European Commission

Minors' health and social media: an interdisciplinary scientific perspective

European Centre for Algorithmic Transparency roundtables

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Contents

Abstract

Protecting minors online is one of the key pillars of the DSA, which contains an obligation for all online platforms to provide a high level of privacy, safety and security for minors using their services. The European Centre for Algorithmic Transparency (ECAT), which is part of the European Commission's Joint Research Centre, supports the implementation of the DSA with scientific expertise and evidence. ECAT hosted two roundtables in the autumn of 2024 with experts on topics ranging from eye health and sleep to body image and self-harm. The discussions focused on reviewing the scientific evidence relating to online platforms, and providing some recommendations for parents, educators and platforms. The present report summarises the discussions, split into two main themes: the impact of social media use and screen time on the **mental health** and **physical health** of minors.

1 Introduction

The Digital Services Act (DSA) is the EU's landmark rulebook for digital services acting as intermediaries by connecting consumers with goods, services and content. This includes online platforms for content-sharing, social networks, marketplaces, app stores, and online travel and accommodation platforms. The aim of the DSA is to make the online environment safer, fairer and more transparent, and it started applying in full in February 2024.

Protecting minors online is one of the key pillars of the DSA, which contains an obligation for all online platforms to provide a high level of privacy, safety and security for minors using their services. In addition, very large online platforms and search engines have an obligation to assess systemic risks that arise from the design, features, and use of their services[1]. This includes any risks of actual or foreseeable negative effects to the rights of the child, and the protection of minors. Critically, they also need to assess risks to the physical and mental well-being of users, of which children are a particularly vulnerable group. Once such risks are identified, these platforms must put in place effective mitigation measures, tailored to the specific risks.

Enforcing the obligations related to the protection of minors is a priority for the European Commission, as highlighted by the Executive Vice President for Tech Sovereignty, Security and Democracy, Henna Virkkunen, in her confirmation hearing on 12th November 2024. She called on all market players to "take their responsibilities and to make sure that the online world for minors is safe and helpful, instead of harming them." (European Parliament, 2024)

To implement this priority effectively, it is essential to understand how the use of digital devices and platforms affect children, and how platforms can mitigate risks of harm while giving children access to the potential benefits of participating in the online world.

The European Centre for Algorithmic Transparency (ECAT), which is part of the European Commission's Joint Research Centre, supports the implementation of the DSA with scientific expertise and evidence, including on the topic of the protection of minors online. ECAT already published an umbrella review on adolescent and mental health. It found that the impact of social media use on adolescents depends on personal characteristics, usage type and platform design (Sala et al., 2024). To follow up on this topic, the European Commission hosted two roundtables in the autumn of 2024 with experts on topics ranging from eye health and sleep to body image and self-harm. The discussions focused on reviewing the scientific evidence relating to online platforms, and providing some recommendations for parents, educators and platforms. The present report summarises the discussions, split into two main themes: the impact of social media use and screen time on the **mental health** and **physical health** of minors. The references and contents of the discussions have been provided by the experts themselves.

[1] Very large online platforms (VLOPs) and search engines (VLOSEs) are defined as those with over 45 million monthly users in the EU. A full list of designated platforms is available on the Commission website: https://digital-strategy.ec.europa.eu/en/policies/list-designated-vlops-and-vloses

2 Mental health

Across Europe, the time children spend online has increased significantly since 2010. The average time spent online is about 3 hours per day for children between 9 and 15 years old (Smahel et al., 2020). Accordingly, the impact on their mental health has become a core focus of public discussion. Pinpointing the source of harms and benefits, as well as determining any causal relationships between online activities and mental health is arduous. Fortunately, the research body on the topic is already significant and growing, though some challenges remain. Indeed, mental health is a complex concept that has been defined differently across the scientific literature.

At the roundtables, scientists discussed the links between social media use and mental health and provided recommendations to keep young people safe and support them in their ability to flourish online. Below you can find summaries of the discussion relating to depression and anxiety, self-harm, body image and eating disorders, as well as problematic social media use.

2.1 General considerations

Contributor: Dr Laura Vandenbosh

Screen time does not have only good or bad effects. The impact varies widely depending on the social media activity, the time of use and the individual profile of each user. Types of uses and their impact in different contexts need to be distinguished. This was highlighted by several umbrella reviews, e.g. Appel et al., 2020, Meier & Reinecke, 2021, and Valkenburg et al., 2022.

Positive social media uses refer to interactions that benefit users. Recently, literature on positive social media uses has particularly referred to the concept of flourishing, referring to those users who engage on social media for "cconnectedness, civil participation, positive social comparison, authentic self-presentation, and self-control" (Rosič et al., 2022). For instance, research has found that publishing authentic posts is linked to positive well-being (Kreling et al., 2022). Similarly, exposure to non-idealised content has been linked to positive outcomes such as inclusive views on beauty (de Lenne et al., 2022). One of the most documented positive social media uses is employing it to connect with friends and heighten users' social capital (Appel et al., 2020).

