



Spotlight

Mental health and digital environments

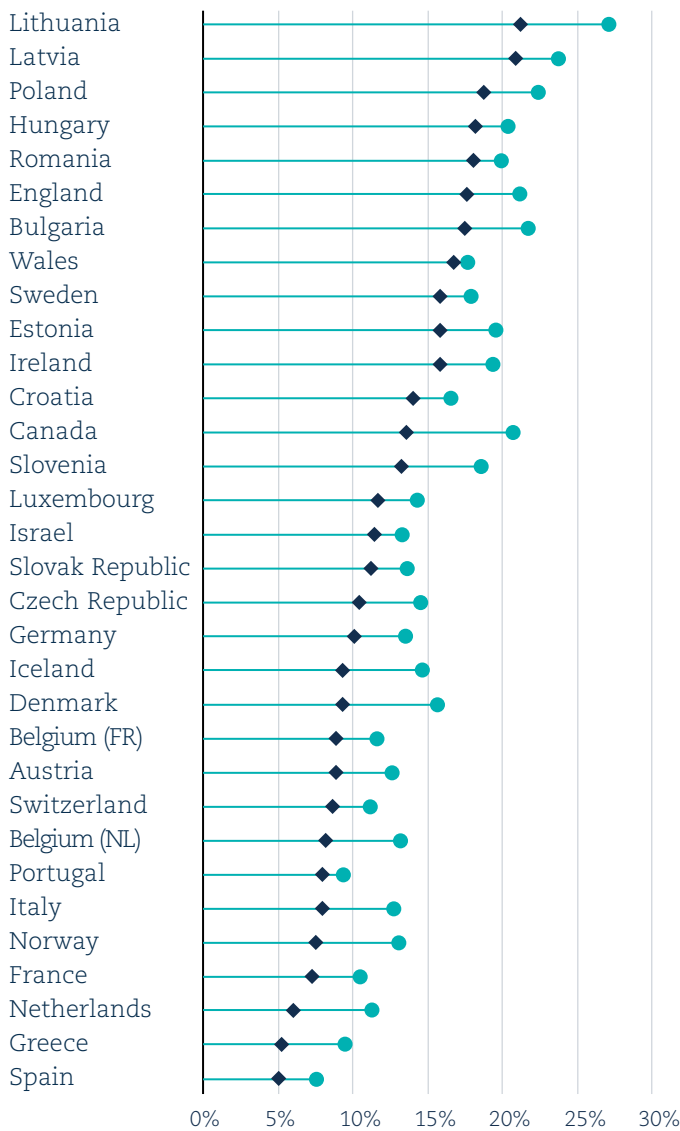
Digital technologies have dramatically changed how people live and communicate, bringing benefits and opportunities, as well as new risks, including for mental health. This Spotlight discusses features of digital environments that help explain why people communicate and interact differently on line, including anonymity, disembodiment and disinhibition. It reviews negative behaviours associated with mental health problems, focusing on cyberbullying, excessive or problematic Internet use (PIU), and problematic social media use (PSMU), and how immersive technologies may magnify their effects. It shows that negative behaviours in digital environments are on the rise and they disproportionately affect girls. The Spotlight concludes with an emerging policy agenda to harness the opportunities and minimise the risks of digital and immersive environments for mental health.

Negativity online is rising and affects girls more

Cyberbullying of young people is increasing.

(11-15 years of age)

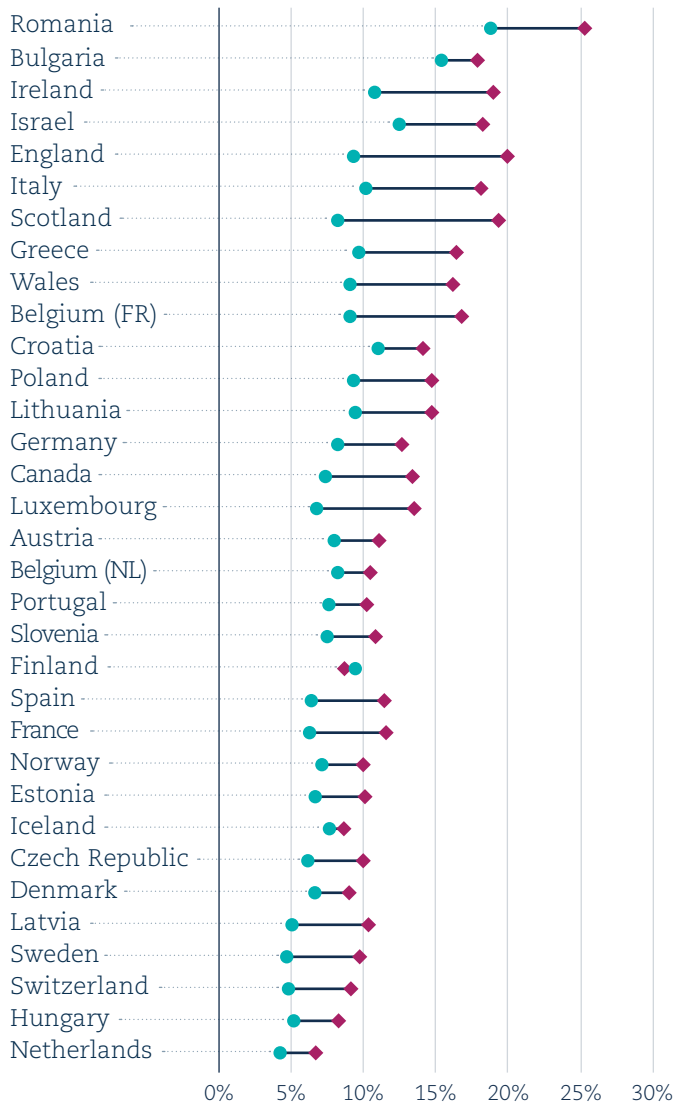
◆ 2017-18 ● 2021-22



Girls are more often problematic social media users than boys.

