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The impact of digital experiences on adolescents with mental health vulnerabilities

A multimethod pilot study

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Key findings

In public, professional and academic debates, a link is often made between a rise in rates of mental health problems experienced by adolescents and their increasing use of the internet. This report describes the first pilot stage of a research project collaboration between King's College London (KCL) and the London School of Economics and Political Science (LSE) exploring the *Dynamic Interplay of Online Risk and Resilience in Adolescence* (DIORA). DIORA focuses on internet use and its relationship to mental health in adolescents made vulnerable by pre-existing mental health problems.

In this report, we begin to explore this relationship with the aim of establishing an initial understanding of the key issues to help focus our future studies. We draw on a scoping review of relevant published evidence with new insights from pilot focus groups with adolescents and young people with experiences of self-harm, eating disorders and attention deficit hyperactivity disorder (ADHD) as well as interviews with relevant experts.

We found that (i) to understand adolescents' mental health in relation to the digital environment, we need to consider offline factors, and (ii) that internet use is associated with both harm and benefits, as far as mental health is concerned.

More specifically, we addressed three research questions:

RQ1: Can adolescents' internet use increase the risk of eating disorders, self-harm and overall poor mental health?

Findings suggest that:

- Children with experience of eating disorders or self-harm are more likely than their peers to seek out or be exposed to online content relating to their mental health problems.

- A considerable number of studies suggests that accessing online content related to a mental health difficulty can trigger or encourage problematic behaviour that exacerbates prior difficulties, although it should be noted that most of this research is based on self-reported experiences and correlational research designs.
- Some of this content is found within online communities dedicated to eating disorders or self-harm, and participation in such communities can be both supportive and harmful for adolescents.

RQ2: Can internet use support adolescents' mental health, whether by placing barriers on the pathway to harm or by introducing online help?

Findings suggest that:

- Adolescents with mental health problems tend to go online for help, seeking either informal support or formal professional help.
- Those who seek such help online are more likely to be in a state of distress than those who do not, suggesting that the digital environment can offer more immediate support to those who feel they have nowhere else to turn.
- Online mental health communities can also offer adolescents a sense of validation and belonging, functioning as a means of self-care to help them regain control over their wellbeing.

RQ3: What aspects of "the internet" matter? The research highlights the multidimensional nature of digital engagement, going beyond straightforward ideas of "internet use."

Findings suggest that:

- Internet use matters. Social media use can be a risk factor, especially when time spent online is excessive, although it is likely that increased risk of self-harm or eating disorders results in excessive digital engagement more than the other way around.
- Digital content and communities related to self-harm and eating disorders play a key role. They are easy to find, being often public and lacking warnings about the nature of the content available; they are sometimes gamified or amplified by the operation of algorithms designed to retain users' attention. These can undermine adolescents' mental health and coping in a range of ways, including by promoting unachievable norms about appearance and body image.

- Prior risk factors shape social interactions. Adolescents with mental health problems are more likely than their peers to experience a range of online risks including cyberbullying, harassment and exposure to disinformation.

In the pilot *focus groups*, the adolescents and young people took a balanced view of the benefits and risks of internet use, pointing to connectivity, support and information as well as the risk of exacerbating poor mental health. There was more divergence in the interviews with the experts, doubtless because of their different areas of expertise. Overall, they expressed a commitment to understanding the particular challenges faced online by adolescents with mental health difficulties, and a desire to find out more.

Both sets of participants (adolescents and experts) identified specific ways in which those with distinct mental health problems vary in their digital engagements, highlighting potential negative consequences for those with ADHD, eating disorders or experience of self-harm. Specifically, adolescents with ADHD reported losing their sense of time and spending excessive time online as well as posting impulsive comments that they subsequently regretted.

In contrast, participants with a history of self-harm expressed concerns about online content that could either provide information about new ways they could intentionally harm themselves or trigger self-harm. Finally, those with a history of eating problems highlighted the importance of the aesthetic aspects of digital content, and drew attention to the ways in which social media can facilitate making unhelpful comparisons with others and exacerbate striving for perfection.

The participants also pointed out dimensions of digital engagement that appear common across mental health conditions:

- Family and peers can find it difficult to recognise when an adolescent is experiencing mental health problems, and may not know how to offer support. This, in turn, can lead the adolescent to seek support online in ways seen to compound their prior problems, although support offered could also be positive.
- The interviews with experts included lively discussions of the specific features or affordances of the digital environment that can exacerbate problems, and yet the industry experts in particular appeared uncertain how to take action to improve adolescents' digital experiences or to redesign their services.

- Mental health practitioners and educators expressed concern that their professions are relatively ill prepared to understand the digital environment or to help adolescents to navigate it successfully.
- Researchers and policymakers were aware of the need to understand the digital environment better so that current policies and practices are better tailored to the distinctive and growing importance of digital technologies in adolescents' lives.
- Adolescents and experts were concerned that digital and popular media create representations and norms of adolescents and their wellbeing that can be unhelpful, adding to the pressures on adolescents or impeding public understanding.

The report concludes by reflecting on how DIORA will build on the current findings with more extensive research allowing the interrogation of causal hypotheses.

Introduction

In the UK and internationally, there is an urgent discussion of a mental health crisis among adolescents, exacerbated by the COVID-19 pandemic (UNICEF, 2021). In 2020, 16 per cent of 5- to 16-year-olds were identified as having a probable mental disorder, a notable rise from 11 per cent in 2017. Further, 53 per cent of 17- to 19-year-olds with a mental health disorder self-harmed or attempted suicide in 2018 (NHS Digital, 2020). Indeed, non-suicidal self-harm has tripled among the general population over the past decade (Mayor, 2019), and adolescent suicide rates have doubled (Bould et al., 2019). Fewer than one-third of adolescents with a mental health disorder received formal treatment in 2017 (NHS Digital, 2020), and an effect of the pandemic appears to have been that fewer adolescents have actually sought out help (NHS Digital, 2020).

There are, of course, many reasons for this troubling rise in mental health difficulties, including exam stress and other academic pressures, poverty and socio-economic disadvantage, family difficulties and childhood trauma, a precarious job market and an uncertain future, and more (Common Sense Media, 2020; Rideout et al., 2021; Thapar, Stewart-Brown, & Harold, 2021; UNICEF, 2021; VoiceBox, 2021). Among these, we focus in this report on just one: the possibility that adolescents' digital engagements may help or undermine their mental health (Hollis et al., 2017).

Digital technology, especially social media use, has been linked to a host of positive outcomes, including information, peer support and professional online support, as well as more informal benefits, such as distraction, social connection and humour. But more often, in academic, policy and public debates, internet access in general and social media use in particular is linked to depression (Kelly et al., 2018), suicide (Niederkrotenthaler et al., 2019) and self-harm, particularly among girls and marginalised groups (Royal College of Psychiatrists, 2020). In

relation to both possible benefits and harms, these debates have not always been rigorously grounded in evidence, and even when they are evidenced, most research cited uses descriptive methods, implying, but less often testing, causal mechanisms, thus impeding the development of policy and practice (Common Sense Media, 2020; Dickson et al., 2018; HM Government, 2019).

This research arose in part from recognition that there is a gap in understanding between those who are experts in mental health and those with expertise in the culture, political economy and regulation of the digital environment (Hollis, Livingstone, & Sonuga-Barke, 2020). The UN Committee on the Rights of the Child (2021, para 2) defines the digital environment as:

> constantly evolving and expanding, encompassing information and communications technologies, including digital networks, content, services and applications, connected devices and environments, virtual and augmented reality, artificial intelligence, robotics, automated systems, algorithms and data analytics, biometrics and implant technology.

Expert discussion tends to focus on the possible role of the internet or social media in the aetiology or treatment of adolescent mental health problems, and rarely looks into the "black box" of the digital environment to ask which aspects of technology might matter, whether it is social media in particular that is problematic, and what dimensions of adolescent digital engagement make the difference. Meanwhile, those who grasp the nuances of the digital environment tend to know too little about the different kinds of mental health problems experienced by adolescents, let alone how these might manifest online; consequently, in internet safety and governance circles, mental health is often discussed generically, without examining the specific digital engagements of adolescents with distinct mental health disorders.

To begin to explore these issues and to bring a degree of specificity to the debate about the impact of the digital world on mental health, we focused on three different mental health conditions: eating disorders, non-suicidal self-injury – often labelled descriptively as "self-harm" – and attention deficit hyperactivity disorder (ADHD). These conditions have been linked to online risks and problematic digital engagement in ways that are thought to make people suffering from them especially vulnerable to its negative effects and in need of its potentially positive benefits (eg, support and intervention).

All three conditions are common during adolescence, affecting between 0.3 per cent and 8.3 per cent of adolescents (Moran et al., 2012; Polanczyk et al., 2015; Smink, van Hoeken, & Hoek, 2012). Each is associated with significant distress and impairment. Based on current models of the three conditions as well as existing research on internet use related to them, we expected to find some similarities but also some differences between the accounts of digital harms and benefits by those affected by these three conditions, with the differences between most marked between ADHD, non-suicidal self-injury and eating disorders.

ADHD is marked by hyperactivity, attention deficits and problems with impulse control, including emotional control (APA, 2013). People with ADHD often display a hunger for stimulation and a drive for immediate reward. This, in turn, may shape the way they interact with the internet, and make them particularly susceptible to poor decision-making online, and internet and gaming addictions (Evren et al., 2018). They are also prone to being targets for bullying (Unnever & Cornell, 2003).

Eating disorders and self-harm have also been associated with problematic internet engagement, although in different ways from ADHD. For instance, in both cases it has been argued that the internet can play a role in the reinforcement and maintenance of the disorder (Jacob, Evans, & Scourfield, 2017; Wang et al., 2018), which is not the case in ADHD. Non-suicidal self-injury and eating disorders share some personal vulnerability (eg, negative self-evaluation) (Butter, Shevlin, & Murphy, 2019) and environmental risk factors more generally (eg, childhood adversity) (Johnson et al., 2002; Russell et al., 2021), and it has been argued that these may be accentuated in the digital environment because of the pressure created by social media and

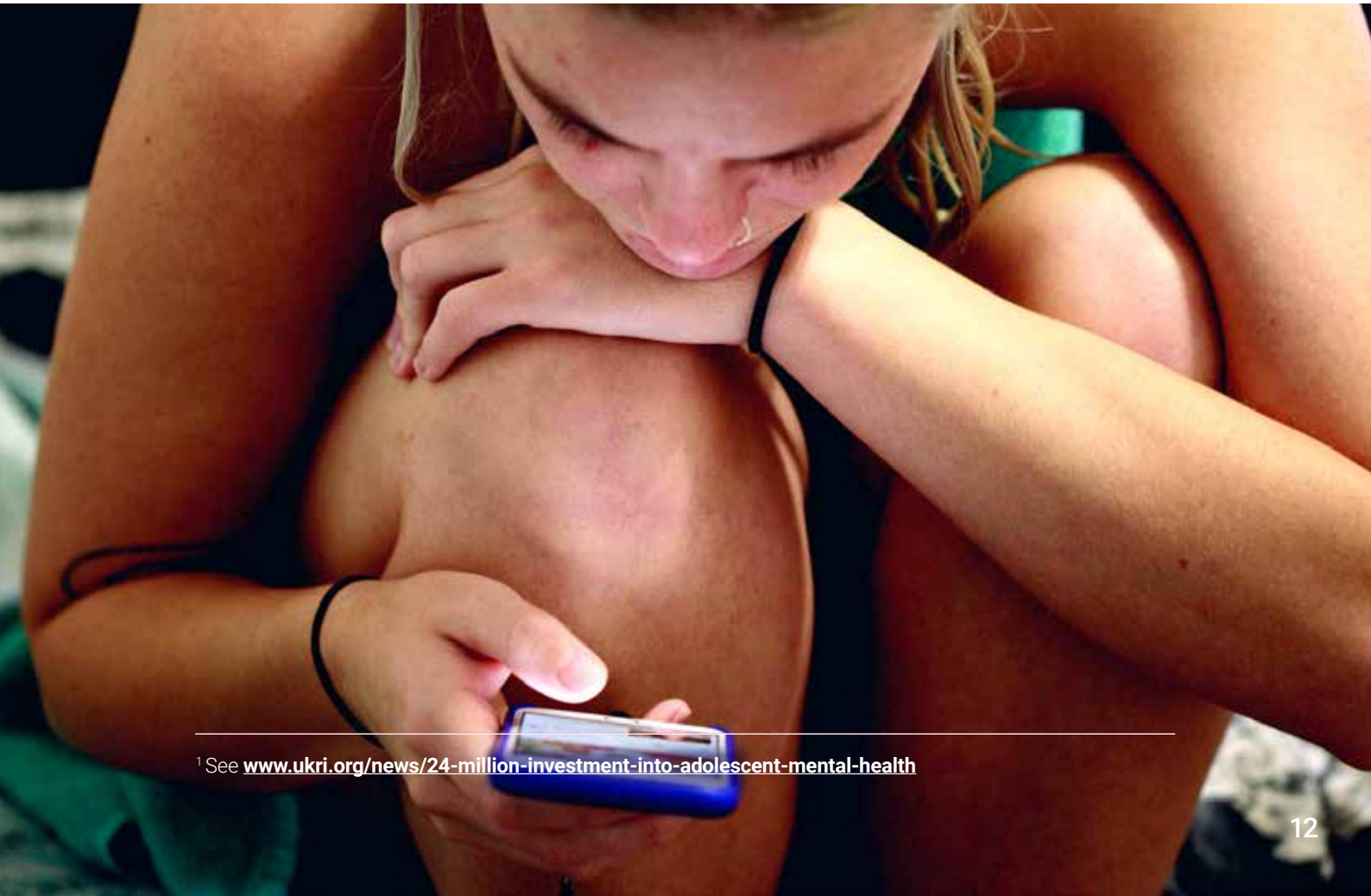
online communities. Online presentations of idealised body shapes and sizes and dieting and food-related content appear to play a particular role in relation to eating disorders. Furthermore, there are pro-eating disorder and pro-self-harm websites that actively promote the value of particular disorder-related activities. In contrast, online peer support groups represent a positive aspect.

The importance of understanding adolescents' mental health vulnerabilities in the context of their use of digital technologies, especially social media, is important both for mental health and other professional services, and also in the public domain. Popular media attention to adolescents' wellbeing in a digital age often points the finger of blame at digital technologies, whether highlighting issues of design, business models and regulation, or instead, the everyday practices of adolescents themselves. Informing the popular debate can, in turn, inform the practices of parents, caregivers and educators, as well as influence the policymakers with the power to regulate the provision of digital products and services.

Much of the popular and public debate, including that fought out in the media spotlight regarding the need for internet regulation, focuses on the general adolescent population. In this report, our focus is largely on those adolescents with prior mental health symptoms or diagnosed conditions, and the role that digital engagement plays in their lives.

Objectives

This research, funded by the Medical Research Council Engagement Award /UKRI Consortium, was undertaken with the objective of identifying prior literature and pilot testing methods for future research, in preparation for a bid to the Medical Research Council on "Adolescent Mental Health and Development in the Digital World", led by Professor Chris Hollis and Professor Ellen Townsend at the University of Nottingham. This bid proved successful, and the research began in autumn 2021, building on this and other pilot research funded by the Engagement Award. The new project is part of £24 million investment into adolescent mental health funded by UK Research and Innovation (UKRI).[1]



[1] See **www.ukri.org/news/24-million-investment-into-adolescent-mental-health**

Research questions

This pilot research undertook a multidisciplinary and multimethod study which asks:

RQ1: Can adolescents' internet use increase the risk of eating disorders, self-harm and overall poor mental health?

RQ2: Can internet use support adolescents' mental health, whether by placing barriers on the pathway to harm or by introducing online help?

RQ3: What aspects of "the internet" matter? The research highlights the multidimensional nature of digital engagement, going beyond straightforward ideas of "internet use".

Methods

Given the exploratory nature of this inquiry, and to explore both prior research and possible methods for future research, a multimethod research design was chosen. This included:

- **Scoping review:** We conducted a scoping evidence review (Collins et al., 2015) by searching 11 databases covering social sciences and humanities, medical science, media, education and child development for studies of adolescents' experiences of self-harm, ADHD and eating disorders in relation to digital technology use published in the past 10 years. The initial 2,257 publications identified by the search were screened for quality and relevance based on the following criteria:

  (i) primary research with adolescents', focusing on their experiences of ADHD, self-harm and eating disorders in relation to use of technologies;

  (ii) deriving from high-quality, methodologically robust research; and

  (iii) published in peer-reviewed journals, in English, and since 2010.

  The original ambition was also to review research on adolescents with ADHD. However, the project lacked the resources to examine what turned out to be a very sizeable literature on ADHD and digital engagement, so these studies were excluded from the scoping review during the screening process.[2]

  A total of **113 studies were analysed**. These included 26 studies of adolescents' experiences of eating disorders, 20 studies of internet content related to eating disorders, 43 studies of adolescents' experiences of self-harm and 24 studies of internet content related to self-harm.

[2] For an overview of ADHD and digital technologies, see Bergin et al. (2020); Ceranoglu (2018); Cerniglia et al. (2019); Chuang, Lee, & Chen (2010); and Enagandula et al. (2018).

- **Empirical research with young adults:** We conducted **three focus groups** with adolescents and young adults who had experience of either self-harm, an eating disorder or ADHD. A total of 17 participants (15 female, 2 male), aged 19–24, who lived in the UK at the time of data collection, took part. We also conducted **one focus group** with clinicians, with 4 participants (2 female, 2 male) who supported adolescents with eating disorders, ADHD and self-harm.