Negative social media uses refer to practices linked to potential harm for users. For instance, the algorithmic driven emphasis on idealised appearance images on visual platforms such as Instagram has consistently been linked to body dissatisfaction for users (Vandenbosch et al., 2022). Also comparing oneself to the idealised lives peers are living online may trigger performance pressure in some users (Devos et al., 2023). Online bullying, forwarding of sexting and other anti-social acts have further been identified as negative social media uses (Maes et al., 2021; Pabian & Vandebosch, 2016).

When applying this knowledge, one needs to keep in mind that media always mediate society. As social media use takes place in a global context, interplay with societal expectations and the overall society remains relevant in the discussion on how to improve users' well-being. In addition, scholars and policymakers need to pay attention to how impacts may vary depending on the length of exposure, the day of the week or even the time of year (Vandenbosch et al., 2025).

2.2 Depression and anxiety

Contributor: Dr Michelle O'Reilly

Reviews of the evidence show mixed results on the relationship between children's social media use and anxiety and depression (Keles et al., 2020; Valkenburg et al., 2022; Vidal et al., 2020). When asked directly, children and adolescents report that social media can make them feel depressed or anxious (not in a clinical sense), and the ways in which children and adolescents use and interact with social media, and their behaviour online can influence their own mood, but also the emotional reactions of their peers, particularly when empathy is mediated by a screen (O'Reilly et al., 2018; O'Reilly, Dogra, et al., 2021). Furthermore, evidence shows that the relationship between social media and anxiety and depression is complicated by mediating factors including the role of parents, sleep, cyberbullying, and digital literacy (Viner et al., 2019).

Indeed, cyberbullying specifically has been shown to be a significant factor leading to low mood and anxiety (Doumas & Midgett, 2021; Englander, 2021). Other contributors include doomscrolling, which can increase anxiety (Rodrigues, 2022) and FoMO (Fear of Missing Out), which can lead to poor sleep, as risk factors for poor mental health (Woods & Scott, 2016). Children who are already vulnerable (e.g. children with a disability or from a low socio-economic background) are more at risk (El Asam & Katz, 2018; Livingstone & Palmer, 2012). Those children who already have anxiety may use social media to manage social relationships but may have worse experiences (O'Day & Heimberg, 2021). Hence, children with less protective factors face greater challenges in staying safe and well online (O'Reilly, Dogra et al., 2021).

Nonetheless, because the evidence is mixed, caution should be exercised not to limit children's digital opportunities and digital rights (Livingstone, 2019). While protecting children's wellbeing and safety is paramount, there are some positive aspects to social media use (O'Reilly, 2020), especially if children are taught to care for others online (e.g., through a digital ethics of care) (O'Reilly et al., 2024; O'Reilly, Levine, et al., 2021).

2.3 Self-harm

Contributor: Lotte Rubæk MSc

Content related to self-harm has been available online for many years, starting with hyper-specialised forums emerging in the 2000s. With the popularisation of social media, secret networks romanticising self-destructive behaviour have grown more common. People who self-harm usually do so to express their emotions on their bodies. Social media appeals to them to document this behaviour, replacing the language and words they lack to express their feelings (Møhl & Rubæk, 2020; Rubæk & Møhl, in press a, in press b).

For example, due to social media recommender system algorithms, a young person may now be exposed to self-harm content on TikTok within 2.6 minutes of scrolling (Center for Countering Digital Hate, 2022). Upon interaction, the entire feed can be filled with this type of content within 15 minutes (Digitalt Ansvar, 2023). Looking to the near future, a news report has been made of chatbots that can advise on self-injury methods and how to avoid being discovered (Bugge, 2023). It has also been reported by a recent investigation by the non-profit Digitalt Ansvar (2024) that Instagram moderation of self-harm content could be improved. The authors created a network of 10 adults' and minors' profiles and made them share more or less explicit self-harm content. In total, 85 posts were shared but after a week, not a single one was removed. Even blatantly self-harm related content shared by both 13-year-old and adult profiles, clearly showing blood, razor blades, or self-harm encouragement,

was not removed. The authors then tried to use artificial intelligence to automatically identify self-harm in the content they created: 38 percent of self-harm images and 88 percent of those categorized as the most severe were correctly identified as self-harm. In addition, Instagram's recommendation system suggested that 13-year-old users become friends with everyone in a self-harm group if the 13-year-old user became friends with one user from the group. This recommendation algorithm may therefore contribute to forming and spreading networks where self-harm material is shared.

