 2023 - wave 4 follow up to the 2017*. 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#>

⁴⁷ 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](https://doi.org/10.1016/s2352-4642(23)00126-8)

⁴⁸ RW, G., SM, G., H, W., K, O., B, A., A, M., T, N., H, M., CM, P., H, W., LM, T., R, G., & CM, B. (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>

⁴⁹ Benchmarking, N. (2023). *NHS Benchmarking annual benchmarking results 2022/23 for Adults and CYP*. Retrieved from <https://www.nhsbenchmarking.nhs.uk/news/the-2022-23-work-programme-report>

⁵⁰ Group, F. a. E. D. W. (2024). *Closing the Gap: Required Actions to Address the Unmet Need in Eating Disorder Prevention and Treatment in the UK*. R. C. o. Psychiatrists.

⁵¹ G, J.-M., R, E. Z., A, G.-C., & R, R.-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>

⁵² 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>

⁵³ 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>

⁵⁴ 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>

⁵⁵ J, C., KT, G., A, T., AAA, A.-S., DB, J., RF, R., J, H., FC, B., & JM, N. (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>

⁵⁶ K, I., C, T., L, H., K, B., C, L., NA, F., O, C., SR, C., A, R.-U., & K, C. (2021 Jun). Problematic usage of the internet and eating disorder and related psychopathology: A multifaceted, systematic review and meta-analysis - PubMed. *Neuroscience and biobehavioral reviews*, 125. <https://doi.org/10.1016/j.neubiorev.2021.03.005>

⁵⁷ 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>

⁵⁸ 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>

⁵⁹ 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>

⁶⁰ 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>

⁶¹ 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>

-
- ⁶²P, H., G, S., E, S., MA, F., & S, A. (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>
- ⁶³ 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>
- ⁶⁴ Donnelly, L., & Hagan, P. (2024, 19.9.2024). The surprising cure 'tech neck' sufferers are embracing. *The Telegraph*. <https://www.telegraph.co.uk/news/2024/09/15/rise-in-patients-seeking-botox-to-cure-tech-neck-devices/>
- 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. *Int J Environ Res Public Health*, 19(17). <https://doi.org/10.3390/ijerph191710530>
- ⁶⁶ 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>
- ⁶⁷ 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>
- ⁶⁸ C, F., ML, A., E, H., G, G.-C., F, B., & M, A. (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>
- ⁶⁹ JM, N., G, S., JH, Y., N, S., O, K., KT, G., A, T., DB, J., & FC, B. (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>
- ⁷⁰ 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>
- ⁷¹ 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/>
- ⁷² Police, A. a. S. (2024). *Child self-generated indecent imagery*. Retrieved from <https://www.avonandsomerset.police.uk/crime-prevention-advice/sexting/>
- ⁷³ Foundation, I. W. (2024). *Annual Report*. <https://www.iwf.org.uk/annual-report-2023/trends-and-data/self-generated-child-sex-abuse/>
- ⁷⁴ 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>
- ⁷⁵ 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/>
- ⁷⁶ Unseen. (2024). *#LikestoLines: Protect your child from county lines online exploitation*. <https://www.unseenuk.org/likes-to-lines-county-lines-online-exploitation/>
- ⁷⁷ 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/>
- ⁷⁸ Committee, H. o. C. E. (2024). *Screen time: impacts on education and wellbeing*. Retrieved from <https://committees.parliament.uk/publications/45128/documents/223543/default/>
- ⁷⁹ ParentKind. (2024). *The National Parent Survey*.
- ⁸⁰ Committee, H. o. C. E. (2024). *Screen time: impacts on education and wellbeing*. Retrieved from <https://committees.parliament.uk/publications/45128/documents/223543/default/>