  The focus groups took place online and lasted for up to 100 minutes and covered:

  (i) attitudes to adolescents' use of digital technology;

  (ii) digital technology in adolescents' response to the COVID-19 lockdown;

  (iii) the relationship between digital technology and mental health disorder; and

  (iv) digital technology use during the COVID-19 lockdown.

  All focus groups were conducted in the summer of 2020, that is, at the time of substantial restrictions on in-person social contact due to the COVID-19 pandemic.

- **Empirical research with experts:** We also conducted **15 expert interviews** with senior professionals from civil society including mental health and safeguarding services, as well as those from industry and academia. The interviews took place online, lasted around one hour and covered (i) the role of technology use on adolescents' mental health; (ii) how ADHD, an eating disorder or self-harm may affect adolescents' digital engagement; (iii) the digital pathways of adolescents with mental health problems; and (iv) research gaps.

The study obtained research ethics approval from King's College London (KCL) and the London School of Economics and Political Science (LSE). Transcripts of the four focus groups and the 15 expert interviews were analysed using thematic analysis following Braun and Clarke's (2006) procedure. Themes were divided into two categories: those relating to risk and harm and to increased opportunities through digital technology use.

This research has limitations, however, which should be noted when reading the findings that follow.

First, the evidence review methodology selected was a scoping review, not a systematic review. A scoping review provides an informed view of the volume and characteristics of an evidence base and a synthesis of what that evidence shows (Collins et al., 2015). This is less demanding or robust than a systematic evidence review (Grant & Booth, 2009).

Second, the research evidence itself is largely survey-based, and so the emphasis is on correlations rather than causation, notwithstanding how the authors of the studies reviewed interpreted their findings.

Third, we included three focus groups with adolescents and young adults primarily to explore qualitative methods for future research (ways of asking questions, terminology in use by adolescents, possible ethical issues) rather than to generate findings per se, although we have included some quotations to highlight concerns that merit further investigation.

Findings from the scoping review

The evidence suggests that there is considerable similarity between digital engagement among adolescents with self-harm and eating disorders in terms of reasons for participating online and the positive and negative effects on them. However, there are also interesting differences, and we note these as they arise. Although our original research questions asked whether adolescents' digital engagements exacerbate or ameliorate prior mental health problems, the available research is generally equivocal, avoiding simple causal claims and tending towards bidirectional and contextual conclusions.

Thus, research suggests that adolescents with prior experiences of self-harm or eating disorders engage with such material and communities in the context of existing mental health problems (Bachner-Melman et al., 2018; Fitzsimmons-Craft et al., 2020; Prnjak, Jukic, & Korajlija, 2019). This is not to say, however, that their digital engagements are always innocent, or that the design and regulation of the digital environment play no role.

The evidence is also clear that to understand online mental health, we also need to consider offline factors. A substantial amount of research shows that offline vulnerabilities related to the adolescent or their social environment are associated with a higher risk of self-harm and eating disorders. Experiences of distress, depression or anxiety are found to increase the likelihood of both self-harm and eating disorders (Chan et al., 2017; Ferguson et al., 2014; Fitzsimmons-Craft et al., 2020; Fridh, Lindström, & Rosvall, 2019; Martorana, 2015; Mitchell et al., 2014; O'Connor, Rasmussen, & Hawton, 2014; Patchin & Hinduja, 2017).

Low self-esteem, loneliness or hopelessness are also risk factors (Goodman, 2013; Martorana, 2015; Nguyen et al., 2020; Yildirim et al., 2018). Other factors associated with higher risk include a history of physical or sexual abuse or violence (Liu et al., 2017; Mitchell et al., 2014; Nguyen et al., 2020; O'Connor et al., 2014; Oksanen et al., 2016; Patchin & Hinduja, 2017;

Turja et al., 2017). Factors from their social environment also influence adolescents. Independent of pre-existing vulnerabilities, such as depression and own suicidal ideation, exposure to suicidal ideation from others (online or offline) increases the likelihood of self-harm (Liu et al., 2017). Having family and friends who had self-harmed in the past also increases the likelihood of the adolescent self-harming (O'Connor et al., 2014).

RQ1: Can adolescents' internet use increase the risk of eating disorders, self-harm and overall poor mental health?

- **Adolescents with mental health problems engage online in some specific ways**

Adolescents who have already been diagnosed with an eating disorder (eg, misusing detox/laxative teas or diet pills or those who meet the criteria for a clinical or subclinical eating disorder) are more likely to access online content related to eating disorders (Carrotte, Vella and Lim, 2015; Fitzsimmons-Craft et al., 2020; Kaewpradub et al., 2017; Prnjak et al., 2019). A clinical sample of 122 adolescents and young adults (aged 12–30) with eating disorders from Israel were more likely than a control group to use the internet for activities such as forums and blogs related to eating, weight, body image and self-comparison (Bachner-Melman et al., 2018).

Another study found that adolescents and young adults with eating disorders have more online than offline friends than their peers, including online friends with eating disorders (Bachner-Melman et al., 2018). Since online engagement with material on eating disorders was found to be consistent with a clinical/subclinical diagnosis, such online activities have been suggested as a potential indicator of symptoms (Fitzsimmons-Craft et al., 2020).

Relatedly, those who find self-harm e-communities are likely to have intentionally sought such content rather than to have come across it by chance (Lewis and Michal, 2016). Seeking self-harm content is associated with more frequent self-harming behaviour, with children tending to access information about self-harm before engaging in self-harm activities (Zhu et al., 2016). Those who are exposed to a higher number of self-injurious methods are more likely to self-harm more frequently, regardless of whether the exposure is via the media or other

people (Zhu et al., 2016). Finally, sexual orientation (LGBTQI) (Patchin and Hinduja, 2017) and significant concerns about sexuality (Mitchell et al., 2014) are also related to a higher risk of self-harm.

Much of the research also suggests that girls are more likely to access online content about both self-harm (Fridh et al., 2019; O'Connor et al., 2014; Oshima et al., 2012; Tseng and Yang, 2015) and eating disorder (Oksanen et al., 2016).

- **Online communities can act as a trigger and encouragement for harmful behaviour**

While online self-injury and eating disorder communities can have a positive impact by providing support and deterring individuals from harmful behaviours, they can also act as a trigger and encouragement for unsafe conduct (Baker and Lewis, 2013; Campaioli et al., 2017; Castro & Osório, 2012; Ging & Garvey, 2018; Harris & Roberts, 2013; Lewis & Baker, 2011; Seko et al., 2015). Such negative effects relate to behaviour imitation, enhanced compulsion and competition in risky practices, identification with the disorder, longer duration and more severity of the disorder, which can become an obstacle to recovery (Campaioli et al., 2017; Castro & Osório, 2012). The language of these online communities often revolves around success, control, perfection and solidarity (Borzekowski et al., 2010), but adolescents can feel encouraged to continue either directly or by witnessing such encouragement of others (Borzekowski et al., 2010; Ransom et al., 2010; Rodgers, Skowron, & Chabrol, 2012).

Hence, there is some evidence that engaging with self-harm content is linked to the decision to engage in self-harm behaviour (O'Connor et al., 2014). A telephone-based study with adolescents in the USA aged 10 to 17 found that visiting self-harm websites was associated with higher likelihood of suicidal thoughts and considering self-harm, even after adjusting for other known risk factors (Mitchell et al., 2014). Adolescents with eating disorders report more negative affects after posting online (Bachner-Melman et al., 2018; Cavazos-Rehg et al., 2020), and risk exposure to negative comments (Cavazos-Rehg et al., 2020; Oksanen et al., 2015). Sharing information and personal stories about eating disorders serves to both alleviate and trigger anxiety about living with this stigmatized illness (Chang & Bazarova, 2016; Hipple Walters et al., 2015; Yeshua-Katz & Martins, 2013).

RQ2: Can internet use support adolescents' mental health, whether by placing barriers on the pathway to harm or by introducing online help?

- **Adolescents with mental health problems tend to go online for help**

Adolescents with experiences of self-harm, particularly those who are self-injuring at the moment, are more likely to go online to support others or to receive support from people dealing with the same issues than their peers who have not self-harmed (De Riggi, Lewis, & Heath, 2018). An Australian study with adolescents and young people aged 14–25 found that almost half of the participants wanted to access support online, even if they eventually spoke to someone offline about their self-injurious behaviour (Frost, Casey, & Rando, 2016). Some thought that finding information online would help them to talk to their family, friends or professionals. A UK study of online self-harm forum users aged 16–25 reported that they found it easier to talk about self-harm online and with strangers than with family or friends (Jones et al., 2011).

There is also some evidence related to experiences of self-harm, which demonstrates that it is the more vulnerable adolescents who seek online support. Distressed adolescents who prefer to seek informal help online tend to be more likely to experience non-suicidal self-injury and suicidal ideation than those who seek help elsewhere (Chan et al., 2017). They are significantly more distressed and suicidal, and had a greater degree of self-injury compared to those who do not seek help online (Frost & Casey, 2016).

This might suggest that the online environment offers support to those adolescents who have nowhere else to turn or who struggle to receive help elsewhere. Similarly, a cross-national study of eating disorder forum users found that they receive more support generally and in relation to their eating concerns from online communities than offline relationships, and overall felt less supported than the non-eating disorder comparison group (Ransom et al., 2010). Another study on US adolescents aged 15+ who engage with thin-ideal/body image content on social media found that over a third said that they would accept support from someone they did not know online, and that they generally favoured online over offline interactions (Cavazos-Rehg et al., 2020).

- **Online mental health communities can offer a sense of validation and belonging**

From the studies that examine the nature of online mental health communities, it seems that adolescents reach out to online communities to get information, support and to be part of a community that is understanding and non-judgmental (Baker & Lewis, 2013; Berger, Hasking, & Martin, 2017; Eichenberg & Schott, 2017; Frost et al., 2016; Harris & Roberts, 2013; Lewis & Michal, 2016; Seko et al., 2015). Digital communities can offer opportunities for self-expression and self-reflection regarding self-harm or eating disorder experiences in a context of confidentiality and reciprocal self-disclosure (Cavazos-Rehg et al., 2020; Ransom et al., 2010; Rodgers et al., 2012; Seko et al., 2015; Tong et al., 2013). Engagement with such communities can serve as a self-care tool or as a strategy for regaining control over the disorder (Gregory & Mustata, 2012; Harvey & Brown, 2012; Hipple Walters et al., 2015; Lewis & Baker, 2011).

There is also an advocacy motivation for participation – to raise awareness about the condition, to counter its glamorising as a lifestyle (Ramos, Neto & Bagrichevsky, 2011; Seko et al., 2015; Yeshua-Katz, 2015), to reduce social stigma (Berger et al., 2017; Franzén & Gottzén, 2011; Frost et al., 2016; Jones et al., 2011) or, more practically, to offer and receive support (Frost et al., 2016). Mainstreaming awareness of mental health problems, some participants and academic commentators believe, might lead to empowerment and visibility of different types of bodies, thereby challenging established modes of gendered beauty (Knapton, 2013), and inviting a more holistic understanding of mental health conditions (Ging & Garvey, 2018).

However, a small-scale online survey (n=68) with self-harm community members in the Netherlands found that the reasons to temporarily stop participating included stress, hostility or conflict, not finding the community helpful, being triggered by participating and upsetting others (Lewis & Michal, 2016). On the other hand, resuming e-communication after a period of absence is associated with trying to get support and help or to trigger oneself (Lewis & Michal, 2016).

- **Adolescents may favour using digital technologies for professional support**

Adolescents with anxiety, depression or problems with eating were found to be three times more likely to use mental health apps (Grist et al., 2018). In another study, those with eating disorders also benefited from using digital tools for therapy and support (Fitzsimmons-Craft et al., 2020). The potential of online technologies for mental health support should not be overstated, however, as adolescents can be reluctant to use these tools (Fitzsimmons-Craft et al., 2020), and online support may not replace face-to-face support (Jones et al., 2011). Adolescents' attitudes aside, more robust evidence is needed on the effectiveness of such support and how suitable it is for different mental health conditions, particularly for more severe cases (Hollis et al., 2020).

RQ3: What aspects of "the internet" matter? The research highlights the multidimensional nature of digital engagement, going beyond straightforward ideas of "internet use".

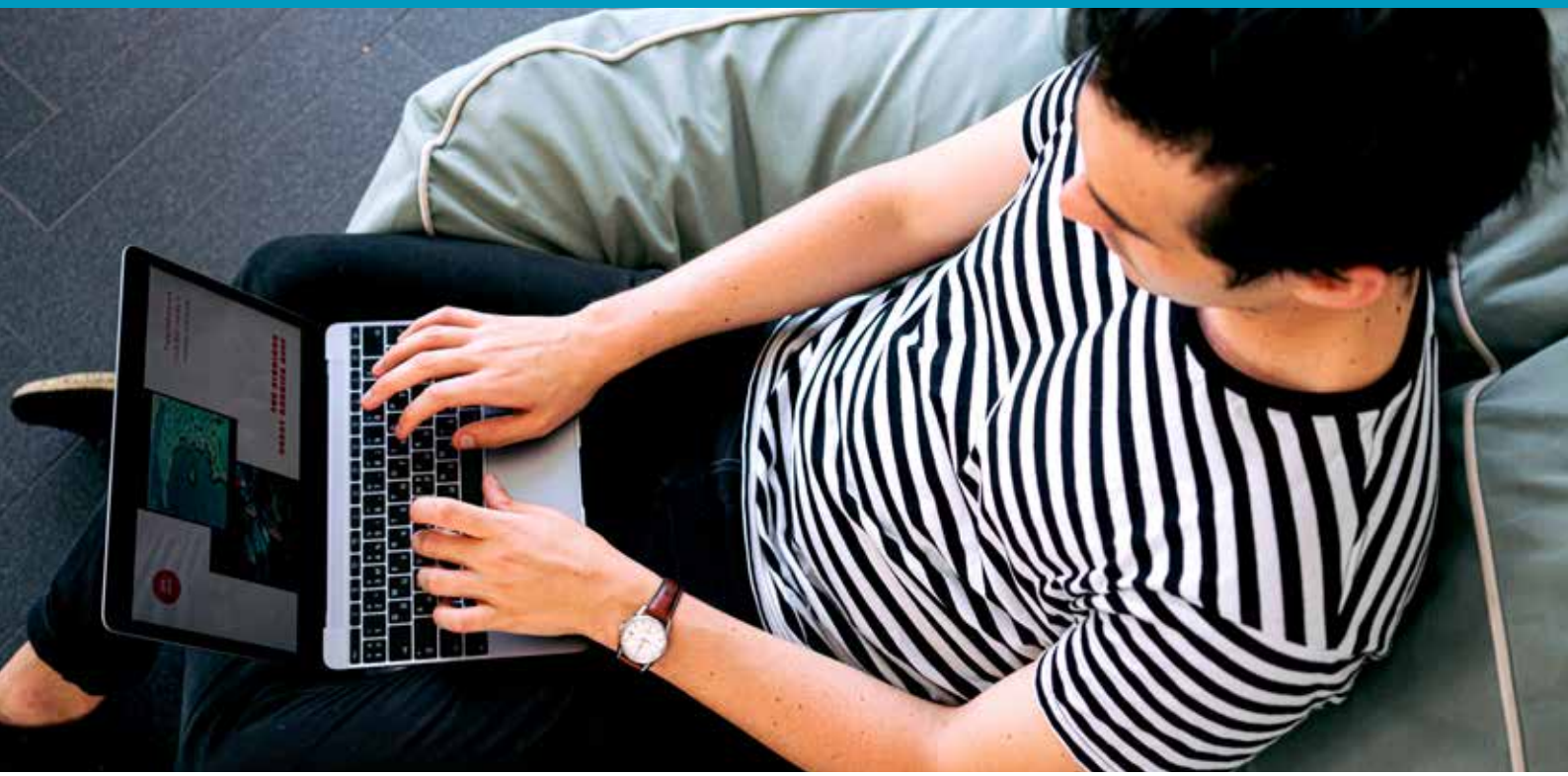
- **Excessive internet use is a risk factor for mental health problems**

Time spent online is not generally linked with an increased risk of either eating disorders or self-harm, according to most of the studies (Bachner-Melman et al., 2018; Oksanen et al., 2016). Two studies on self-harm in Taiwan are an exception to this, showing an increased risk of self-harm (Lung et al., 2020; Tseng & Yang, 2015). However, excessive use of the internet is associated with higher risks of eating disorders and self-harm.

Several studies suggest a correlation between excessive or late-night use of the internet and experiences of self-harm (Aktepe et al., 2013; Kaess et al., 2014; Liu et al., 2017, 2019; Pan & Yeh, 2018; Strittmatter et al., 2015). Two studies in China found that the risk is higher when combined with other factors, such as low physical activity (Liu et al., 2019), or when internet use is extreme (Tang et al., 2020).

There is also a relationship between excessive use of the internet and eating disorders (Alpaslan et al., 2015; Claes et al., 2012; Domoff et al., 2020; Yildirim et al., 2018) or unhealthy weight (Alpaslan et al., 2015; Domoff et al., 2020), as well as other impulse control disorders, such as compulsive shopping (Claes et al., 2012). Hence, the evidence suggests that the increased risks for an eating disorder are more likely to be related to underlying difficulties with impulsivity, lack of control, emotion regulation or sensation-seeking than just with the frequency of internet use.