According to Lee et al. (2022) approximately one third of self-injuring young people post self-harm content online. Exposure to self-injury content increases the risk of a user self-injuring with the same method within the month (Zhu et al., 2016). Homogenous groups of people who self-harm can lead to the normalisation of the behaviour, especially since self-injuring young people tend to have fewer offline friends (Børns Vilkår & TrygFonden, 2021). Participation in those groups can lead to competition and faster escalation of the behaviour, up to suicide in some instances (Branley & Covey, 2017; Harris et al., 2017). Self-injury content shared online can also inspire young people to try new self-harming methods and push them to go further (Brown et al., 2020; Hetrick et al., 2020; Jacob et al., 2017; Susi et al., 2023).

Still, online communities for young people at risk of self-harm are not necessarily negative. Social media allows them to get help from others at any moment. The anonymity encourages them to speak more freely, and those connections can make them feel understood and accepted the way they are (Eichenberg & Schott, 2017). But even this care is a two-sided coin: since users get support when they post a self-harm picture, it can give the impression that support is only available when they self-harm (Brennan et al., 2022).

2.4 Body image and eating disorders

Contributors: Dr Ilaria Cataldo, Lotte Rubæk MSc and Dr Laura Vandenbosch

Among the concerns often raised about social media is the extent to which it creates unrealistic expectations for many areas of life, including beauty standards (Mills et al., 2018; Scully et al., 2023). Moreover, social media abound with appearance advice in terms of make-up, hair styling, fashion, skin care and even plastic surgery (Devos et al., 2022). Often such practices occur with popular influencers that build strong and impactful parasocial relationships with adolescents (Devos et al., 2022). The sexualized content that these role models distribute can be particularly harmful to children and young people.

"Fitspiration" is another example of a popular appearance modification behaviour on social media. It refers to a trend of people posting pictures of their whole body, or part of it, which often exclude the face (Easton et al., 2018). The goal is usually to document changes and improve one's body image. However, it raises concerns about the physical self-perception of those frequently exposed to social media posts of heavily beautified body pictures.

This is particularly worrying when it comes to children under 10 as they are in the process of building their own (online) identity. They use social media to experiment, test their environment and get feedback from peers and adults. Specifically, the feedback pre-adolescents seek is the confirmation that they are *likable*. Idealisation is a typical mechanism in adolescence since its first stages and serves as a tool to meet limits and recalibrate both reality and self-perception (van der Merwe, 2017). However, the portrayal of perfect bodies has become the new normal in the current social media context. The social comparison to those idealised images is associated with body dissatisfaction and body disregard, which increase the risks of depression and self-harm, as children and adolescents,

especially the most vulnerable, might feel they have failed in becoming likable and interesting (Bozzola et al., 2022)

An increase in anorexia is observed around the age of 10, both in boys and girls. In fact, *fitspiration* has been linked to a set of unfavourable consequences, like eating disturbances, misuse of substances and performance-enhancing supplements, exercise addiction and appearance-related anxiety (Cataldo et al., 2021). Apart from being exposed to appearance content, adolescents also produce appearance idealised content (Schreurs & Vandenbosch, 2022). Research has revealed that the use of face filters and body filters links to adolescents' acceptance of plastic surgery (Maes & de Lenne, 2022).

There is scientific evidence supporting a cross-sectional relationship between posting or seeing picture perfect content on social media and users' perfectionism, narcissism, body dissatisfaction (Vanhoffelen et al., 2023, 2024) and self-esteem (Schreurs & Vandenbosch, 2022). Research cannot confirm the causality of these links in longitudinal studies over a long time period (Vanhoffelen et al., 2023, 2024). Short-period studies such as ESM (Experience Sampling Method), seem to hint at more stable short-period effects (de Valle et al., 2021; Devos, Karsay, et al., 2023b; Devos, Schreurs, et al., 2023).

For instance, looking at picture perfect posts can under certain circumstances elicit performance pressure while looking at idealised pictures can temporarily cause body dissatisfaction (Devos et al., 2024; Vandenbosch et al., 2022). Depending on the context, a similar post can elicit a different feeling within a viewer. Every teenager and child are unique, they live in different environments and evolve in unique ways (Valkenburg, 2022), therefore, some children or adolescents are more affected than others (Kalmus et al., 2024). Finally, body positive content that promotes a broader conceptualization of beauty and represent non-idealized models on social media has been shown to link to adolescents' pro-social body attitudes (Kvardova et al., 2025).

2.5 Problematic social media use

Contributors: Dr Christian Montag and Dr Samson Nivins

The transition from childhood to adolescence is a crucial moment, as brain structures undergo drastic changes, especially in the prefrontal area, associated with processing environmental cues and integrating emotional contents to plan behavioural responses (Achterberg et al., 2022; Maza et al., 2023).

How and how much children use social media are affected by factors such as age, parental income, gender and mother's education. Children whose parents have a low income tend to spend more time on social media, and those whose mothers have a high education tend to spend less time. Overall, girls tend to spend more time online than boys (Twenge & Martin, 2020; You et al., 2023).