Social media use is also a risk factor, as some studies show that spending time on social networks may be associated with an increased risk of self-harm (Barthorpe et al., 2020; Shafi et al., 2020). Data from the Millennium Cohort Study suggests that a greater amount of time spent on social media on a weekday is associated with an increased risk of self-harm for girls, alongside increased depressive symptoms and poor self-esteem (Barthorpe et al., 2020). However, no link was found between social media use and the risk of suicide (Brown et al., 2019; Shafi et al., 2020) or eating disorders (Ferguson et al., 2014).



- **Digital affordances can undermine mental health**

The online environment is saturated with content related to dieting, fitness and health (Carrotte et al., 2015; Oksanen et al., 2015; Syed-Abdul et al., 2013), including popular social media accounts that distribute and promote information about self-harm and eating disorders (Arseniev-Koehler et al., 2016; Bert et al., 2016; Lewis & Michal, 2016). The dynamic nature of the digital ecology (Livingstone, 2016) and its digital affordances (Bucher & Helmond, 2017), fuelled by adolescents' reliance on social media and the operation of algorithms that promote extreme content, makes potentially harmful content more easily accessible (Custers, 2015), possibly leading to aestheticisation and mainstreaming of harmful mental health content (Ging & Garvey, 2018).

Such content rarely provides content warnings, and many accounts are public (Bert et al., 2016; Borzekowski et al., 2010; Lewis & Michal, 2016). Digital design allows for some gamified and interactive features (Ging & Garvey, 2018) and a type of engagement that is distinctively visual (Fitzsimmons-Craft et al., 2020; Ging & Garvey, 2018; Lewis & Michal, 2016), which makes engagement even more attractive.

Some affordances can be positive, however – for example, apps can offer the opportunity to track moods and find new strategies to manage negative thoughts and control harmful impulses (Grist, Porter, & Stallard, 2018).

- **Poor mental health is associated with exposure to other online risks**

There is some evidence that online experiences of both self-harm and eating disorders are associated with other online risks. The research on eating disorders is more limited in this aspect, showing that cyberbullying and online disinhibition are linked to increased likelihood of accessing content on eating disorders (Almenara, MacHackova & Smahel, 2016; Carrotte et al., 2015; Marco & Tormo-Irun, 2018). The research on self-harm is more comprehensive, showing that various forms of online victimisation, such as being the target of hurtful material online, harassment or untrue information, or an online crime, are associated with an increased risk of self-harm (Oksanen et al., 2016). Cyberbullying is another online risk that is associated with self-harm (Fridh et al., 2019; Hay & Meldrum, 2010; Heerde & Hemphill, 2019; Lung et al., 2020; Nguyen et al., 2020; Patchin & Hinduja, 2017; Peng et al., 2019; Wiguna et al., 2018).

The association between self-injury and cyberbullying involvement applies to perpetrators, victims and victim-perpetrators (Fridh et al., 2019; Heerde & Hemphill, 2019). A cohort study of adolescents in Taiwan found that bullying at the age of 12 increases the likelihood of self-harm one year later, while bullying at 13 did not show an increased risk of self-harm at the time of the study (Lung et al., 2020). This might show that it takes longer for the harmful effect to develop over time. Similarly, while receiving "malicious texts" increases the risk of self-harm (Jose & Fu, 2018), the opposite is also true – adolescents who self-harm are more likely to turn to malicious texting, later on, suggesting that self-aggression and aggression toward others are related. In turn, sending hurtful messages to others can trigger self-harm feelings (Jose & Fu, 2018), creating a vicious cycle of negative emotions and hurtful behaviours.

- **Effects on adolescents with eating disorders are mediated by internalising norms**

Online discussions of dieting and fitness can be related to problematic stigmatising language around weight, portraying guilt-related messages regarding food, and praising thinness ("thinspiration", "fitspiration") (Carrotte et al., 2015). There is some evidence, specifically related to eating disorders, suggesting that the effects of such exposure might be mediated through the internalisation of unachievable beauty standards and dissatisfaction with one's own body.

Hence, media exposure to thinspiration and fitspiration on its own does not predict eating disorders (Ferguson et al., 2014; Lopez, Corona & Halfond, 2013; Terhoeven et al., 2020). For example, exposure to thinspiration on social media did not predict eating disorders in a longitudinal study with 237 adolescents in the USA aged 10–17 (Ferguson et al., 2014). Media-influenced socio-cultural values and ideals about appearance did not significantly predict disordered eating and appearance concerns in another US study with Latino adolescents aged 13–18 (Lopez et al., 2013).

However, exposure to thinspiration is associated with a desire for a thinner body and peer comparison which, in turn, predicts disordered eating (Chang et al., 2013; Ferguson et al., 2014; Michels & Amenyah, 2017; Terhoeven et al., 2020). Some research suggests that this relationship might be explained by the internalisation of a negative body image and body dissatisfaction (Chang et al., 2013; Gubelmann et al., 2018; Kaewpradub et al., 2017; Marco & Tormo-Irun, 2018). Body dissatisfaction is also associated with greater media pressure and internalised thinspiration (Michels & Amenyah, 2017).

Findings from the focus groups and expert interviews

Across the three pilot focus groups with adolescents and young people (17 participants), the participants took a balanced view of adolescents' engagement with digital technology, pointing to positive aspects such as connectivity, support and information, as well as negative aspects such as the risk of exacerbating poor mental health. The emotional situation for the adolescent at the time of engagement with digital technologies can be a crucial element in whether positive or negative consequences occur for them. Many of the comments offered by the adolescent participants reflect an appreciation of the nuances of particular contexts:

> *It just kind of impacts people to a different extent depending on, like, what their previous experience are.* **Adolescent**

> *I feel like digital technology plays a pretty big gateway for adolescents [… to] have more freedom and meet people with those interests.* **Adolescent**

There was more divergence among the experts, doubtless because they represented different stakeholder groups, with different areas of expertise. Overall, however, they expressed a commitment to understand the particular challenges faced online by adolescents with mental health difficulties, along with a good measure of puzzlement about how these difficulties might manifest in digital contexts, and uncertainty about how they could find out more.

Indicative findings follow, signalling insights gained from the qualitative research and also areas that require further and more systematic research. It may be gleaned that, in some respects, adolescents and also the experts recognise that the different mental health conditions pose distinct challenges to adolescents' engagement with digital technologies.

Attention deficit hyperactivity disorder

- According to the pilot focus groups, adolescents with ADHD can lose sense of time when engaging with digital technology, and spend excessive amounts of time using it. The risk of becoming overly immersed in the digital world for long periods of time was a prominent concern:

> *Once you open Facebook, or whatever, any kind of social media, you're kind of in there then and then, especially if you've got like ADHD, [you] tend to lose track of time and before you know it, like, three hours is past.* **Adolescent**

- Also, feeling vulnerable after posting on social media impulsively presented particular challenges to adolescents with ADHD; they appear at particular risk of posting things they may later regret or lead to feelings of ostracism from peers:

  "...with a lot of people with ADHD, they'll share things without considering what they are sharing, so kind of, like, we don't have that filter where it tells you to 'hang on a minute: is this gonna offend anyone? Is this gonna upset people?" **Adolescent**

- Industry experts thought that identifying users with ADHD from their online behaviour is more challenging than self-harm or eating disorders, and it would be hard to do unless the users flag it themselves:

  "...we haven't actually specifically labelled anything for ADHD."
  Industry expert

- Particularly relevant to adolescents' experiences during the COVID-19 pandemic, a central issue was related to struggles with maintaining focus on online lessons and engaging when they couldn't see the face of speakers during verbal interactions:

  "I think [for the people with ADHD], it's actually very important for them to see the people they're talking to, you, and read their facial expressions and their body language." **Adolescent**

- A positive effect was related to how digital technology adds helpful structure and ways of organising to many aspects of everyday life; alerts and calendar reminders were considered particularly important.

Self-harm

- While exposure to new harmful experiences is relevant to all adolescents with existing mental health disorders, the self-harm group was particularly vocal about the dangers of learning new harmful techniques through social media:

> *It can introduce you to kind of new things, and actually that is obviously really damaging.* **Adolescent**

> *If you are interested in this particular activity, you'll go online and will look for people who…can relate to you or look for tips on the activity.* **Adolescent**

- It was also believed that adolescents can be exposed to "triggering" web content, which, if an adolescent is in a certain mind set, can lead to carrying out acts of self-harm:

> *I also feel that people who do have a history of self-harm, anxiety or depression are more likely to be triggered by things that they see on social media […] it just kind of impacts people to a different extent.* **Adolescent**

> *If you've got previous kind of history with self-harm or anxiety, depression and that kind of can enhance your thoughts as well, […] and then if you're becoming influenced by things online...then that can become a vicious cycle.* **Adolescent**

- Another concern related to self-harming in response to online posts that romanticise or attempt to normalise self-harm or present images of self-harm. This confirms the findings that self-harm responses are more directly impacted or exacerbated by digital media exposure:

  "[Tumblr and forums]...promote…things like self-harm and kind of romanticising mental illness and so really unhealthy level." **Adolescent**

- During lockdown, the pressures of online arguments and criticisms were felt particularly strongly, creating vulnerability to acts of self-harm.
- Accessing support and sharing interests with people beyond one's immediate environment was seen as a positive, since isolation was considered particularly problematic for adolescents with self-harm problems.
- Social support was important to all groups, and adolescents with self-harm problems discussed how particular online communities could help them feel understood and less isolated:

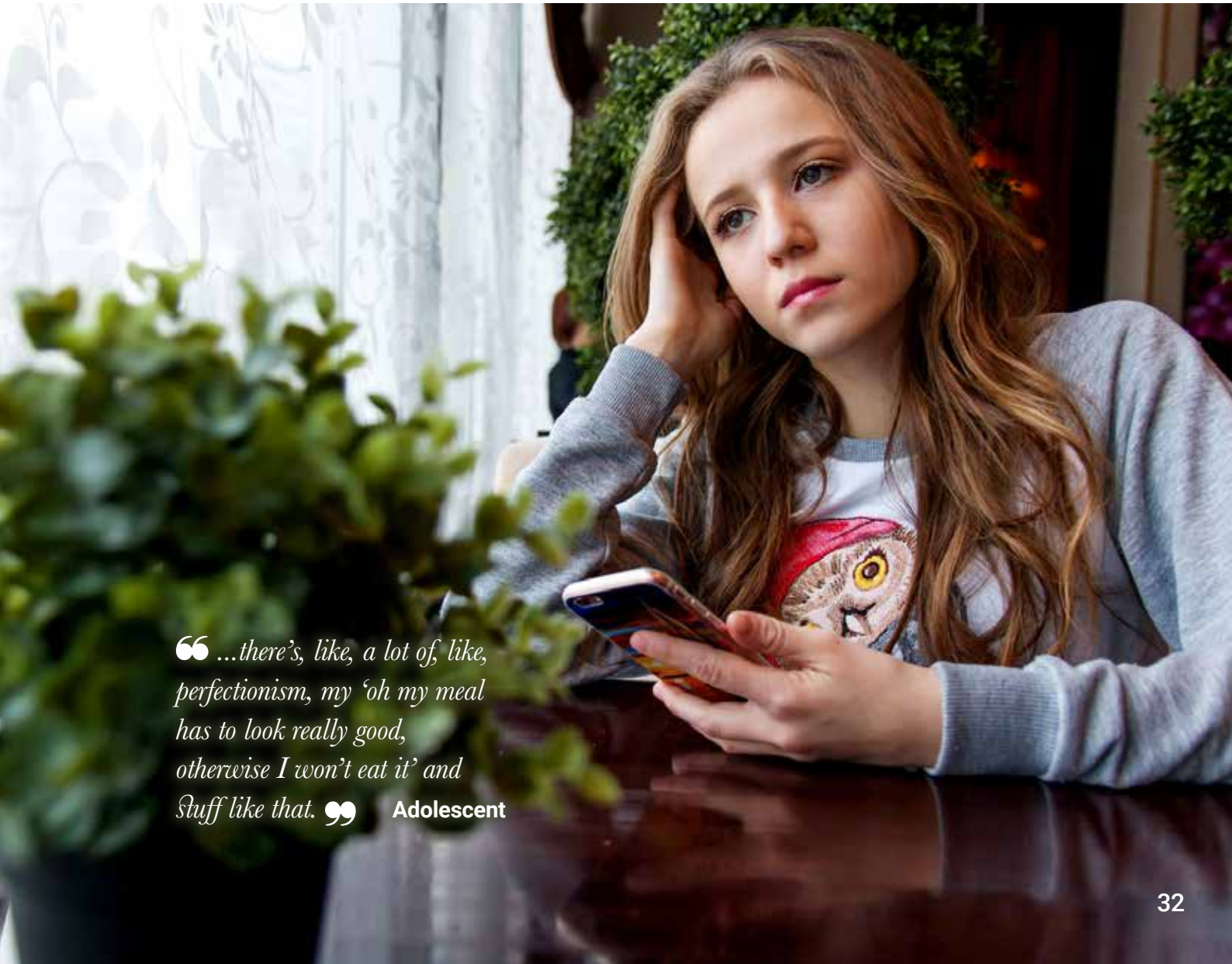
  "Maybe they are feeling isolated, lonely or depressed, and those feelings are driving them to seek out communities where they feel like they can belong. Whether or not those communities are very positive and affirming ones or whether or not they're actually communities that may be encouraged. Those behaviours, I think it's more to do with the feelings which lead them to self-harming. Those feelings are kind of, probably what impacts how they use digital technologies." **Adolescent**

- It was believed that a focus on understanding of self-harm reduction techniques would be valuable, including through the use of apps such as Calm Harm, which can facilitate the management of self-harm problems.

Eating disorders

- Adolescents with an eating disorder were thought to be particularly affected by the aesthetic aspects of digital content; understanding that images can be manipulated was thought to be crucial for them.
- Vulnerability to negative self–other comparisons and perfectionism, both key characteristics of the social media environment, was also particularly relevant to this group. Hence, adolescents with an eating disorder can suffer an exacerbation of perfectionism problems due to digital technology use:

> *It can make it can make people develop or have higher expectations or become a perfectionist.* **Adolescent**



> *...there's, like, a lot of, like, perfectionism, my 'oh my meal has to look really good, otherwise I won't eat it' and stuff like that.* **Adolescent**

- Highly curated and glamorised online self-representation can be harmful. Even though adolescents are aware that it is not accurate, they still compare themselves to these images (eg, shared by influencers), and might feel discouraged that they don't look like this:

  > *People don't teach you that it's not real. […] I hadn't known, like, how heavily edited the pictures were.* **Adolescent**

  > *You follow them or see their pictures. You don't think that 'oh that's them in a certain angle in a certain light'; you just compare yourself to them.* **Adolescent**

  > *Recently, someone said, I know when I look at social media, I'm not seeing the reality of that person's life, but it is still having a really negative impact on me.* **Civil society and education expert**

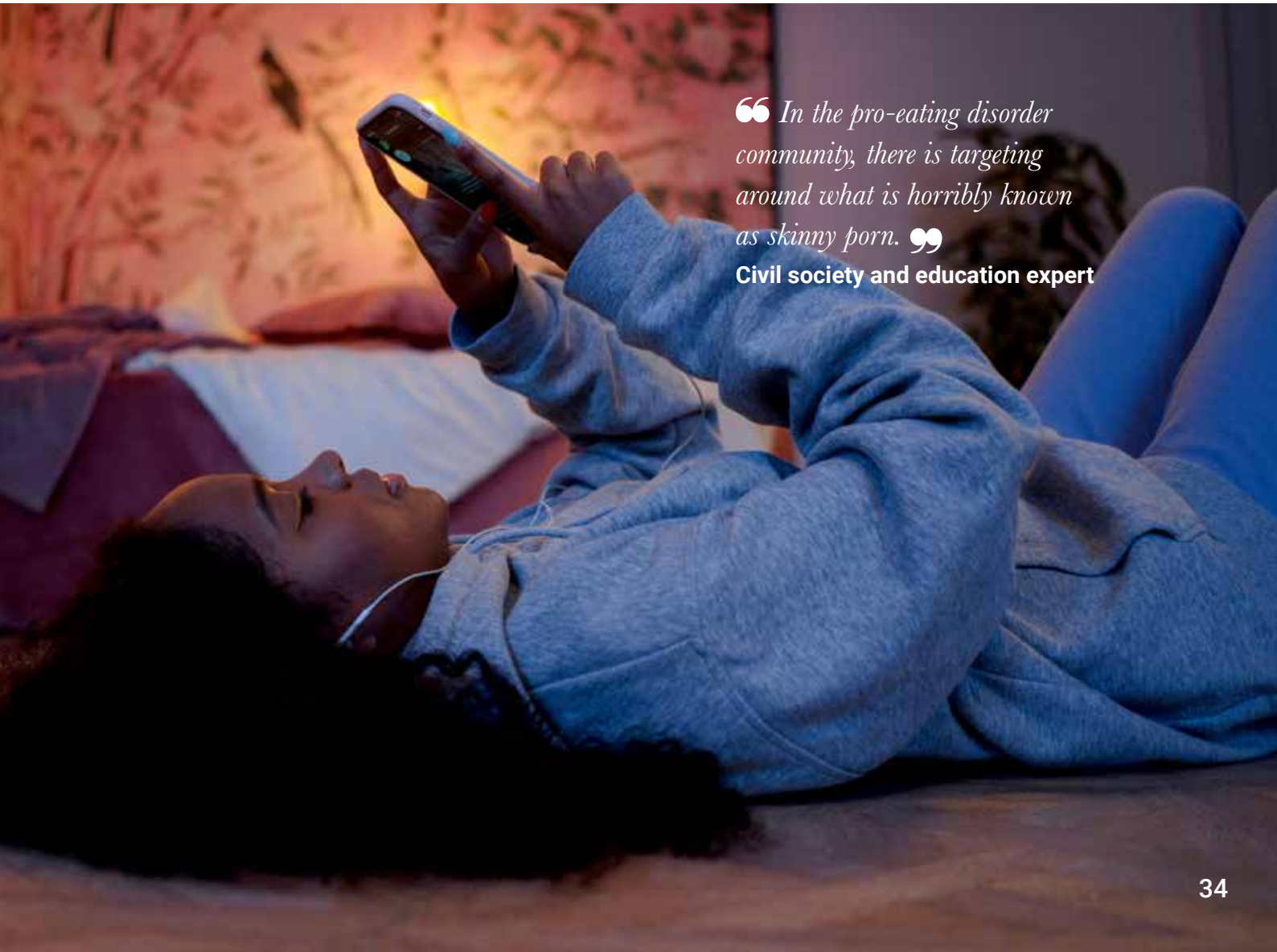
- Fitness apps, government messages about healthy weight/BMI (body mass index) or school efforts to promote exercise generally aimed at a healthy lifestyle might trigger vulnerable adolescents by tapping into their sensitivities and exacerbating their uncertainties. Such messages can reinforce competition with others, for example over how many likes they receive or steps they do or how thin they look:

  > *When you are living with an eating disorder, it can be extremely competitive. […] And it fuels, I think, that part of the illness quite dramatically and in quite a dangerous way.* **Civil society and education expert**

- COVID-19 added additional pressures as more people started posting information about exercise and fitness as a way of coping with the lockdown:

> *Because of lockdown no one really had anything to share and so everyone was sharing their day-to-day exercises.* **Civil society and education expert**

- Parental monitoring of digital technology use was a concern about this group who felt that this had altered how they engaged online during the COVID-19 lockdown.
- Selection of positive role models from social media, who make positive lifestyle choices, is important for this group.
- At the same time, the experts thought that this group was particularly targeted by grooming.



> *In the pro-eating disorder community, there is targeting around what is horribly known as skinny porn.*
> **Civil society and education expert**

Common experiences and challenges for those with mental health difficulties

While the three mental health conditions generated some nuanced observations, as noted above, for the most part both adolescents and experts tended to talk of those with mental health problems, or, sometimes, "vulnerable" adolescents, making little distinction for the different diagnoses. By contrast with the earlier findings from the scoping review, which attempted to tease out the factors relating to digital engagement that exacerbate or ameliorate adolescents' mental health problems, the findings that follow provide insights into how adolescents, and the professionals and experts responsible for supporting them, understand the role of the digital environment for adolescents in general and, more specifically, for those with mental health problems.

FAMILY AND PEERS

- **It can be hard to notice that an adolescent is experiencing mental health problems**. Some may be reticent in face-to-face contexts or even purposefully hide their struggles to protect their families and friends. Apps and other digital resources can allow them to express their difficulties without embarrassment or shame:

> *It's quite private, what you do, unless your parents are quite nosy.*
> **Adolescent**

> *Some young people are trying to protect other people from their self-harm because of strong negative emotions.* **Academic expert**

> *People in their real life might not know anything about it but their online world does. So again, it's the safer sharing, the more anonymous sharing of some expression of pain.* **Research expert**

- **In many cases parents and caregivers do not know how to approach the topic of mental health, and there is silence and stigma around it.** There is reluctance to discuss these issues with adolescents, especially with younger ones, out of fear that such conversations might expose them to harmful ideas:

  "When it comes to young children, we're really frightened to have those conversations because we're, oh, we're going to send them to those sites. Whereas actually, if they are using them, having the conversation to help even quite young children develop some sort of critical digital literacy is very important." **Research expert and parent of an adolescent who self-harms**

- **Mental health-related experiences are often associated with a lot of shame and guilt**, so it is often hard for adolescents to discuss their mental health difficulties with people around them. Vulnerable adolescents can be helped greatly by the opportunities for self-expression provided, for example via social media platforms; this was considered more important in the context of the COVID-19 lockdown:

  "Those are just things that are very, very private and tend to accumulate a lot of shame." **Academic expert**

  "Young people don't seek help for self-harm; they would rather hurt themselves than talk to a grown up about how they're feeling."
  Academic expert

- **Online experiences of self-harm are usually related to difficulties in the adolescents' everyday life and social environment**. It is often to do with factors such as social isolation, family difficulties or distress:

  "It's a manifestation of distress...that comes back to this idea of dealing with very difficult negative emotions." **Academic expert**

  "It's actually quite often what's happening offline. The fact that they do lack support, they do lack understanding." **Research expert**

- **Other online risks create further vulnerability for adolescents.** A violent or toxic peer culture can push adolescents into more extreme circumstances and contribute to their poor mental health outcomes. Incidents related to cyberbullying or revenge porn were recognised as risk factors by adolescents and experts:

  > *The idea of having anonymity online in some spaces means that it's a lot easier to kind of make comments and do things akin to cyberbullying.*
  > **Adolescent**

- Rather than telling adolescents what not to do and creating barriers that they will only try to bypass, **it is more effective to teach them the skills they need to help them be aware** of the possible negative effects and how best to avoid harm:

  > *Relationship breaks down, images get distributed. And yes, so the negative consequences flow from that, obviously.* **Industry expert**

  > *It's not one thing; it's a cluster of issues around the digital environment.*
  > **Academic expert**

- Adolescents also **learn from their peers' harmful coping mechanisms**:

  > *[Young people tend to think] I saw a friend coping in this way, and I wondered whether it would help for me.* **Academic expert**

  > *The problems are, like, entire communities online. Where, if you're, like, not in very good headspace, [it] is easy, it's, like, gravitate towards, like, mental health communities, some of which can be super supportive. Others can just be super triggering.* **Adolescent**

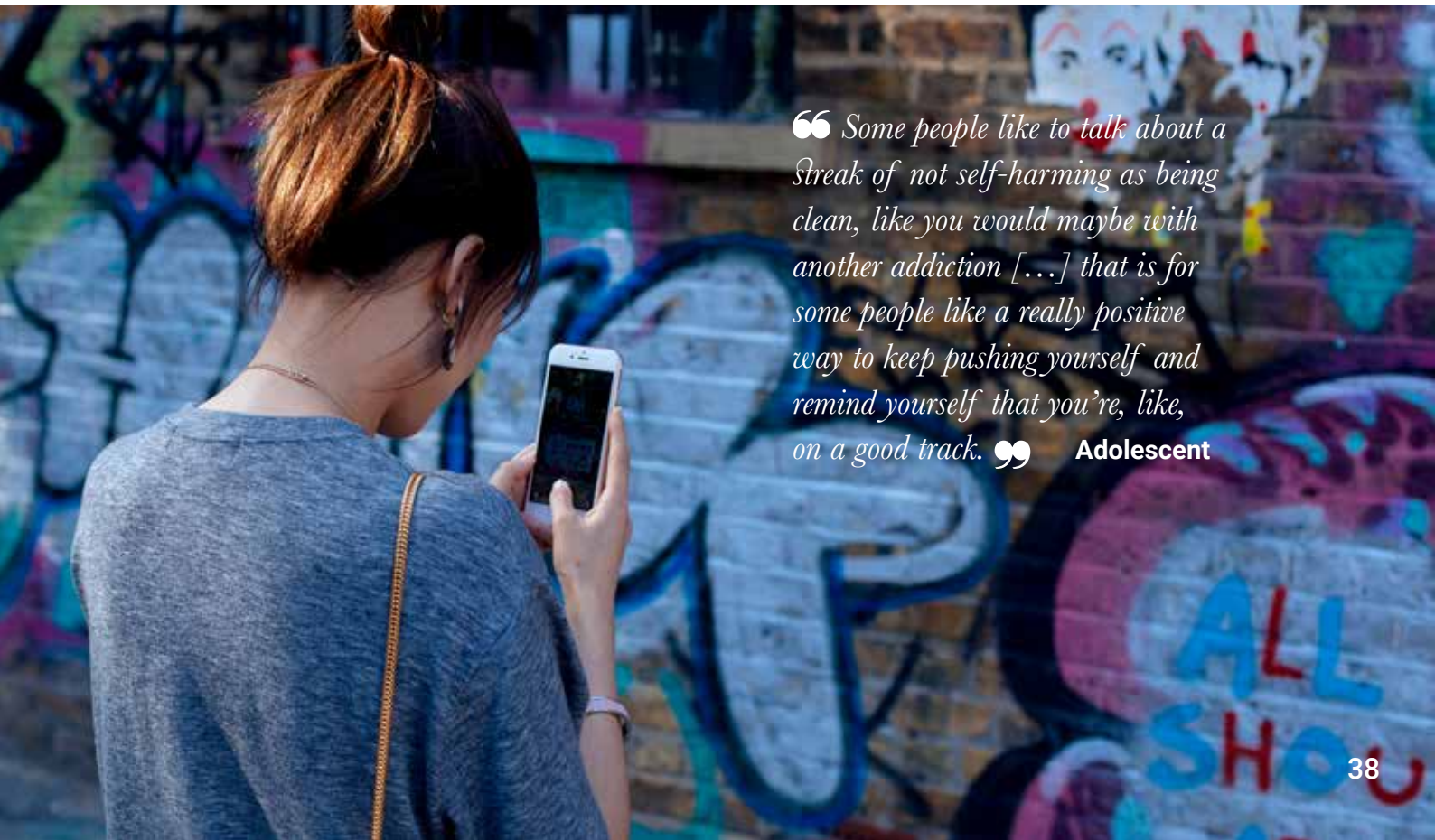
- **Online communities offer a unique connection for adolescents who struggle with their mental health.** It is often hard for families to understand the positive experience that online support groups offer, especially as adolescents tend to keep this separate from their other connections:

  “A big thing for some adolescents is using digital technology to make relationships with people with whom they share interests with, in situations where their current environment lacks people who have those interests.” **Adolescent**

  “To feel loved and accepted. They feel a real strong friendship within these groups. They are very powerful communities.” **Research expert**

- **Adolescents continue to take part in online communities to protect others.** They use their own experiences to navigate others away from severe harm and to counteract the glamorising of mental health disorders:

  “They are there now to protect other people from using that site and getting drawn into more extreme harming behaviours.” **Research expert**



INDUSTRY AND DESIGN

- **Adolescents can be quite knowledgeable in using technology to follow or create negative mental health content**, whether switching between platforms, having inside knowledge of trending hashtags, or using encrypted platforms to exchange content. It is a dynamic field and more knowledgeable users can be better at finding or hiding harmful content in plain sight, which can make it hard to identify risks:

> *If I send it to you in an encrypted message it's not actually going to be taken down.* **Civil society expert**

> *Each community has a slightly different language and coded language, which makes it difficult to understand sometimes what's happening.* **Industry expert**

- **Once adolescents come across harmful content, it follows them around.** Technological features, such as algorithmic content suggestions, personalisation and nudge techniques might expose adolescents with mental health difficulties to further negative content, making it harder to break the negative cycle:

> *Quite often if you've had an eating disorder the advertisements that are being pushed are all around diet culture.* **Civil society and education expert**

> *Snowball effect, where things get worse and worse.* **Industry expert**

> *Ethically, it's worrying, isn't it, that the algorithms could draw certain types of content towards a young person who may be vulnerable.* **Academic expert**

- **The harmful effects are hard to identify.** Adolescents are affected differently by their digital engagement depending on their vulnerabilities, and while some will show resilience, others might be harmed. Taking measures in confronting those who create the harmful content is also problematic, as some of these people are already vulnerable:

  “The really difficult part is the grey areas. What could be seen as neutral by your eye but would be seen as a dog whistle by somebody who is actually in that community.” **Industry expert**

  “Those communities are potentially in crisis and are vulnerable people themselves. So, that is a challenge for us.” **Industry expert**

- **It is not clear what good practice looks like; there is very little evidence on effectiveness.**

  “Vulnerabilities, experiences vary, it’s hard to come up with a solution that works for everyone.” **Industry expert**

  “Nobody is quite sure what best practice is.” **Industry expert**

- **It is important to find the right balance between freedom of expression and participation and protection.** Platforms targeted at adolescents tend to embed the safeguarding in their design and have a preventative approach, while other platforms rely more on the removal of extreme material:

  Children can engage, they can meet others, they can socialise within a certain framework of limitations, that they can't just freely do whatever. **Industry expert**

  We do not allow any content that glorifies, normalises or promotes suicide, self-harm, eating disorders. But we do allow conversations that are based on people talking about supporting each other, lived experiences and moving away from moments of crisis and also education. **Industry expert**

- Tools currently used include proactively searching trending harmful content and reviewing content being reported by users or non-governmental organisations (NGOs). **Strategies that rely on removing content constantly have to catch up** with a moving target, and have little preventative effect. They can be inefficient as the removed content reappears elsewhere:

  They do get taken down and then they're set up again somewhere else. **Research expert**

  Sometimes these people are very annoyed with us removing it or preventing us from sharing it and will try to be very creative in coming back and re-sharing it. **Industry expert**

  Removing, it's displacing the problem. **Industry expert**

- **Newer and more pro-active strategies include the use of artificial intelligence (AI) and machine learning to identify harmful material.** These are used both by specialist mental health and parental monitoring apps and more general social networks. Yet, there are some concerns about privacy and the use of such data:

  "[You can identify] things related to depressive symptoms, things relating to more anxiety or nervousness, and things relating to a child who might be responding as if they were being victimised or abused in some way."
  Industry expert

  "Using artificial intelligence to identify on certain platforms when users were really in crisis, and then delivering [some support]." **Industry expert**

  "But the implications on privacy are huge and that's the trade-off and society needs to discuss what's acceptable." **Industry expert**

- **Adolescents can get exposed to extreme content existing online. This content is often hard to find and signpost.**

  "We've had suicide notes…talking about their state of mind and being depressed, lonely, all those things, and really naming… Putting very serious threats in there." **Industry expert**

  "They'll just put the image itself up and it just lives. No tags, it's not really attached to anything really meaningful or a blog with a name that gives it any indicator to what's going on." **Industry expert**

  "You see certain blogs that are recruiting young, vulnerable people, and you can see it, and then we, of course, remove those." **Industry expert**

- **Some companies adopt an educational approach that seeks to expand adolescents' digital skills and empower them as digital citizens.** This is a proactive approach that aims to tackle the problem at its core by creating positive online behaviour and mental health awareness, thus has the *potential* to offer a longer-term solution:

> *Digital citizenship as a whole and an approach that we want to lift as a part of the skill-building we need to do and the opportunity we have to influence children in building those competencies.* **Industry expert**

- **There is an overlap between user safety and brand safety.** Being involved in a high-profile case can be damaging for any company's reputation and efforts are made to avoid them. When incidents happen, emergency actions risk being more drastic and less thought-through:

> *I think that made for a really ripe environment for a really major, highly restrictive policy that was not the one that we originally intended.*
> **Industry expert**

MENTAL HEALTH PRACTITIONERS AND EDUCATORS

- **Mental health professionals tend to lack digital expertise** and shy away from discussing the use of technology with adolescents in relation to mental health. This often creates a barrier for treatment due to adolescents' active involvement in online activities:

> *They were actually completely unaware of the extent to which young people were using those sites… I think that there still is a lack of understanding certainly from the specialist.* **Research expert**

> *...when people talk about Tik Tok, Instagram, Facebook, Twitter. I've got a grasp of some of those, but I don't fully understand the purpose of all of them.* **Clinician**

> *...all of this kind of encouragement of using digital technology and connecting with people… I think that's maybe what feels quite nerve wracking as a clinician at the moment, is, just that sort of these sort of uncharted waters of, you know, there's so much going on, so much possibility, and actually; do you really know what are the good things about things? And for who?* **Clinician**

- **Technology is mainly seen as a barrier to recovery and not also as part of treatment.**

> *Specialists around mental health are very judgmental around the technology.* **Academic expert**

> *It doesn't fit with their treatment plan. And therefore, it's outside of it somehow.* **Academic expert**

> *The treatment for eating disorders is around calorie gain… It's still very medicalised…the technology bit doesn't fit with that scheme.*
> **Academic expert**

- Mental health is dynamic, taking adolescents on a **pathway in and out of recovery and pro-harm digital spaces**. Understanding the different role technology can play is crucial for supporting adolescents effectively:

> *A lot of young people who are using these sites will navigate through pro-recovery to pro-harm, depending on how they are feeling at a time.*
> **Research expert**

- **Self-regulation of mental illness and digital activities involves the important skill of distinguishing between beneficial and harmful effects.** Several experts emphasised the importance of supporting adolescents to develop the competence to realise when online content or engagement stops being useful and the ability to step away to avoid harm. Arguably, it is the most vulnerable adolescents who find this harder to do.
- Adolescents who feel vulnerable might **share content online to get support or confirmation, but this can expose them to further risks** like bullying and sexual solicitation.

> *If they feel excluded and isolated socially or they're facing some big family crisis or a trauma, they look for protectors or people who will love them and this becomes obvious to those who are looking to manipulate and coerce.*
> **Civil society expert**

> *It's about educating people on the positives of the technology and how they can use it in a way that's better for them.* **Civil society and education expert**

RESEARCH AND POLICY

- **Government or school policies and initiatives emphasising fitness, physical activity and healthy eating can be triggering for adolescents who are already vulnerable** and hyper-sensitive to fitness and weight-loss concerns.