A heavy use of social media can potentially lead to problematic social media use. Though the ICD-11 (World Health Organization, 2019) does not officially recognise this specific disorder, it could be studied through the existing gaming/ gambling disorder framework. In case the translation works, the common symptoms of gaming disorder are: putting gaming in the centre of one's life beyond all other things, being unable to control the gaming behaviour, continuing gaming despite the problems it creates, and functional impairment (Montag, Schivinski, et al., 2021; Pontes et al., 2021).

A study using the ICD-11 gaming and gambling addiction assessment on excessive social media use shows promising results towards applying those previous and well used frameworks to the addictive

facet of problematic social media use (Montag & Markett, 2024), but this should be seen just as a starting point.

The term problematic social media use is in itself not unproblematic, because it is not clear what is studied: addiction to social media, cyberbullying, eating disorders, loss of privacy, social upward comparison or other problematic outcomes (Montag, Demetrovics, et al., 2024).

However, social media is not the sole cause of correlated mental health issues: mental health conditions are influenced by many factors. Further, it is likely that the relationship between social media usage and the mental health of children might be bi-directional. For instance, negative emotions might be reduced by using social media – and then excessive behaviour might result in more problems due to social withdrawal or other problems arising from excessive social media use.

2.6 Recommendations

From the discussions and presentations on the impact of online platforms on the mental health of minors, several recommendations emerged. These recommendations do not necessarily reflect a consensus among the participating experts but provide valuable ideas for further exploration in the search for ways to protect children and young people online.

To mitigate the risks associated with online platforms, parents, educators, policymakers and tech companies must work together. They must acknowledge that there are broader systemic and structural challenges at play, and that minors are not a homogeneous group that can be treated as such.

One key strategy for mitigating mental health risks is to increase children's digital literacy skills (Schreurs & Vandenbosch, 2021). Children often overestimate their ability to navigate the online space safely and identify advertising and fake news, while underestimating the potential psychological effects of being online (Vanwynsberghe et al., 2024) However, a major obstacle is that parents and teachers are not well-equipped to deal with the rapidly changing tech landscape, including the increasing presence of artificial intelligence (Schreurs & Vandenbosch, 2024).

To address this challenge, tech companies can take several steps. They can use their expertise to develop technology that supports users' wellbeing, digital literacy, online safety and online flourishing, also limiting the use of elements of persuasive design known for promoting problematic online behaviours (e.g. infinite scrolling, the "like feature" or the "double tick" function) (Flayelle et al., 2023). They can also implement features that support digital empathy, such as prompts that encourage children to think critically before posting online. Moreover, algorithms can be curated to offer good "rabbit holes" instead of the negative ones (Hilbert et al., 2023).

Platforms can also make the internet safer for children by closely monitoring the types of content minors in particular are being exposed to. They could offer support in line with local media literacy organisations by priming youth to visit their resources when being exposed to child inappropriate content. Similarly, they can systematically identify which influencers in particular have minor audiences and monitor if child inappropriate content occurs in their posts. Lastly, they could provide schools with the tools and resources needed to promote digital skills and online safety for children.

In sum, tech companies can benefit from listening to children's voices during the design and development of their products. By putting children's best interests at the core of the design process, companies can promote their empowerment and responsibility in the use of digital products. They would also benefit from sharing data with researchers to deepen the understanding of the impact of

social media use on mental health and problematic social media use (Montag, Hegelich, et al., 2021; Montag, Schulz, et al., 2024).

In addition, several other key recommendations emerged for online platforms:

- Deploy robust age verification processes, to prevent users from accessing platforms if they do not meet the platform's or legal minimum age requirements.
- Deploy safer algorithms that exclude content such as unhealthy beauty practices or self-harm advice and promote positive contents such as body positivity content.
- Develop features that help young people identify, regulate and express their emotions.
- Test new applications with independent scientists before release to understand potential risks for children.
- Offer resources to parents and educators to help them understand signs of depression, anxiety, body dissatisfaction, and substance use.
- Be transparent about their algorithms, i.e. communicating on the characteristics of their training models, their databases and frameworks.

Finally, policymakers must be aware that laws and interventions can have unintended side effects. A well-designed test phase before a law/intervention implementation is warranted. Policymakers can also support research on these topics by providing more funding (Montag & Becker, 2024), including for large scale studies with European samples, as studies on the topic are more often carried out in the US with US samples. Another way to support research would be enforcing platforms' transparency obligations, including the accessibility of their data for researchers (Montag et al., 2025).

3 Physical health

The previous section highlighted the scientific evidence that links social media and mental health. However, screen time can also affect children's physical health.

As in the case with mental health, screen time does not have exclusively positive or negative effects for physical health. An example highlighted in the discussion was the finding that total screen time has a negative relationship with exercise, but using sports apps has a positive relationship with exercise. With the rise in daily screen time for children and adolescents following the COVID crisis, the impacts have been studied closer, and the results are giving us new insights.

In this section of the report, we summarise related discussions on vision, brain development, alcohol abuse and sleep.

3.1 Vision

Contributors: Dr Elena Bozzola and Dr Hanne-Mari Schiøtz Thorud

Following the COVID crisis and the rise of online classes for children, the impact of screens on children's vision has become more apparent and more important (Madigan et al., 2022; Trott et al., 2022).

When we focus on a screen, we involve 20 eye muscles, as well as muscles in the neck, shoulders and back to keep the eyes still. When this focus prolongs itself in time, it increases the tension in those muscles, increasing the risks of back pain and headaches (Mataftsi et al., 2023; Yue et al., 2023). It also increases the risk of digital eye strain, causing symptoms such as dry eyes, tearing eyes, blurred vision, double vision, eye redness, eye pain, neck-and-shoulder pain and headaches (Falkenberg et al., 2020; Seguí-Crespo et al., 2024). Together, these symptoms can be referred to as *computer vision syndrome (CVS)* or *digital eye strain (DES)*, and the risk increases with the amount of screen time, but also with un- or mal-corrected vision problems, text that is too small, low resolution and contrast, incorrect screen height and distance to the screen, and inadequate ambient lighting (American Optometric Association, 2013; Falkenberg et al., 2020; Mataftsi et al., 2023; Thorud et al., 2021, 2022, 2024)

Those risks are higher for children as many have undiagnosed vision disorders or had their eyes examined with lower quality tests (Bjørset et al., 2022; Bozzola et al., 2024; Falkenberg et al., 2019; Pirindhavellie et al., 2023; Wilson et al., 2022). The risks are relative to the time spent on screens (Falkenberg et al., 2020; Liu et al., 2019; Mataftsi et al., 2023; Thorud et al., 2022).

There is currently no strong evidence that links the amount of screen time and the development of myopia (near-sightedness) (Bozzola et al., 2024; Morgan et al., 2021; National Academies of Sciences, Engineering, and Medicine, 2024). However, there is considerable evidence that outdoor time may contribute to delaying the onset of myopia, and the prevailing consensus is that it is advantageous to promote increased outdoor time for children (Kido et al., 2024; Zhang & Deng, 2020).

3.2 Brain development

Contributors: Michaela Kent Msc. and Dr Samson Nivins

There has been a recent increase in brain imaging studies focused on the impact of high levels of overall screen time on brain development.

They suggest that it may affect the pre-frontal cortex, which regulates self-control, decision-making and impulse regulation (Achterberg et al., 2022; Maza et al., 2023). Adolescence is a critical development period for this area of the brain, and it is possible that screen time can modify the normal development trajectory (Chen et al., 2023; Maza et al., 2023; Nivins, Sauce, et al., 2024), though results in this area are mixed (Miller et al., 2023).

Other areas potentially impacted are the medial prefrontal cortex, the posterior temporal sulcus and the temporal parietal junction, which are responsible for social interactions. They process social cognition, including theory of mind, or understanding what another person is thinking or feeling (Achterberg et al., 2022).

Social media could also affect the amygdala that processes emotions and anxiety. Long-term exposure might lead to increased anxiety and even structural changes in the amygdala over time (He et al., 2023; Hmidan et al., 2023; Vannucci et al., 2020).

Social media can engage the reward system as well, by regulating the release of dopamine. This can lead to a feedback loop that encourages further use. As a result, the normal dopamine regulation might be disturbed (Maza et al., 2023).

Evidence suggests that the use of screen time in children under 6 can be detrimental to their development. Indeed, screen time could be associated with a lower general development in children between 3.5 and 5.5 years old (Linebarger et al., 2014), although parental involvement and social and economic factors also play a major role (Yang et al., 2024).

A heavy social media use (over 2.6 hours a day) in children could be associated with other long-term effects. Children who use social media heavily at age 9 tend to spend more time on them later, which might highlight their addictive effect (Nivins, Mooney, et al., 2024; Nivins, Sauce, et al., 2024). A heavy use could also be associated with early brain maturation (Nivins, Sauce, et al., 2024). This maturation is a natural stage of human development where the brain progressively transitions from its high evolution rate of childhood towards its slower, steadier evolution rate of adulthood. This early maturation in children who spend a lot of time on social media can happen between the ages of 12 and 15, which is the window for the apparition of many psychiatric disorders such as depression (McGrath et al., 2023).

Other imagery studies have showed that heavy social media use in children may affect the development of their cerebellum and reward system (Nivins, Sauce, et al., 2024). This last phenomenon could lead to depressive symptoms later in life (Phillips et al., 2015).