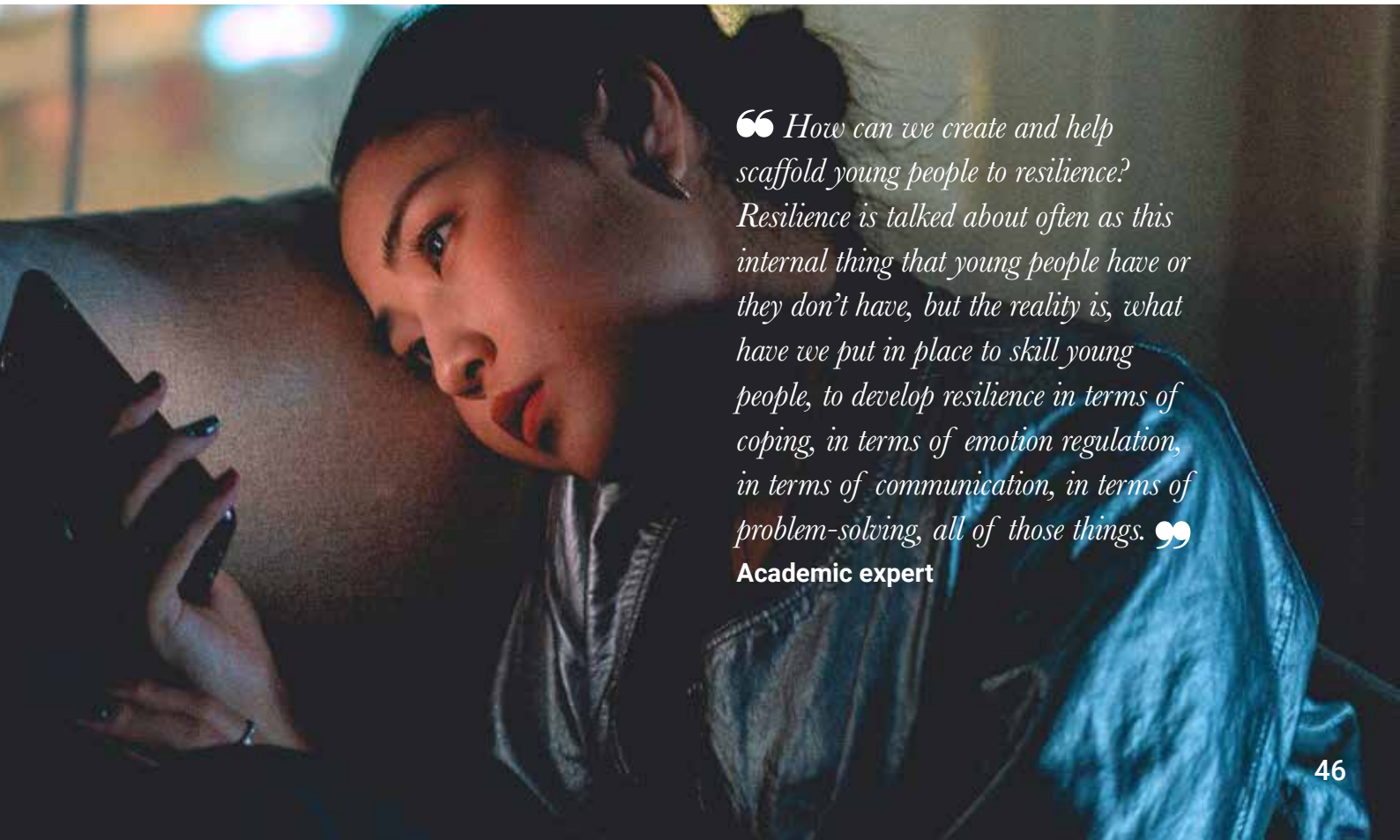
> *That whole message around BMI, that messaging around exercise was done in quite an unhealthy way. So, for people with eating disorders, all of that stuff can be really triggering.* **Civil society and education expert**

> *All of that comparison stuff then again can bring that person into a really, really dangerous place and encourages that disordered relationship.*
> **Civil society and education expert**

- **We need more public health messaging around mental health problems** in similar ways to more well-established public health concerns such as smoking, vaccination and road safety. Such public conversations can create awareness and remove the stigma on the topic:

> *We had incredibly powerful public health messaging around the dangers of smoking and drinking, whereas we don't have that for self-harm. And because we have the stigmatisation, self-harm is all about attention-seeking… It's a really bold signal of distress that we need to pay attention to.*
> **Academic expert**

- **Dealing with mental health needs to be part of broader efforts to scaffold resilience through digital media**, especially in a context where face-to-face resources are insufficient:
- **We need a balanced approach that weighs up adolescents' rights to participation and protection.** It is important to create an environment that allows adolescents to develop, learn and build resilience and to acknowledge the normal messiness of life:



> *How can we create and help scaffold young people to resilience? Resilience is talked about often as this internal thing that young people have or they don't have, but the reality is, what have we put in place to skill young people, to develop resilience in terms of coping, in terms of emotion regulation, in terms of communication, in terms of problem-solving, all of those things.*
> **Academic expert**

> *Being comfortable with the messiness of adolescence. […] distinguished between the needs and the evolving capacities of a teen from that of a much younger user.* **Industry expert**

> *If you deny that young person's right not just to those particular communities, but to everything else, to connecting to their family, to their school, friends, etc., it's really difficult. I think that's certainly something that's worrying practitioners more now.* **Research expert**

- **The pandemic has made the situation worse for many vulnerable adolescents** who are using online spaces to express their distress and seek help:

> *When the pandemic started in early March, in April, we saw a 55 per cent increase in that period of users clicking on those self-harm PSAs [public service announcements]. So, it was a very dramatic turn and one that certainly matched globally what was happening to especially young people who were growing more isolated.* **Industry expert**

- **The way that we identify and measure mental health might need updating to capture the current context.** For example, self-harm is usually understood as self-inflicted pain, and girls are seen to be at a higher risk. However, boys tend to engage in different practices of provoking violence that traditional definitions would not capture:

> *We did work with young offenders. We were asking about whether they deliberately got themselves into fights because that's a way to get hurt, and you get the same punching windows, car accidents, are actually, it turns out for those young people, acts of self-harm. Actually, what they want is the hurt and the pain.* **Academic expert**

- **Better coordination and cooperation between industry and child protection agencies could contribute to better learning and training opportunities.** Several industry experts shared their experiences of lacking context about adolescents' lives to understand better their online behaviour and be more effective in the early identification of mental health problems. In addition, some mentioned that there is very little follow-up when cases are reported, which seems to be a missed opportunity for training and improving moderation:

> *"Whenever we report things to emergency services or law enforcement, we are not informed about the outcome of that intervention."* **Industry expert**

- **Within the wealth of online information, finding reliable sources and helpful material can be challenging and requires skills** of information search and evaluation. Digital technologies can have a positive effect on how adolescents cope with mental health by giving them access to support, resources and information. Positive and reliable content is important to get these benefits, but it can be hard to identify and access.

DIGITAL AND POPULAR MEDIA

- **A culture of curated perfectionism can affect negatively adolescents' sense of self and their self-esteem.** It can create unattainable goals for adolescents and the constant need to compare themselves to others and a feeling of failure:

> *"I worry about what you might call curated perfectionism and how the standards that young people feel that have to attain physically and intellectually – everybody has to go to university, everybody has to look beautiful at all times – these are often unattainable goals for many young people. So, you've constantly got that thwarting in your personal life of not measuring up."* **Research expert**

> *Personally, I feel like I've been more shy to use it. I don't like posting pictures of myself because I feel like I'm constantly getting judged and based on how I look and people are always looking at, I don't know. I just feel more insecure, I guess.* **Adolescent**

- **Media coverage of tragic cases is very problematic.** It creates an unhelpful atmosphere of panic that prevents the fruitful discussion of mental health. High-profile suicide cases in the media can also act as a trigger for some young people:

> *I think, too often, it only comes to light in tragedy, which I think is then very difficult to develop our understanding from. Because sadly, they are the cases that do hit the headlines.* **Academic expert**

> *It's a particularly difficult area to work in, in terms of media generally, because we know about these, what we might call contagion effects, which we understand less well for self-harm, but we are very aware of in suicide. We know the particular kinds of media coverage can be really problematic and lead to clusters that might be related to certain suicides, for example.*
> **Academic expert**

- **It's a visual, dispersed and easily shareable form of communication that facilitates the distribution of material** that can be harmful to mental health. Social communication online is dispersed and happening across many accounts that follow each other, creating a large and dynamic community of users. It is easy to share and distribute self-harm or eating disorder messages that often rely on the visual:

> *You see the same images across lots of different accounts.*
> **Research expert**

> *The number of photographs, of images, the change is just absolutely incredible.* **Research expert**

- Many experts shared the concern that the popularity of mental health discussions on social media can help by **normalising these conditions, but sometimes it can also create a craze** and glamorise disorders:

> *New hashtags and this new craze around the eating disorder which again then fuels the illness even further.* **Civil society and education expert**

> *There's always the worry that there are so many other people doing it, it's normalised.* **Academic expert**

> *People share their cuts and photos they have taken themselves and then people say, 'Wow. You're so brave. You're so amazing' and suddenly they're getting validated in some way and they are pushed to do more.* **Civil society expert**

Implications for future research in the DIORA study

- The existing research tends to focus more on the negatives than the positive outcomes from internet use for adolescents' mental health. DIORA will adopt a balanced view – identifying any beneficial aspects and how these can be maximised. There is also a pressing need for research that evaluates the actual harm that may result from exposure to self-harm or eating disorder materials, especially research that disentangles whether such engagement is preceded by mental health problems or whether it exacerbates them. It is also hard to evaluate the long-term effects on adolescents' wellbeing and if the digital environment can provide a coping mechanism or exacerbate difficulties, and how this might differ based on adolescents' particular vulnerabilities.
- Less is known about protective factors, but there is some indicative evidence that happiness, a healthy lifestyle, family support and encouraging parenting can reduce risks linked to digital engagement. DIORA will explore how these can be used to inform positive interventions.

- The research reveals the complexity of adolescents' digital engagement, including but going beyond straightforward measures of internet use or time spent on social media. As a starting point in defining and measuring digital engagement, the report has noted the following dimensions that will be explored further in DIORA:
  - Exposure to, interaction with or participation in digital content, conduct and contact that afford opportunities and/or risks.
  - Excessive time spent online (although time use or "screen time" in general is less important).
  - Information and help-seeking activities (as both recipient and provider).
  - Sensitivity or vulnerability to triggering or unhealthy or risky digital contents or interactions.
  - Interest in and contribution to the representations, emotions, norms and practices characteristic of digital spaces.
  - Participation in and belonging to (niche) online communities.
  - Knowledge of, and interaction or coping with, digital affordances or design features.
  - Ways in which digital activities complement or compensate for or exacerbate/are exacerbated by offline activities or experiences.
- There are several methodological limitations in the existing studies, in combination highlighting how higher quality research methods and deeper conceptual work are needed and to interpret and contextualise the findings. Many of the internet-related studies seem out of date, referring to content that was no longer available (websites, hashtags, blogs, videos, etc.). The studies explore different platforms and content formats, and vary in their search and selection methods. They also focus predominantly on publicly available content, while much of the current emphasis is on private groups and discussions. The studies focusing on adolescents' accounts of their digital lives often include convenience samples that include both adolescents and adults, and vary in their measurement instruments, particularly in relation to self-harm. In spite of the wide age range covered by the studies (10–66 years old), there is little developmental focus and few comparisons of children and adolescents of different ages.

- Despite growing research and policy interest in adolescents' digital skills and competencies, as yet little work has examined these skills among those with mental health problems. Some indicative findings suggest that adolescents who have strategies to use the internet to reduce their levels of stress are much less likely to experience self-harm than those whose stress level is induced, while extreme cases of pathological use have the highest risk of self-harm (Kaess et al., 2014). One UK study also showed that lack of confidence with digital technologies acted as a barrier for healthcare professionals to access an online forum for supporting self-harming adolescents (16–25 years) (Owens et al., 2015).

Most research tends to treat all aspects of the digital environment as one "black box" or to focus on just one aspect, such as social media use. DIORA will pay greater attention to the specifics of the devices, apps and familiar and more niche social media that adolescents engage with, to better understand the digital journeys of adolescents with mental health difficulties.

References

Aktepe, E., Olgaç-Dündar, N., Soyöz, Ö., & Sönmez, Y. (2013). Possible internet addiction in high school students in the city center of isparta and associated factors: A cross-sectional study. *Turkish Journal of Pediatrics, 55*(4), 417–425.

Almenara, C. A., MacHackova, H., & Smahel, D. (2016). Individual differences associated with exposure to "ana-mia" websites: An examination of adolescents from 25 European countries. *Cyberpsychology, Behavior, and Social Networking, 19*(8), 475–480. doi:10.1089/cyber.2016.0098.

Alpaslan, A. H., Koçak, U., Avci, K., & Uzel Taş, H. (2015). The association between internet addiction and disordered eating attitudes among Turkish high school students. *Eating and Weight Disorders, 20*(4), 441–448. doi:10.1007/s40519-015-0197-9.

APA (American Psychiatric Association). (2013). *Diagnostic and statistical manual of mental disorders (5th edn)*.

Arseniev-Koehler, A., Lee, H., McCormick, T., & Moreno, M. A. (2016). #proana: Pro-eating disorder socialization on twitter. *Journal of Adolescent Health, 58*(6), 659–664. doi:10.1016/j.jadohealth.2016.02.012.

Bachner-Melman, R., Zontag-Oren, E., Zohar, A. H., & Sher, H. (2018). Lives on the line: The online lives of girls and women with and without a lifetime eating disorder diagnosis. *Frontiers in Psychology, 9*. doi:10.3389/fpsyg.2018.02128.

Baker, T. G., & Lewis, S. P. (2013). Responses to online photographs of non-suicidal self-injury: A thematic analysis. *Archives of Suicide Research, 17*(3), 223–235. doi:10.1080/13811118.2013.805642.

Barthorpe, A., Winstone, L., Mars, B., & Moran, P. (2020). Is social media screen time really associated with poor adolescent mental health? A time use diary study. *Journal of Affective Disorders, 274*, 864–870. doi:10.1016/j.jad.2020.05.106.

Berger, E., Hasking, P., & Martin, G. (2017). Adolescents' perspectives of youth non-suicidal self-injury prevention. *Youth & Society, 49*(1), 3–22. doi:10.1177/0044118X13520561.

Bergin, A. D., Vallejos, E. P., Davies, E. B., Daley, D., Ford, T., Harold, G., Hetrick, S., Kidner, M., Long, Y., Merry, S., Morriss, R., Sayal, K., Sonuga-Barke, E., Robinson, J., Torous, J., & Hollis, C. (2020). Preventive digital mental health interventions for children and young people: A review of the design and reporting of research. *NPJ Digital Medicine, 3*(1), 133. doi:10.1038/s41746-020-00339-7.

Bert, F., Gualano, M. R., Camussi, E., & Siliquini, R. (2016). Risks and threats of social media websites: Twitter and the proana movement. *Cyberpsychology, Behavior, and Social Networking, 19*(4), 233–238. doi:10.1089/cyber.2015.0553.

Borzekowski, D. L. G., Schenk, S., Wilson, J. L., & Peebles, R. (2010). E-ana and e-mia: A content analysis of pro-eating disorder web sites. *American Journal of Public Health, 100*(8), 1526–1534. doi:10.2105/AJPH.2009.172700.

Bould, H., Mars, B., Moran, P., Biddle, L., & Gunnell, D. (2019). Rising suicide rates among adolescents in England and Wales. *The Lancet, 394*(10193), 116–117.

Brown, R. C., Bendig, E., Fischer, T., David Goldwich, A., Baumeister, H., & Plener, P. L. (2019). Can acute suicidality be predicted by Instagram data? Results from qualitative and quantitative language analyses. *PLoS ONE, 14*(9). doi:10.1371/journal.pone.0220623.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77–101. doi:10.1191/1478088706qp063oa

Bucher, T. & Helmond, A. (2017). *The affordances of social media platforms. The SAGE handbook of social media.* London: SAGE Publications.

Butter, S., Shevlin, M., & Murphy, J. (2019). Negative self-evaluation and the genesis of internal threat: Beyond a continuum of suicidal thought and behaviour. *Psychological Medicine, 49*(15), 2591–2599. doi:10.1017/S0033291718003562.

Campaioli, G., Sale, E., Simonelli, A., & Pomini, V. (2017). The dual value of the web: Risks and benefits of the use of the internet in disorders with a self-destructive component in adolescents and young adults. *Contemporary Family Therapy: An International Journal, 39*(4), 301–313. doi:http://dx.doi.org/10.1007/s10591-017-9443-9.

Carrotte, E. R., Vella, A. M., & Lim, M. S. C. (2015). Predictors of "liking" three types of health and fitness-related content on social media: A cross-sectional study. *Journal of Medical Internet Research, 17*(8). doi:10.2196/jmir.4803.

Castro, T. S., & Osório, A. (2012). Online violence: Not beautiful enough... Not thin enough. Anorectic testimonials in the web. *PsychNology Journal, 10*(3), 169–186.

Cavazos-Rehg, P. A., Fitzsimmons-Craft, E. E., Krauss, M. J., Anako, N., Xu, C., Kasson, E., Costello, S.J., & Wilfley, D. E. (2020). Examining the self-reported advantages and disadvantages of socially networking about body image and eating disorders. *International Journal of Eating Disorders, 53*(6), 852–863. doi:10.1002/eat.23282.