However, we need to be cautious when drawing conclusions. Most of those studies show only moderate effects on the brain. And those effects cannot be linked univocally to behavioural effects, nor can they show any kind of causality. Moreover, many of those studies have been run in a US context whereas it is known that different cultural contexts (different social norms, usages, rules, attitudes) shape the brain differently. Therefore, in this domain, results cannot be generalised at global scale.

3.3 Alcohol abuse

Contributor: Dr Kathleen Beullens

Over the past decade, significant research has been conducted studying the relationship between social media use and alcohol consumption (Curtis et al., 2018; Vannucci et al., 2020). This body of work has identified key mechanisms underlying this association, including the role of attitudes and social norms (Geusens & Beullens, 2018, 2021; Vanherle et al., 2023). Content analyses reveal that alcohol-related content is highly prevalent on social media and is typically presented in a positive context, although these portrayals differ across platforms and their specific features (Beullens & Schepers, 2013; Vanherle et al., 2023; Vranken et al., 2024). Empirical studies demonstrate that both exposure to and sharing of alcohol-related content are associated with increased alcohol consumption among adolescents (Geusens & Beullens, 2018, 2019, 2021; Vanherle et al., 2023). This relationship is bidirectional: greater exposure to such content, as well as sharing it, is linked to higher offline alcohol consumption, which in turn leads to further sharing of these behaviours on social media.

Individual differences play a moderating role in this association, with factors such as dispositional traits, social contexts, and developmental stages influencing the strength of the relationship. For instance, a daily diary study found that the association between social media use and alcohol consumption was significant only for adolescents below the legal drinking age of 16 in Belgium, but not for older adolescents (Vanherle et al., 2024). Additionally, family context was shown to buffer these effects, with more negative alcohol-related socialization from parents and peers attenuating the influence of alcohol-related social media exposure (Geusens & Beullens, 2019).

These findings underscore the complexity of the relationship between social media use and alcohol consumption, as the effects are not uniform across individuals. Social, developmental, and dispositional factors all contribute to variations in outcomes. Current efforts are focused on mapping these interactions comprehensively.

Future research priorities include addressing gaps such as the need for studies involving non-WEIRD (Western, Educated, Industrialized, Rich, Democratic) samples, examining the temporal dimensions over which effects occur (Vandenbosch et al., 2025), and exploring how different forms of social media content—such as positive alcohol depictions, advertising, and prevention messages—interact. These areas of inquiry are essential for advancing our understanding of the nuanced interplay between social media and adolescents' alcohol use.

3.4 Sleep

Contributors: Dr Virginie Sterpenich and Dr Lauren Hale

Sleep is essential for healthy development (Czeisler, 2015; Matricciani et al., 2019). It regulates emotion and well-being, consolidates memory, helps brain maturation and produces growth hormone (Short et al., 2018). Evidence shows that sleep deprivation affects appetite and increases risk-taking behaviour (Gruber et al., 2012; Rossa et al., 2014).

Children and adolescents need more sleep than adults but 70% of US teens do not meet this sleep need (Wheaton & Claussen, 2021). In Europe, the percentage of adolescents from 10 to 16 years old meeting sleep recommendations on school days ranged from 32% in Poland to 86.3% in Flemish Belgium (Gariepy et al., 2020). Out of the many potential causes, screens play a part. Over 500 empirical papers, including both observational and experimental studies, support the negative link between screen time and sleep (Hale & Guan, 2015; Hartstein et al., 2024). The time spent on screens

often replace part of the sleeping time (Hale & Guan, 2015). It also induces psychological stimulation and inhibit the production of sleep-promoting hormones, which makes falling asleep take longer (Hale & Guan, 2015; Reichenberger, Master, et al., 2024). This phenomenon is heightened with screens and activities that are more active in nature, for example playing a video game vs watching TV (Hartstein et al., 2024; Reichenberger, Master, et al., 2024; Yland et al., 2015). It is stronger for adolescents who reported greater non-academic daily digital technology use in the evening relative to their peers (Burnell et al., 2022).

Regardless of what children use the device for, the blue light of screens has a negative effect on their sleep and melatonin production (Chang et al., 2015). In a study on 203 US adolescents aged 13-17, over 60% were on their phone between midnight and 6 am (Radesky et al., 2023). Using an interactive screen at night leads to later sleep onset (Reichenberger, Hartstein, et al., 2024).

Current consensus supports the idea that both the amount of daily screen use and night-time smartphone use impact sleep, even though night-time use has a greater impact (Hartstein et al., 2024).

Based on a study by the Morphée Network in France in 2020 on 2513 adolescents, 22.3% of children and adolescents use their phones before going to bed. 26.7% of them use their devices at night, 33.6% are awakened by notifications, 26% plan an alarm clock to check their phone during the night and 15% send texts in the middle of the night (Zayoud & Matulonga Diakiese, 2022).

When children are under 5 years old, parents have a lot of control over their use of screens, which lessens the impact of screens at night. For children aged 6 to 12 years old, there is a significant effect of screens on sleep. They take more time falling asleep and have a lower-quality sleep. For adolescents of 13 to 15 years old, screens induce problems falling asleep, their sleep quality decreases with the use of social networks, and they experience pre-sleep cognitive arousal (Lund et al., 2021). This screen-related lack of sleep is the main factor connecting screens and depressive symptoms. A 2019 study found that increased digital media use was consistently associated with shorter sleep duration and more insomnia symptoms. These sleep-related variables mediated the association between digital media use and greater depressive symptoms (Li et al., 2019). Those results suggest that interventions focused on improving children's sleep may be effective to mitigate this effect.

Two different behaviours are involved with the use of screens in the evening: bedtime procrastination (delaying the time to go to bed) and while-in-bed procrastination (delaying the time to sleep while using a screen in bed) (Bauducco et al., 2024; Magalhães et al., 2020).

Evidence from intervention studies that reduce screen time before bed support the hypothesis that screen time delays sleep and reduces sleep duration. A decreased screen time after 9pm diminishes the daily screen time by 61 minutes and improves sleep duration by 19 minutes. As a result, vigilance and efficiency increase during the following day (Perrault et al., 2019). Another study asked teens (age 14-18) to limit phone use one hour before bed for one week. During this week of restriction compared to baseline phone use, teens turned their lights off 17 minutes earlier and slept 21 minutes longer (Bartel et al., 2019). Finally, parental control appears to be effective, as adolescents aged 13 to 15 who are required by their parents to keep their smartphones out of their rooms at night sleep more than 30 minutes longer than those who keep their phones in their rooms (Mammeri et al., in review).

3.5 Recommendations

Among the recommendations that emerged on mitigating risks of excessive screen time on the physical health of children and adolescents were:

- Children and young people need to be effectively informed of the risks of screen use on their vision, and be encouraged to take regular breaks, as well as get regular check-ups with optometrists, paediatricians and ophthalmologists.
- Platform age verifications need to protect younger users better, but we also need further studies to avoid arbitrary age cut-off points.
- Platform content moderation for children should be improved and restrict marketing and influencers that promote unhealthy products such as alcohol.
- To improve sleep, the most efficient rule is forbidding phones in bedrooms or/and the use of phones at night.
- We need to conduct more longitudinal research to uncover the time intervals during which social media effects develop, the difference between long- and short-term effects, the role of children's developmental stages and the role of their potential vulnerabilities.
- Companies should collaborate with researchers and provide access to data to enable such research.

4. Conclusions

The impact of screen time and social media use on children's mental and physical health is complex and multifaceted. There is significant scientific evidence linking them to the mental and physical health of children and teenagers. However, this link is not always negative, and children can also benefit from screen time, depending on the use, environment, and personal characteristics.

Experts agree that there is no single solution to mitigate the risks while preserving the benefits. They highlight the need for stakeholders (children, parents, educators, researchers, regulators and tech companies) to work together to address the challenges posed by social media use and screen time, and to develop strategies that consider the diverse needs and experiences of children, who are not a homogenous group. In this task, tech companies and platforms have their share of responsibilities and duties to build a better and safer internet for children. Experts provided recommendations that span from technical features such as screen time reminders or content moderation, to the development of supporting material for developing online resilience skills.

5. Contributors

Dr Kathleen Beullens is vice dean of research of the Faculty of Social Sciences (KU Leuven, Belgium) and professor at the Media Psychology Lab. Her research focuses on the (longitudinal) effects of different media uses (e.g., television, social media, video games, mobile phones) on children's and adolescents' psychosocial well-being. As a researcher in media psychology, she aims to unravel the processes through which various forms of (social) media use are associated with health and risk-related outcomes (including alcohol use, smoking). In addition, she examines the context of children's ubiquitous screen media use and its impact on peer and parental relations. Her work has so far resulted in more than 80 international peer-reviewed articles, book chapters, and conference presentations, and received multiple awards. On top of her research activities, Beullens teaches multiple courses in the bachelor and Master of Communication Sciences at KU Leuven.

Dr Elena Bozzola is a paediatrician. Following her initial training at the University of Pavia, she completed her Masters in paediatrics and had an observership at the Miami Children's Hospital Infectious Disease Unit, USA. In addition to her role as a paediatrician, Elena Bozzola is also a Councillor of the Italian Society of Paediatrics. She is the author or co-author of more than 170 publications and serves as associate/ guest editor of several scientific journals.

Ilaria Cataldo is a post-doctoral fellow at the University of Bologna, Italy; her research interests concern the association between online behavioral trends and offline consequences for mental health. Her current research focuses on the role of cognitive domains, like flexibility, in mediating the relationship between mental health in young adults and their use of technological devices.