Ceranoglu, T. A. (2018). Inattention to problematic media use habits: Interaction between digital media use and attention-deficit/hyperactivity disorder. *Child & Adolescent Psychiatric Clinics of North America, 27*(2), 183–191. doi:https://dx.doi.org/10.1016/j.chc.2017.11.009.

Cerniglia, L., Guicciardi, M., Sinatra, M., Monacis, L., Simonelli, A., & Cimino, S. (2019). The use of digital technologies, impulsivity and psychopathological symptoms in adolescence. *Behavioral Sciences, 9*(8). doi:10.3390/bs9080082.

Chan, M., Li, T. M. H., Law, Y. W., Wong, P. W. C., Chau, M., Cheng, C., Fu, K. W., Bacon-Shone, J., Cheng, Q. E., & Yip, P. S. F. (2017). Engagement of vulnerable youths using internet platforms. *PLoS ONE, 12*(12). doi:10.1371/journal.pone.0189023.

Chang, F. C., Lee, C. M., Chen, P. H., Chiu, C. H., Pan, Y. C., & Huang, T. F. (2013). Association of thin-ideal media exposure, body dissatisfaction and disordered eating behaviors among adolescents in Taiwan. *Eating Behaviors, 14*(3), 382–385. doi:10.1016/j.eatbeh.2013.05.002.

Chang, P. F., & Bazarova, N. N. (2016). Managing stigma: Disclosure-response communication patterns in pro-anorexic websites. *Health Communication, 31*(2), 217–229. doi:10.1080/10410236.2014.946218.

Chuang, T.-Y., Lee, I. C., & Chen, W.-C. (2010). Use of digital console game for children with attention deficit hyperactivity disorder. *Online Submission, 7*(11), 99–105.

Claes, L., Müller, A., Norré, J., van Assche, L., Wonderlich, S., & Mitchell, J. E. (2012). The relationship among compulsive buying, compulsive internet use and temperament in a sample of female patients with eating disorders. *European Eating Disorders Review, 20*(2), 126–131. doi:10.1002/erv.1136.

Collins, A., Coughlin, D., Miller, J., & Kirk, S. (2015). *The production of quick scoping reviews and rapid evidence assessments: A how to guide.* http://nora.nerc.ac.uk/id/eprint/512448

Common Sense Media. (2020). *Tweens, teens, tech, and mental health: Coming of age in an increasingly digital, uncertain, and unequal world*. www.commonsensemedia.org/research/tweens-teens-tech-and-mental-health

Custers, K. (2015). The urgent matter of online pro-eating disorder content and children: Clinical practice. *European Journal of Pediatrics, 174*(4), 429–433. doi:https://dx.doi.org/10.1007/s00431-015-2487-7.

De Riggi, M. E., Lewis, S. P., & Heath, N. L. (2018). Brief report: Nonsuicidal self-injury in adolescence: Turning to the internet for support. *Counselling Psychology Quarterly, 31*(3), 397–405. doi:10.1080/09515070.2018.1427556.

Dickson K, Richardson M, Kwan I, et al. (2018). *Screen-based activities and children and young people's mental health and psychosocial wellbeing: A systematic map of reviews*. London: EPPI-Centre, Social Science Research Unit

Domoff, S. E., Sutherland, E. Q., Yokum, S., & Gearhardt, A. N. (2020). Adolescents' addictive phone use: Associations with eating behaviors and adiposity. *International Journal of Environmental Research and Public Health, 17*(8). doi:10.3390/ijerph17082861.

Eichenberg, C. & Schott, M. (2017). An empirical analysis of internet message boards for self-harming behavior. *Archives of Suicide Research, 21*(4), 672–686. doi:10.1080/13811118.2016.1259597.

Enagandula, R., Singh, S., Adgaonkar, G. W., Subramanyam, A. A., & Kamath, R. M. (2018). Study of internet addiction in children with attention-deficit hyperactivity disorder and normal control. *Industrial Psychiatry Journal, 27*(1), 110–114. doi:https://dx.doi.org/10.4103/ipj.ipj_47_17.

Evren, B., Evren, C., Dalbudak, E., Topcu, M., & Kutlu, N. (2018). Relationship of internet addiction severity with probable ADHS and difficulties in emotion regulation among young adults. *Psychiatry Research, 269*, 494–500. doi:https://doi.org/10.1016/j.psychres.2018.08.112.

Ferguson, C. J., Muñoz, M. E., Garza, A., & Galindo, M. (2014). Concurrent and prospective analyses of peer, television and social media influences on body dissatisfaction, eating disorder symptoms and life satisfaction in adolescent girls. *Journal of Youth and Adolescence, 43*(1), 1–14. doi:10.1007/s10964-012-9898-9.

Fitzsimmons-Craft, E. E., Krauss, M. J., Costello, S. J., Floyd, G. M., Wilfley, D. E., & Cavazos-Rehg, P. A. (2020). Adolescents and young adults engaged with pro-eating disorder social media: Eating disorder and comorbid psychopathology, health care utilization, treatment barriers, and opinions on harnessing technology for treatment. *Eating and Weight Disorders, 25*(6), 1681–1692. doi:http://dx.doi.org/10.1007/s40519-019-00808-3.

Franzén, A. G. & Gottzén, L. (2011). The beauty of blood? Self-injury and ambivalence in an internet community. *Journal of Youth Studies, 14*(3), 279–294. doi:10.1080/13676261.2010.533755.

Fridh, M., Lindström, M., & Rosvall, M. (2019). Associations between self-injury and involvement in cyberbullying among mentally distressed adolescents in Scania, Sweden. *Scandinavian Journal of Public Health, 47*(2), 190–198. doi:10.1177/1403494818779321.

Frost, M. & Casey, L. (2016). Who seeks help online for self-injury? *Archives of Suicide Research, 20*(1), 69–79. doi:10.1080/13811118.2015.1004470.

Frost, M., Casey, L., & Rando, N. (2016). Self-injury, help-seeking, and the internet: Informing online service provision for young people. *Crisis, 37*(1), 68–76. doi:10.1027/0227-5910/a000346.

Ging, D. & Garvey, S. (2018). "Written in these scars are the stories I can't explain": A content analysis of pro-ana and thinspiration image sharing on instagram. *New Media and Society, 20*(3), 1181–1200. doi:10.1177/1461444816687288.

Goodman, R. (2013). Using digital storytelling as voice for adolescent females who self-injure. *International Journal for Human Caring, 17*(2), 29–34. doi: http://dx.doi.org/10.20467/1091-5710.17.2.29.

Grant, M. J. & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal, 26*(2), 91–108. doi:https://doi.org/10.1111/j.1471-1842.2009.00848.x.

Gregory, R. J. & Mustata, G. T. (2012). Magical thinking in narratives of adolescent cutters. *Journal of Adolescence, 35*(4), 1045–1051. doi:10.1016/j.adolescence.2012.02.012.

Grist, R., Cliffe, B., Denne, M., Croker, A., & Stallard, P. (2018). An online survey of young adolescent girls' use of the internet and smartphone apps for mental health support. *BJPsych Open, 4*(4), 302–306. doi:10.1192/bjo.2018.43.

Grist, R., Porter, J., & Stallard, P. (2018). Acceptability, use, and safety of a mobile phone app (Blueice) for young people who self-harm: Qualitative study of service users' experience. *JMIR Mental Health, 5*(1), e16. doi:https://dx.doi.org/10.2196/mental.8779.

Gubelmann, A., Berchtold, A., Barrense-Dias, Y., Akre, C., Newman, C. J., & Suris, J. C. (2018). Youth with chronic conditions and risky behaviors: An indirect path. *Journal of Adolescent Health, 63*(6), 785–791. doi:10.1016/j.jadohealth.2018.06.021.

Harris, I. M. & Roberts, L. M. (2013). Exploring the use and effects of deliberate self-harm websites: An internet-based study. *Journal of Medical Internet Research, 15*(12). doi:10.2196/jmir.2802.

Harvey, K. & Brown, B. (2012). Health communication and psychological distress: Exploring the language of self-harm. *Canadian Modern Language Review, 68*(3), 316–340. doi:10.3138/cmlr.1103.

Hay, C. & Meldrum, R. (2010). Bullying victimization and adolescent self-harm: Testing hypotheses from general strain theory. *Journal of Youth and Adolescence, 39*(5), 446–459. doi:10.1007/s10964-009-9502-0.

Heerde, J. A. & Hemphill, S. A. (2019). Are bullying perpetration and victimization associated with adolescent deliberate self-harm? A meta-analysis. *Archives of Suicide Research, 23*(3), 353–381. doi:10.1080/13811118.2018.1472690.

Hipple Walters, B., Adams, S., Broer, T., & Bal, R. (2015). Proud2bme: Exploratory research on care and control in young women's online eating disorder narratives. *Health (United Kingdom), 20*(3), 220–241. doi:10.1177/1363459315574118.

HM Government. (2019). *Online harms White Paper*. www.gov.uk/government/consultations/online-harms-white-paper

Hollis, C., Falconer, C. J., Martin, J. L., Whittington, C., Stockton, S., Glazebrook, C., & Davies, E. B. (2017). Annual research review: Digital health interventions for children and young people with mental health problems – a systematic and meta-review. *Journal of Child Psychology and Psychiatry, 58*(4), 474–503. doi:10.1111/jcpp.12663.

Hollis, C., Livingstone, S., & Sonuga-Barke, E. (2020). Editorial: The role of digital technology in children and young people's mental health – a triple-edged sword? *Journal of Child Psychology and Psychiatry, 61*(8), 837–841. doi:https://doi.org/10.1111/jcpp.13302.

Jacob, N., Evans, R., & Scourfield, J. (2017). The influence of online images on self-harm: A qualitative study of young people aged 16–24. *Journal of Adolescence, 60*, 140–147. doi: https://doi.org/10.1016/j.adolescence.2017.08.001.

Johnson, J., Cohen, P., Kasen, S., & Brook, J. S. (2002). Childhood adversities associated with risk for eating disorders or weight problems during adolescence or early adulthood. *American Journal of Psychiatry, 159*(3), 394–400. doi:10.1176/appi.ajp.159.3.394.

Jones, R., Sharkey, S., Ford, T., Emmens, T., Hewis, E., Smithson, J., Sheaves, B., & Owens, C. (2011). Online discussion forums for young people who self-harm: User views. *Psychiatrist, 35*(10), 364–368. doi:10.1192/pb.bp.110.033449.

Jose, P. E. & Fu, K. Y. (2018). Does receiving malicious texts predict subsequent self-harming behavior among adolescents? *Computers in Human Behavior, 89*, 328–334. doi:10.1016/j.chb.2018.08.005.

Kaess, M., Durkee, T., Brunner, R., Carli, V., Parzer, P., Wasserman, C., Sarchiapone, M., Hoven, C., Apter, A., Balazs, J., Balint, M., Bobes, J., Cohen, R., Cosman, D., Cotter, P., Fischer, G., Floderus, B., Iosue, M., Haring, C. . . . Wasserman, D. (2014). Pathological internet use among european adolescents: Psychopathology and self-destructive behaviours. *European Child and Adolescent Psychiatry, 23*(11), 1093–1102. doi:10.1007/s00787-014-0562-7.

Kaewpradub, N., Kiatrungrit, K., Hongsanguansri, S., & Pavasuthipaisit, C. (2017). Association among internet usage, body image and eating behaviors of secondary school students. *Shanghai Archives of Psychiatry, 29*(4), 208–217. doi:10.11919/j.issn.1002-0829.216092.

Kelly, Y., Zilanawala, A., Booker, C., & Sacker, A. (2018). Social media use and adolescent mental health: Findings from the UK millennium cohort study. *EClinicalMedicine, 6*, 59–68.

Knapton, O. (2013). Pro-anorexia: Extensions of ingrained concepts. *Discourse and Society, 24*(4), 461–477. doi:10.1177/0957926513482067.

Lewis, S. P. & Baker, T. G. (2011). The possible risks of self-injury web sites: A content analysis. *Archives of Suicide Research, 15*(4), 390–396. doi:10.1080/13811118.2011.616154.

Lewis, S. P. & Michal, N. J. (2016). Start, stop, and continue: Preliminary insight into the appeal of self-injury e-communities. *Journal of Health Psychology, 21*(2), 250–260. doi:10.1177/1359105314527140.

Liu, H. C., Liu, S. I., Tjung, J. J., Sun, F. J., Huang, H. C., & Fang, C. K. (2017). Self-harm and its association with internet addiction and internet exposure to suicidal thought in adolescents. *Journal of the Formosan Medical Association, 116*(3), 153–160. doi:10.1016/j.jfma.2016.03.010.

Liu, M., Zhang, J., Hu, E., Yang, H., Cheng, C., & Yao, S. (2019). Combined patterns of physical activity and screen-related sedentary behavior among Chinese adolescents and their correlations with depression, anxiety and self-injurious behaviors. *Psychology Research & Behavior Management, 12*, 1041–1050. doi:https://dx.doi.org/10.2147/PRBM.S220075.

Livingstone, S. (2016). *A framework for researching Global Kids Online: Understanding children's well-being and rights in the digital age*. www.globalkidsonline.net/framework

Lopez, V., Corona, R., & Halfond, R. (2013). Effects of gender, media influences, and traditional gender role orientation on disordered eating and appearance concerns among Latino adolescents. *Journal of Adolescence, 36*(4), 727–736. doi:10.1016/j.adolescence.2013.05.005.

Lung, F. W., Shu, B. C., Chiang, T. L., & Lin, S. J. (2020). Relationships between internet use, deliberate self-harm, and happiness in adolescents: A Taiwan birth cohort pilot study. *PLoS ONE, 15*(7), e0235834. doi:10.1371/journal.pone.0235834.

Marco, J. H. & Tormo-Irun, M. P. (2018). Cyber victimization is associated with eating disorder psychopathology in adolescents. *Frontiers in Psychology, 9*(JUN). doi:10.3389/fpsyg.2018.00987.

Martorana, G. (2015). Characteristics and associated factors of non-suicidal self-injury among Italian young people: A survey through a thematic website. *Journal of Behavioral Addictions, 4*(2), 93–100. doi:10.1556/2006.4.2015.001.

Mayor, S. (2019). Major rise in non-suicidal self harm in England, study shows. *British Medical Journal*. doi:10.1136/bmj.l4058.

Michels, N. & Amenyah, S. D. (2017). Body size ideals and dissatisfaction in Ghanaian adolescents: Role of media, lifestyle and well-being. *Public Health, 146*, 65–74. doi:10.1016/j.puhe.2017.01.006.

Mitchell, K. J., Wells, M., Priebe, G., & Ybarra, M. L. (2014). Exposure to websites that encourage self-harm and suicide: Prevalence rates and association with actual thoughts of self-harm and thoughts of suicide in the United States. *Journal of Adolescence, 37*(8), 1335–1344. doi:10.1016/j.adolescence.2014.09.011.

Moran, P., Coffey, C., Romaniuk, H., Olsson, C., Borschmann, R., Carlin, J. B., & Patton, G. C. (2012). The natural history of self-harm from adolescence to young adulthood: A population-based cohort study. *The Lancet, 379*(9812), 236–243. doi:https://doi.org/10.1016/S0140-6736(11)61141-0.

Nguyen, H. T. L., Nakamura, K., Seino, K., & Vo, V. T. (2020). Relationships among cyberbullying, parental attitudes, self-harm and suicidal behavior among adolescents: Results from a school-based survey in Vietnam. *BMC Public Health, 20*(1). doi:10.1186/s12889-020-08500-3.

NHS Digital. (2020). *Mental health of children and young people in England: Wave 1 follow up to 2017 survey*. https://files.digital.nhs.uk/AF/AECD6B/mhcyp_2020_rep_v2.pdf

Niederkrotenthaler, T., Stack, S., Till, B., Sinyor, M., Pirkis, J., Garcia, D., Rockett, I. R. H., & Tran, U. S. (2019). Association of increased youth suicides in the United States with the release of 13 reasons why. *JAMA psychiatry, 76*(9), 933–940.

O'Connor, R. C., Rasmussen, S., & Hawton, K. (2014). Adolescent self-harm: A school-based study in Northern Ireland. *Journal of Affective Disorders, 159*, 46–52. doi:10.1016/j.jad.2014.02.015.

Oksanen, A., Garcia, D., Sirola, A., Näsi, M., Kaakinen, M., Keipi, T., & Räsänen, P. (2015). Pro-anorexia and anti-pro-anorexia videos on YouTube: Sentiment analysis of user responses. *Journal of Medical Internet Research, 17*(11). doi:10.2196/jmir.5007.

Oksanen, A., Nasi, M., Minkkinen, J., Keipi, T., Kaakinen, M., & Rasanen, P. (2016). Young people who access harm-advocating online content: A four country survey. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 10*(2). doi:10.5817/cp2016-2-6.

Oshima, N., Nishida, A., Shimodera, S., Tochigi, M., Ando, S., Yamasaki, S., Okazaki, Y., & Sasaki, T. (2012). The suicidal feelings, self-injury, and mobile phone use after lights out in adolescents. *Journal of Pediatric Psychology, 37*(9), 1023–1030. doi:10.1093/jpepsy/jss072.

Owens, C., Sharkey, S., Smithson, J., Hewis, E., Emmens, T., Ford, T., & Jones, R. (2015). Building an online community to promote communication and collaborative learning between health professionals and young people who self-harm: An exploratory study. *Health Expectations, 18*(1), 81–94. doi:10.1111/hex.12011.

Pan, P. Y. & Yeh, C. B. (2018). Internet addiction among adolescents may predict self-harm/suicidal behavior: A prospective study. *Journal of Pediatrics, 197*, 262–267. doi:10.1016/j.jpeds.2018.01.046.

Patchin, J. W. & Hinduja, S. (2017). Digital self-harm among adolescents. *Journal of Adolescent Health, 61*(6), 761–766. doi:10.1016/j.jadohealth.2017.06.012.

Peng, Z., Klomek, A. B., Li, L., Su, X., Sillanmaki, L., Chudal, R., & Sourander, A. (2019). Associations between Chinese adolescents subjected to traditional and cyber bullying and suicidal ideation, self-harm and suicide attempts. *BMC Psychiatry, 19*(1). doi:10.1186/s12888-019-2319-9.

Polanczyk, G. V., Salum, G. A., Sugaya, L. S., Caye, A., & Rohde, L. A. (2015). Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of Child Psychology and Psychiatry, 56*(3), 345–365. doi:https://doi.org/10.1111/jcpp.12381.

Prnjak, K., Jukic, I., & Korajlija, A. L. (2019). How perfectionism and eating disorder symptoms contribute to searching weight-loss information on the internet? *Medicina (Lithuania), 55*(10). doi:10.3390/medicina55100621.

Ramos, J. S., Neto, A. F. P., & Bagrichevsky, M. (2011). Pro-anorexia cultural identity: The characteristics of a lifestyle in a virtual community. *Interface: Communication, Health, Education, 15*(37), 447–460. doi:10.1590/S1414-32832011005000018.

Ransom, D. C., La Guardia, J. G., Woody, E. Z., & Boyd, J. L. (2010). Interpersonal interactions on online forums addressing eating concerns. *International Journal of Eating Disorders, 43*(2), 161–170. doi:10.1002/eat.20629.

Rideout, V., Fox, S., Peebles, A., & Robb, M. (2021). *Coping with COVID-19: How young people use digital media to manage their mental health*. Common Sense and Hopelab.

Rodgers, R. F., Skowron, S., & Chabrol, H. (2012). Disordered eating and group membership among members of a pro-anorexic online community. *European Eating Disorders Review, 20*(1), 9–12. doi:10.1002/erv.1096.

Royal College of Psychiatrists (2020). *Technology use and the mental health of children and young people*. www.rcpsych.ac.uk/improving-care/campaigning-for-better-mental-health-policy/college-reports/2020-college-reports/Technology-use-and-the-mental-health-of-children-and-young-people-cr225

Russell, A. E., Joinson, C., Roberts, E., Heron, J., Ford, T., Gunnell, D., Moran, P., Relton, C., Suderman, M., & Mars, B. (2021). Childhood adversity, pubertal timing and self-harm: A longitudinal cohort study. *Psychological Medicine*, 1–9. doi:10.1017/S0033291721000611.

Seko, Y., Kidd, S. A., Wiljer, D., & McKenzie, K. J. (2015). On the creative edge: Exploring motivations for creating non-suicidal self-injury content online. *Qualitative Health Research, 25*(10), 1334–1346. doi:10.1177/1049732315570134.

Shafı, R. M. A., Nakonezny, P. A., Romanowicz, M., Nandakumar, A. L., Suarez, L., & Croarkin, P. E. (2020). Suicidality and self-injurious behavior among adolescent social media users at psychiatric hospitalization. *CNS Spectrums*. doi:10.1017/S1092852920001108.

Smink, F. R. E., van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of eating disorders: Incidence, prevalence and mortality rates. *Current Psychiatry Reports, 14*(4), 406–414. doi:10.1007/s11920-012-0282-y.

Strittmatter, E., Kaess, M., Parzer, P., Fischer, G., Carli, V., Hoven, C. W., Wasserman, C., Sarchiapone, M., Durkee, T., Apter, A., Bobes, J., Brunner, R., Cosman, D., Sisask, M., Värnik, P., &. Wasserman, D. (2015). Pathological internet use among adolescents: Comparing gamers and non-gamers. *Psychiatry Research, 228*(1), 128–135. doi:10.1016/j.psychres.2015.04.029.

Syed-Abdul, S., Fernandez-Luque, L., Jian, W. S., Li, Y. C., Crain, S., Hsu, M. H., Wang, Y. C., Khandregzen, D., Chuluunbaatar, E., Nguyen, P. A., & Liou, D. M. (2013). Misleading health-related information promoted through video-based social media: Anorexia on YouTube. *Journal of Medical Internet Research, 15*(2). doi:10.2196/jmir.2237.

Tang, J., Ma, Y., Lewis, S. P., Chen, R., Clifford, A., Ammerman, B. A., Gazimbi, M. M., Byrne, A., Wu, Y., Lu, X., Chang, H., Kang, C., Tiemeier, H., & Yu, Y. (2020). Association of internet addiction with nonsuicidal self-injury among adolescents in China. *JAMA Network Open, 3*(6), e206863. doi:http://dx.doi.org/10.1001/jamanetworkopen.2020.6863.

Terhoeven, V., Nikendei, C., Bärnighausen, T., Bountogo, M., Friederich, H. C., Ouermi, L., Sié, A., & Harling, G. (2020). Eating disorders, body image and media exposure among adolescent girls in rural Burkina Faso. *Tropical Medicine and International Health, 25*(1), 132–141. doi:10.1111/tmi.13340.

Thapar, A., Stewart-Brown, S., & Harold, G. T. (2021). What has happened to children's wellbeing in the UK? *The Lancet Psychiatry, 8*(1), 5–6. doi:10.1016/s2215-0366(20)30481-8.

Tong, S. T., Heinemann-LaFave, D., Jeon, J., Kolodziej-Smith, R., & Warshay, N. (2013). The use of pro-ana blogs for online social support. *Eating Disorders, 21*(5), 408–422. doi:10.1080/10640266.2013.827538.

Tseng, F. Y. & Yang, H. J. (2015). Internet use and web communication networks, sources of social support, and forms of suicidal and nonsuicidal self-injury among adolescents: Different patterns between genders. *Suicide and Life-Threatening Behavior, 45*(2), 178–191. doi:10.1111/sltb.12124.

Turja, T., Oksanen, A., Kaakinen, M., Sirola, A., Kaltiala-Heino, R., & Räsänen, P. (2017). Proeating disorder websites and subjective well-being: A four-country study on young people. *International Journal of Eating Disorders, 50*(1), 50–57. doi:10.1002/eat.22589.

UN Committee on the Rights of the Child. 2021. *General comment No. 25 on children's rights in relation to the digital environment, CRC/C/GC/25*. United Nations.

UNICEF. (2021). *On my mind: Promoting, protecting and caring for children's mental health*. www.unicef.org/reports/state-worlds-children-2021

Unnever, J. D. & Cornell, D. G. (2003). Bullying, self-control, and ADHD. *Journal of Interpersonal Violence, 18*(2), 129–147. doi:10.1177/0886260502238731.

VoiceBox. (2021). *Digital wellbeing: A balancing act*. Retrieved from https://parentzone.org.uk/article/digital-wellbeing-balancing-act-report-voicebox

Wang, T., Brede, M., Ianni, A., & Mentzakis, E. (2018). Social interactions in online eating disorder communities: A network perspective. *PLoS ONE, 13*(7), e0200800. doi:10.1371/journal.pone.0200800.

Wiguna, T., Irawati Ismail, R., Sekartini, R., Setyawati Winarsih Rahardjo, N., Kaligis, F., Prabowo, A. L., & Hendarmo, R. (2018). The gender discrepancy in high-risk behaviour outcomes in adolescents who have experienced cyberbullying in Indonesia. *Asian Journal of Psychiatry, 37*, 130–135. doi:10.1016/j.ajp.2018.08.021.

Yeshua-Katz, D. (2015). Online stigma resistance in the pro-ana community. *Qualitative Health Research, 25*(10), 1347–1358. doi:10.1177/1049732315570123.

Yeshua-Katz, D. & Martins, N. (2013). Communicating stigma: The pro-ana paradox. *Health Communication, 28*(5), 499–508. doi:10.1080/10410236.2012.699889.

Yildirim, M. S., Sevincer, G. M., Kandeger, A., & Afacan, C. (2018). Investigation of the relationship between risk of internet addiction, food addiction, and self-esteem in high school students. *Dusunen Adam, 31*(2), 187–194. doi:10.5350/DAJPN2018310206.

Zhu, L., Westers, N. J., Horton, S. E., King, J. D., Diederich, A., Stewart, S. M., & Kennard, B. D. (2016). Frequency of exposure to and engagement in nonsuicidal self-injury among inpatient adolescents. *Archives of Suicide Research, 20*(4), 580–590. doi:10.1080/13811118.2016.1162240.

Appendix I: Coded studies with adolescents

Eating disorder – studies with adolescents

Author(s)	Sample size	Sample: general or clinical	Age	Method	Country
Almenara et al. (2016)	18,709	General	11–16	Face-to-face survey	25 European countries (EUKO)
Alpaslan et al. (2015)	584	General	14–20	School survey	Turkey
Bachner-Melman et al. (2018)	122	Clinical (a lifetime eating disorder diagnosis)	12–30	Face-to-face survey and an online survey – age-matched controls	Israel
Carrotte et al. (2015)	1,001	General (social media users)	15–29	Online survey	Australia
Cavazos-Rehg et al. (2020)	598	General	15+	Online survey	USA
Chang et al. (2013)	2,992	General	15–16	School survey	Taiwan
Claes et al. (2012)	60	Clinical (outpatients with an eating disorder)	15–57	Face-to-face survey	USA
Domoff et al. (2020)	111	Clinical (excessive smartphone users)	M=14.6	Face-to-face survey	USA

Author(s)	Sample size	Sample: general or clinical	Age	Method	Country
Ferguson et al. (2014)	237	General	10–17	Surveys and BMI	USA
Fitzsimmon-Craft et al. (2020)	405	Pro-eating disorder social media users (Instagram, Facebook, Twitter, Reddit)	15–25	Online survey	USA
Grist et al. (2018)	775	General	11–16	School survey	UK
Gubelmann et al. (2018)	5,179	General	15–34	Online survey	Switzerland
Kaewpradub et al. (2017)	620	General	7–12	School survey	Thailand
Lopez et al. (2018)	96	General	13–18	Face-to-face survey and BMI	USA
Marco & Tormo-Irun (2018)	676	General	12–19	Survey	Spain
Michels & Amenyah (2017)	370	General	11–18	School survey and body measurements	Ghana
Oksanen et al. (2016)	3,565	General	15–30	Online survey	USA, UK, Germany, Finland
Peat et al. (2015)	1,053 (girls)	General	12–35	Face-to-face survey and body measurements	China
Prnjak et al. (2019)	228	General (social media users)	17–66	Online survey	NA
Ransom (2010)	60	Eating disorder forum users	14–30	Online surveys and control using undergrads aged 18–28	USA, UK, EU, Canada, Australia, Asia

Author(s)	Sample size	Sample: general or clinical	Age	Method	Country
Rodgers et al. (2012)	29	Pro-ana forum users	12–23	Qualitative digital method (open-ended questions via email)	France
Terhoeven et al. (2020)	696	General	12–20	Face-to-face interview	Burkina Faso
Turja et al. (2017)	3,557	General	15–30	Online survey	USA, UK, Germany, Finland
Yeshua-Katz (2015)	33	Pro-ana bloggers	15–33	Online interviews	USA, UK, EU, Canada, New Zealand
Yeshua-Katz & Martins (2013)	33	Pro-ana bloggers	15–33	Semi-structured interviews	USA, UK, EU, Canada, New Zealand
Yildirim et al. (2018)	378	General	14–18	School survey	Turkey

Self-harm – studies with adolescents

Author(s)	Sample size	Sample: general or clinical	Age	Method	Country
Aktepe et al. (2013)	1,645	General	14–19	School survey	Turkey
Alavi et al. (2015)	182	Clinical (adolescents referred to a hospital-based urgent consultation clinic)	M=14.4	Retrospective chart review	Canada
Barthorpe et al. (2020)	11,884	General	13–15	Household survey (Millennium Cohort Study)	UK
Berger et al. (2017)	2,637	General	12–18	School survey	Australia
Brown et al. (2019)	52	Users with Instagram accounts associated with non-suicidal self-injury	M=16	Online interview	Germany
Chan et al. (2017)	1,010	General	<18–29	Telephone survey (mobile)	Hong Kong
De Riggi et al. (2018)	142	General	14–15	School survey	Canada
Eichenberg & Schott (2017)	309	Users of self-harm message boards	13–46	Online survey	Germany
Fridh et al. (2019)	6,841	General	14–21	School survey	Sweden
Frost & Casey (2016)	679	General	14–25	Online survey	Australia

Author(s)	Sample size	Sample: general or clinical	Age	Method	Country
Frost et al. (2016)	457	General	14–25	Online survey	Australia
Goodman (2013)	7	General	14–20	Digital storytelling (a written story and photographs, videos and soundtracks)	USA
Grist et al. (2018)	40	Clinical (Children and Adolescent Mental Health Services)	12–17	Face-to-face interview	UK
Harris & Roberts (2013)	329	Online self-harm forum users	M=23	Online survey	NA
Hay & Meldrum (2010)	426	General	10–21	School survey	USA
Heerde & Hemphill (2019)	156,284	General	11–19	Systematic review	Multiple (based on 27 studies)
Jones et al. (2011)	47	Online self-harm forum users	16–25	Online survey	UK
Jose & Fu (2018)	1,276	General	10–15	School survey (longitudinal)	New Zealand
Kaess et al. (2014)	11,356	General	M=14.9	School survey	Austria, Estonia, France, Germany, Hungary, Ireland, Israel, Italy, Romania, Slovenia, Spain

Author(s)	Sample size	Sample: general or clinical	Age	Method	Country
Lewis & Michal (2016)	68	Self-injury e-community members	16–57	Online survey	USA, Canada, England, Austria, Germany, Finland, Ireland, Russia, Sweden, Netherlands
Li et al. (2019)	22,628	General	M=15.4	School survey	China
Liu et al. (2017)	2479	General	14–19	School survey	Taiwan
Liu et al. (2019)	13,659	General	M=15.2	School survey	China
Lung et al. (2020)	1,457	General	12–13	Household survey (cohort study)	Taiwan
Martorana (2015)	362	Young people visiting self-harm support websites	12–30	Online survey	Italy
Mitchell et al. (2014)	1,560	General	10–17	Telephone survey	USA
Nguyen et al. (2020)	648	General	11	School survey	Vietnam
O'Connor et al. (2014)	3,596	General	15–16	School survey	Northern Ireland
Oksanen et al. (2016)	3,565	General	15–30	Online survey	USA, UK, Germany, Finland
Oshima et al. (2012)	17,920	General	12–18	School survey	Japan

Author(s)	Sample size	Sample: general or clinical	Age	Method	Country
Owens et al. (2015)	77	Self-harm forum users	16–25	Mixed (questionnaire and forum logs)	UK
Pan & Yeh (2018)	1,861	General	M=15.9	School survey	Taiwan
Patchin & Hinduja (2017)	5,593	General	12–17	Online survey (representative)	USA
Peng et al. (2019)	2,647	General	12–14	School survey	China
Seko et al. (2015)	17	Self-harm community members	16–27	Online interview	Canada
Shafi et al. (2020)	112	Clinical (psychiatric patients)	12–17	Retrospective chart review	USA
Stallard et al. (2018)	40	Clinical (CAMHS)	12–17	Survey (face-to-face, pre and post)	UK
Strittmatter et al. (2015)	8,807	General	M=15	School survey	Estonia, Germany, Italy, Romania, Spain
Tang et al. (2020)	15,623	General	11–20	School survey	China
Tseng & Yang (2015)	391	General	12–18	School survey	Taiwan
Villani et al. (2019)	312	General	14–21	School survey	Italy
Wiguna et al. (2018)	2,917	General	11–18	School survey	Indonesia
Zhu et al. (2016)	90	Clinical (inpatient psychiatric programme)	12–17	Mixed (questionnaire and interview)	USA

Appendix II: Scoping evidence review methodology

This review of adolescent mental health in a digital world focused on what is known and not known regarding the three target groups – ADHD, self-harm and eating disorders – specifically in relation to digital technologies, and whether they represent a source of help or hindrance.

Inclusion criteria

To ensure the quality of the review, we applied the following inclusion criteria:

- Literature relating to adolescents' experiences of ADHD, self-harm and eating disorders in relation to use of technologies.
- Primary research with adolescents younger than 18. Research with adults was only included only when adolescents were also participating (eg, as part of family studies).
- From any country, but published in English.
- Published since 2010 to ensure relevance for current contexts and current technological advances.
- Published in peer-reviewed journals. Grey literature, such as policy or advocacy-related publications from non-governmental organisations (NGOs), government reports and industry sources were excluded (although they informed the design of the research).
- Deriving from high-quality, methodologically robust research.

DATABASES

We searched the following multidisciplinary databases:

- **Web of Science** – covers all aspects of the sciences, social sciences and humanities since the early 20th century. Enables easy citation tracking.
- **Scopus** – thousands of high-quality science, social science and arts journals, some dating before 1970. Enables easy citation tracking.
- **International Bibliography of the Social Sciences (IBSS)** – cross-disciplinary coverage across the social sciences from 1951. Covering four primary subject areas: anthropology, economics, political science and sociology.

Medical databases:

- **Medline Ovid** – biomedical and health journals covering clinical care, public health and health policy development.
- **PsycINFO Ovid** – all fields of psychology from the 19th century.
- **EMBASE Ovid** – indexes medical, biomedical and neuroscience journal articles published since 1947. Data from over 95 countries.