Lauren Hale, PhD is a Professor of Family, Population, and Preventive Medicine, Program in Public Health, at Stony Brook University's Renaissance School of Medicine. She studies the social patterning of sleep health and how it contributes to inequalities in health and well-being with current or previous funding from NICHD, NIDDK, NHLBI, NIA, and the Stephen and Pam Della Pietra Family Foundation. Dr. Hale is interested in sleep health equity, policies related to sleep health (i.e. high school start time, daylight saving time), and behavioral modifications (i.e. reducing evening screen use, increasing physical activity) for improving sleep health at the individual and population level. Dr. Hale has over 175 peer-reviewed journal articles. Dr. Hale recently served on the National Sleep Foundation's Board of Directors (including as Chair and Vice Chair) and is the founding Editor-in-Chief of the journal Sleep Health. She also serves on the Scientific Advisory Panel of the Pajama Program and Children and Screens: Institute of Digital Media and Child Development.

Michaela Kent is a PhD candidate in the Neuroscience Program at Western University in London, Ontario, Canada. Michaela has worked on neuroimaging projects to explore aspects of social cognition and social interactions. Her current research involves studying the developing brain in more naturalistic settings using optical neuroimaging and behavioural measures.

Samson Nivins is a post-doctoral fellow at Karolinska Institutet, Sweden, with a special interest towards integrating and understanding the role of prenatal and biological risk factors in neuropsychiatric disorders in children. He earned his Ph.D. from the University of Auckland and completed master's research at Karolinska Institutet. With over 17 publications in leading journals like JAMA, he has received awards including the Student Leadership Award (2022) and Best Poster Presentation (2021).

Dr Christian Montag is, as of April 2025, Distinguished Professor for Cognitive and Brain Sciences at University of Macau, Macau, China. He works at the intersection of psychology, neuroscience and computer science. He investigates how digitalization influences our brain and psychological processes.

Dr Michelle O'Reilly (BSc [hons], MSc, MA, PhD, PGCAPHE, SFHEA, C.Psychol, AFBPsS) is an Associate Professor of Communication in Mental Health at the University of Leicester and a Research Consultant and Quality Improvement Advisor for Leicestershire Partnership NHS Trust (UK). Michelle is also a Chartered Psychologist in Health and a visiting scholar at Tavistock and Portman NHS Foundation Trust. Michelle has research interests in mental health and social media, self-harm and suicide, neurodevelopmental conditions, and child mental health services, such as mental health assessments and family therapy.

Lotte Rubæk holds a MSc in Psychology from the University of Copenhagen, is an authorised psychologist and a specialist in psychotherapy. She is leading a self-injury team in Child and Adolescent Mental Health Services (CAMHS) and she is the overall leader of a clinical academic group for self-injury in the Capital Region of Denmark. She has been a member of Meta's SSI global expert group for a number of years and raised criticism when she left it. Throughout her career, Lotte has had non-suicidal self-injury (NSSI) as her primary focus area, and she has worked clinically with self-injuring and eating disordered adolescents since graduating in 2007. Lotte has published two books and has a third on the way and several articles and book chapters about NSSI - including two chapters for the Oxford Handbook of NSSI. Lotte gives lectures throughout the country on self-injury and social media, among other things.

Hanne-Mari Schiøtz Thorud is a physiologist and professor at the National Centre for Optics, Vision and Eye Care at the University of South-Eastern Norway. Her expertise lies in visual ergonomics, focusing on the interactions between the visual system, visual demands, and physical health. Her research explores how screen use impacts physical health, including eyestrain, musculoskeletal pain, and headaches, in both children and adults.

Dr Virginie Sterpenich is a Senior Researcher in the Department of Neuroscience at the University of Geneva. She is also responsible for the Sleep Lab at Campus Biotech in Geneva. Her research focuses on the role of sleep in memory consolidation and emotional regulation. She is particularly interested in the sleep of children and adolescents. Through interventional studies, she has worked to improve adolescent sleep by addressing factors such as evening screen use, which negatively impacts their sleep. Dr Sterpenich has received several grants to support her research and is the author or co-author of more than 55 publications on sleep.

Dr Laura Vandenbosch (associate professor, director Media Psychology Lab, KU Leuven) studies the media/well-being link among young media users. Her recent research focused on unraveling the greater complexities that surround digital media effects by using data linkage, ESM, longitudinal and qualitative research methods (see, for instance, her ERC starting grant funded MIMIc project on how youth's mimicking of digital media ideals pressure their well-being). In 2024, she was included in Stanford's global list of top 2 % scientists in the area of a media and communication. Overall, her work has been honored with more than 17 awards including multiple dissertation awards, best paper award and early career prizes from European (NeFCA, DGPuK, KU Leuven) and international (ICA) organizations.

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