Social science/adolescents-related databases:

- **Communication & Mass Media Complete (CMMC)** – covers media studies, journalism, linguistics, popular culture and IT.
- **SocINDEX with Full Text** – for sociology research offering indexed records from top sociology journals covering many studies including gender studies, criminal justice, social psychology, racial studies, religion and social work.
- **British Education Index** – covers all aspects of educational policy and administration, evaluation and assessment, technology and special educational needs.
- **Child Development & Adolescent Studies** – current and historical literature related to growth and development of children through the age of 21.

- **Education Resources Information Center (ERIC)** – an authoritative database of indexed and full-text education literature and resources. Sponsored by the Institute of Education Sciences of the US Department of Education. Coverage dating back to 1966.

SEARCH TERMS

We used a combination of several groups of search terms to cover: (1) the selected mental health conditions (ADHD, self-harm and eating disorders); (2) the technological environment; and (3) adolescents. The first group was refined after some testing to exclude tech-based diagnosis and interventions, limiting the irrelevant results:

- **Group 1, mental health words**: attention deficit hyperactivity disorder OR eating disorder[3] OR self-harm, but excluding diagnosis and interventions, ie,:
  - "Attention deficit hyperactivity disorder" OR ADHD OR "disturbance of activity and attention" OR inattention OR "attention problems" OR "attention deficit" OR "attention disorder" OR hyperactivity OR impulsivity OR "hyperactivity disorder" OR "hyperkinetic disorder" OR "hyperkinetic syndrome" OR overactivity OR "minimal brain dysfunction" OR "minimal brain disorder" **OR**
  - "Eating disorder" OR "appetite disorder" OR "binge eating disorder" OR anorexia OR bulimia OR hyperphagia OR pica OR "rumination-regurgitation disorder" OR "rumination regurgitation disorder" OR "avoidant restrictive food intake disorder" OR overeating OR "compulsive eating" OR "compulsive vomiting" OR "food addiction" **OR**

[3] These terms have been identified based on the following documents: **DSM manual of the American Psychiatric Association**, **WHO ICD-10 Classification of Mental and Behavioural Disorders**, **Pub med mesh headings**, **Self-harm this Cochrane review**, **AHIMA ICD-10-CM Coding for Attention-Deficit/Hyperactivity Disorder (ADHD)**, **MeSH Attention Deficit Disorder with Hyperactivity**.

- "Self-injur*" OR "Self injur*" OR "self-injurious behavio*" OR "self injurious behavio*" OR "self-mutilat*" OR "self mutilat*" OR automutilat* OR "self-destructive behaviour" OR "self destructive behaviour" OR "self-damag*" OR "self damag*" OR "self-harm*" OR "self harm*" OR "self-destruct*" OR "self destruct*" OR "self-hurt" OR "self hurt" OR "self-violen*" OR "self violen*" OR "self-wound*" OR "self wound*" OR "self-inflicted injur*" OR "self inflicted injur*" OR "self-inflicted wounds" OR "self inflicted wounds
- **NOT** intervention OR RCT OR "randomi*ed controlled trial" OR diagnosis OR screening OR prevention OR "clinical trial" OR "random allocation" OR placebo OR "blind method" (avoiding tech-based diagnosis and interventions) **AND**

- **Group 2, technology terms**: digital* OR mobile* OR internet OR online OR "social media" OR cyber* OR app OR technolog* OR comput* OR gaming OR ICT AND
- **Group 3 adolescent terms**: child* OR youth OR teen* OR adolescen* OR minors OR kid* OR girl* OR boy* OR pupil* OR "school student"

We searched for these words in the title and key words and not in the abstract of the publication, as some initial test searches showed that this produced a very large number of results, many of which were irrelevant to the scope of the review (eg, focusing on technology-based diagnosis or on interventions). Hence, we added the exclusions in Group 1 above and restricted the search to title and key words only. Only for Scopus were the exclusion words (NOT…) applied to the abstract as well, otherwise the number of results was too large to address in a rapid evidence review. A decision was also made not to mirror this in the other databases as the number of results in those databases was smaller, and we did not want to risk excluding valuable material.

The search identified N_0=2,257 results, which were reduced to N_1=1,730 after removing duplicates and sources that were not articles and not in English (see Figure 1).

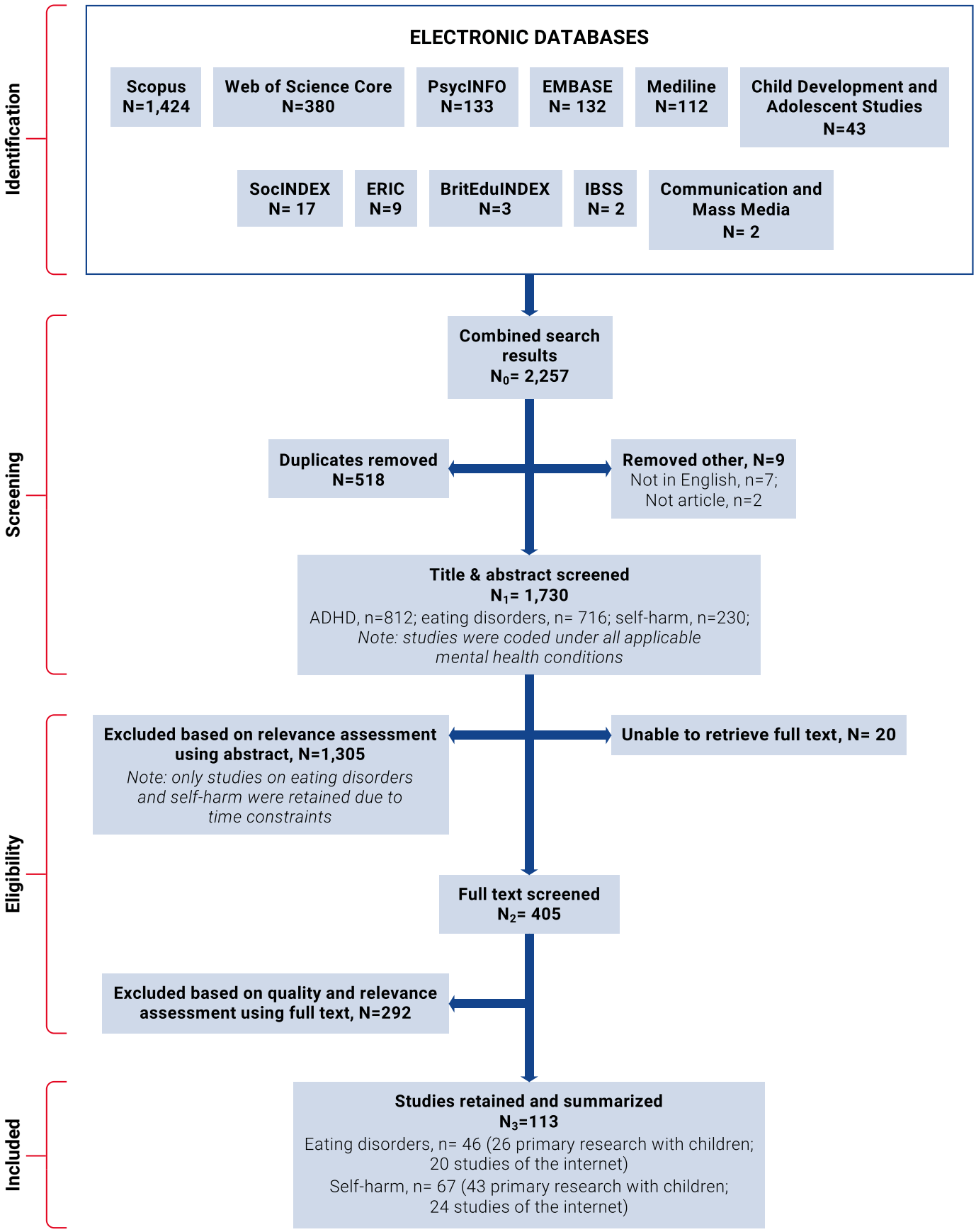


Figure 1: The process of identification, screening and eligibility

SCREENING AND ELIGIBILITY

We used a two-step screening process during which we made eligibility assessments: first, we excluded studies based on relevance using only titles and abstracts (N=1,305, see Figure 1); we then used full text to make judgements about the quality of the study and its relevance for the review and made further eliminations (N=291). Most often, the exclusions during the screening process were related to:

- Use of a digital word when it's not about engagement with digital technologies: use of digital research methods (eg, an online survey) or a methodological piece, use of technology for treatment (eg, digital subtraction angiography).
- Not research with adolescents (eg, "adolescent" used for the study of young adults) or not research about adolescent' experiences (eg, internet research where the users are not adolescents). A few exclusions also related to randomised controlled trials or assessment protocols where no research data was discussed.
- Medical conditions – accidents captured by self-harm words (oral trauma and tooth avulsion following explosion of an e-cigarette), digital present in the name of the condition (eg, Oral-Facial-Digital Syndrome), cancer and tumour-related health conditions captured by the eating disorder words. We also excluded studies that focused only on suicidal ideation without reporting on self-harm and studies on involuntary self-harm (eg, accidental harm caused during an incident).
- Inaccurate key words used in the publication (eg, internet when the study or paper was not related to the internet in any apparent way).
- Poor quality or unclear research methods – the information on the sample, measurements, or analysis was insufficient or indicated poor quality of the findings.

A final sample of N_3=113 studies remained after screening, which were coded and analysed. These included n=46 studies on eating disorders (including 26 studies with primary research with adolescents and 20 studies of the internet, such as websites, online discussions, images or videos related to eating disorder content) and n=67 studies on self-harm (43 with primary research and 24 on the internet).

Appendix III: Focus group topic guide

Interview themes

Preamble/scene setting: By digital technology, we mean all the digital devices, apps and connected services that adolescents might use. We are asking these questions in order to understand the potential risks and opportunities of adolescents' uses of these technologies, given the particular mental health difficulties that they have experienced, so that we can conduct useful research and inform support services and policymakers.

We are conducting these focus groups because there is a lack of sufficient understanding of the relationship between digital technology use and mental health issues in adolescence Our purpose is to understand this link better in relation to both the positive and negative aspects, and to identify how to support adolescents better, especially those with mental health difficulties.

1) Attitudes to adolescents' use of digital technology

(i) Could you describe how you/adolescents use digital technology in general?

Prompts: Apps, any good ones they should be using? What are the key issues? What are the positive aspects? What are the negative aspects?

Are there generational differences in how digital technology is used? If so, what do you think they are?

What motivates adolescents to use digital technology?

Why do you think that adolescents use digital technology in these ways?

Are there benefits of adolescents using digital technology in these ways?

Could you describe the benefits? Please give an example.
Do others agree?

Are there negative aspects of adolescents using digital technology in these ways? Could you describe them? Please give an example. Do others agree?

Is digital technology being used by adolescents to regulate their actions and emotions? How? Can you provide examples? What are the positive consequences of such use? What are the negative consequences of such use?

Are adolescents aware of how much they use digital technology?

2) Digital technology in young people's responses to COVID-19 lockdown

(i) Has adolescents' use of digital technology changed during the COVID-19 lockdown? In what ways?

Prompts: Do you think that social media use by adolescents changed during the COVID-19 lockdown? Can you describe how?

Prompts: Do you think online game use by adolescents changed during the COVID-19 lockdown? Can you describe how?

Prompts: Use of the digital world for self-expression, or contact with friends, or relation to sleep, etc.

(ii) What is the impact of these changes?

What are positive aspects of these changes?

What are the negative aspects of these changes?

Will the changes have a long-lasting impact?

What will the long-term effects of these changes be on adolescents?

3) The relationship between digital technology and disorder

(ii) In general terms do you think that ADHD, an eating disorder or self-harm affects how people use digital technology? Which kinds of devices or apps are you thinking about? What is it about those devices or apps that makes them [follow up on what was said, eg, attractive or problematic etc.]?

(iii) Do you see a particular match between these people's lives/needs and the features of the technologies?

Do you think digital technology plays a role in the development of ADHD, an eating disorder or self-harm or in its persistence? In what way?

Are there positive aspects of the use of digital technology for people with ADHD, an eating disorder or those who are self-harming? Can you describe them?

Are there aspects of the use of digital technologies by adolescents diagnosed with ADHD, eating disorder or self-harm that are difficult to understand? Can you describe them?

(iv) If there are harmful effects, how can they be reduced? Should policymakers focus more on the clinical services available, or on the design or regulation of digital technologies?

What do professionals need to know about how adolescents with ADHD, an eating disorder or self-harm issues use digital technology?

What do teachers and doctors need to know about the experience of adolescents with ADHD, an eating disorder or self-harm issues who use digital technology?

What might professionals who support individuals with ADHD, an eating disorder or self-harm issues not quite understand about the use of digital technologies by those who have those disorders?

What should professionals who support individuals with ADHD, an eating disorder or self-harm issues let these adolescents know about using digital technology? (Professionals)

(v) What role do you think digital technology should play in the treatment of ADHD, an eating disorder or self-harm issues? Can you give some examples of where you think this has worked well?

What are the ways in which health services use digital technology to help adolescents with ADHD, an eating disorder or who self-harm?

What are the beneficial uses?

What aspects could be improved?

Do adolescents with ADHD, an eating disorder or self-harm issues engage well with digitally provided support platforms from health services?

Are they easy to use?

Do they find them interesting?

What should they be like in the future?

Are adolescents using digital technology to regulate their actions and emotions? How? Can you provide examples? What are the positive consequences of such use? What are the negative consequences of such use?

Are adolescents aware of how much they use digital technology?

Possible follow-up questions:

- Ways in which adolescents use digital technology, eg, what platforms are adolescents with ADHD, an eating disorder or self-harm issues using?
- Reasons for use: When young people with ADHD, an eating disorder or self-harm issues are using digital technology, is it because they find it enjoyable, they are killing time/seeking escape from the real world/to find information/connect with others?

4) Digital and disorder during the COVID-19 lockdown

(vi) How do/did people with ADHD, an eating disorder or self-harm issues cope during the COVID-19 lockdown?

(vii) Do you think their pattern of digital use would have changed?

(viii) Would this have a positive and/or negative impact?

(ix) What could be/have been provided, in terms of digital technology, that would help?

5) The most important research questions

(i) If you had a million pounds to find out more about the role of digital use in ADHD, eating disorders or self-harm issues, what question would you want answered? What would you hope to learn? How should such knowledge be used?

Appendix IV: Expert interview topic guide

1) Preamble/scene setting

Thank you for agreeing to participate.

Interested in the role of digital technologies in adolescents' mental health (MH). Aims to identify knowledge gaps. Interested in your professional opinion.

We are talking to a range of experts (mental health support, education, media and tech industry, online protection).

Confidential and we will anonymise (remove names of people, companies, products).

We would like to record the conversation via Zoom.

2) Let's start with how adolescents engage with digital technologies. From your professional practice, what do think is the role of technology use on adolescents' mental health?

Prompts:

- Positive aspects; negative aspects; adolescents of different ages; adolescents with diverse conditions; gender; different skills?
- What technological features could affect MH (counting likes, nudge techniques, closed groups, harm#, popularity of harmful content; influencers)?
- Value (risk) of affordances: anonymity, targeting, recommender algorithms?
- What kind of MH content is available to them online (positive/negative)? How is this content used? Nature of online communities?
- What role does technology play in treatment? Prevention? What is available to adolescents? Do they use it?

- What is the current child online protection practice of the industry that you know of (content regulation, time use regulation, violent content filters, reporting, AI content screening, age restrictions)? Are these efficient? Anything else that should be done?
- What do and don't adults understand about adolescents' digital activities?

3) **We are particularly interested in ADHD, eating disorders and self-harm. In general terms, do you think that ADHD, eating disorders and self-harm affects how adolescents use digital technology?**

Prompts:

- Can you identify adolescents with mental health issues online? Do we know when an adolescent online is in trouble (how?)? If an adolescent is in trouble, what happens?
- Where do they go and who/what do they engage with (apps, platforms, activities, groups)?
- Need for and effect from engagement (normalising; emotional regulation; support; belonging; harm; venting; triggering; spiralling (down); curating their feed; regulating emotions; need for validation/ recognition/acceptance/affirmation; coping with isolation, loneliness; comparison, competitiveness).
- Any differences between ADHD, eating disorders and self-harm? Other vulnerabilities? Differential susceptibility? The nature of niche spaces to explore MH problems?
- What is the role of digital skills (hiding in plain sight, hiding, privacy; more competent use)?
- Comparing social support available on and offline, from peers or professionals?
- Any differences due to COVID-19 (short- and long-term)?

4) **We also want to get a sense of the journeys/pathways of adolescents with MH issues, both in terms of in/out/and through the internet and in/out/and through their mental illness. So let's start with the internet aspect – what can you tell us about adolescents' journeys online/offline?**

Prompts:

- Online pathways – multiple sites.
- Pathways through their mental illness (getting worse, getting better).
- Connection between the online and illness pathways: crisis management, relapse, harm.

5) **I want to ask you about the gaps in what we know. Are there any particular aspects that we should try to learn more about?**

Prompts:

- What remains "behind the scenes", unacknowledged?
- Where to draw the line of children's "personal space"? Any differences between adolescents' and adults' views?

6) **We want to learn more – what do you recommend we should look at?**

Prompts:

- People to talk to; places online to look at; new research.

More about the project:
lse.ac.uk/media-and-communications/research/research-projects/Adolescent-mental-health-and-development-in-the-digital-world

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