(11-15 years of age)

● Boys ◆ Girls (2021-22)



Across 37 countries and regions, young people reported an increase of

49%

in problematic social media use between 2017 | | 2022

Source: OECD based on the WHO's HBSC study.



As the use of digital technologies intensifies, the way people communicate and behave changes. Advancements in artificial intelligence (AI), big data analytics and immersive technologies, coupled with the COVID-19 pandemic, have accelerated digitalisation worldwide. While the evolving digital environment brings important benefits and opportunities for developing healthy, productive and fulfilling lives, it also creates new risks and potential dangers to mental health (Büchi, 2021^[1]).

While disentangling cause and effect is challenging, the risks of digital and immersive environments for mental health raise important questions. Public health authorities and the international policy community have identified concerns about online victimisation and cyberbullying, particularly for youth, as a significant risk by (OECD, 2021^[2]). Recently, both the United States Surgeon General and the American Psychological Association have warned about the risks of social media for mental health, including cyberbullying and PSMU (APA, 2023^[3]; OSG, 2023^[4]).

This Spotlight discusses the features of digital environments that help explain how people communicate and interact on line. It reviews some of the related negative behaviours associated with mental health problems, focusing on cyberbullying, PIU and PSMU. It considers the unique features of immersive environments and how they may affect mental health, and it explores data available on the prevalence of cyberbullying and PSMU. It concludes with a policy agenda to harness the opportunities and minimise the risks of digital environments for mental health.

Anonymity, disembodiment and disinhibition help explain why people communicate and interact differently on line

Digital environments provide new ways to communicate and interact, allowing people to establish relationships and have experiences that would be impossible off line. However, societal norms and physical constraints are different in digital and physical environments. Three features that help explain why people communicate and interact differently on line are anonymity, disembodiment and disinhibition (Suler, 2004^[6]; Whitty and Young, 2017^[5]). These features of digital environments can lead to feelings of happiness and strengthen mental health. Yet they can also enable negative behaviours like cyberbullying, PIU and PSMU that are associated with mental health problems.

Anonymity is a common feature of many online activities and interactions. Anonymity may positively affect mental health by creating a free and safe space for people to express their opinions and explore different aspects of their identity without fear of judgement or criticism. In the same vein, allowing people to choose what aspects of themselves to keep anonymous has been shown to help some people share personal feelings they otherwise would not. It also allows connection to others with similar feelings or experiences, leading to greater perceived social support (Naslung et al., 2016^[8]; Holtz and Kanthawala, 2020^[7]). In addition, it can help marginalised people benefit from social and emotional support while remaining relatively anonymous (Ybarra et al., 2015^[10]; Hawkins and Haimson, 2018^[9]).

At the same time, anonymity poses risks. Feeling unidentifiable in digital environments can lead people to feel unaccountable and irresponsible for their actions, leading to impulsiveness, hastiness and carelessness (Terry and Cain, 2016^[11]). The anonymity of interactions in many digital environments can also lead to feelings of moral disengagement (Kowalski et al., 2014^[12]). Thus, anonymity can make it easier for people to engage in aggressive behaviours, such as cyberbullying (Wachs, Wright and Vazsonyi, 2019^[13]) and trolling – the act of deliberately “baiting” people on line to provoke a strong reaction (Australian eSafety Commission, 2023^[14]). These behaviours can enable conflict, emotional distress and anger.

Disembodiment is another important feature of digital environments. Disembodiment allows people to create identities and have experiences without being held back by physical appearance, age, occupation, location, ethnic origin or other factors influencing face-to-face interactions. The possibilities brought by the “disembodiment of the self” – the ability to create an online identity independent of physical features (Bessière, Seay and Kiesler, 2007^[15]) – allow people to play with different identities in digital environments. This, in turn, raises concerns about the risk of the dissociation of identities (Whitty and Young, 2017^[5]). A related question involves the creation of unrealistic beauty standards and how they affect mental health. The possibility to construct hyper-realistic bodies in the virtual world through avatars and filters have been associated with dissatisfaction with, and the distortion of, one’s body image, negatively affecting self-esteem (Park and Ogle, 2021^[16]).

A third distinctive feature of digital environments is disinhibition, which refers to a lack of restraint in social interactions. While disinhibition may lead to benevolence and generosity, it is often linked to acts of psychological aggression, such as the use of hostile and derogatory language and the defamation of others’ reputations (Lapidot-Lefler and Barak, 2012^[17]). The feeling of anonymity may contribute to disinhibition because it can lead to disregard for traditional social norms and rules. Reduced eye contact and personal visibility in digital environments can exacerbate disinhibition (Whitty



and Young, 2017^[5]), as well as the perception of reduced accountability for behaviours in digital environments. Online disinhibition is often linked to problems of cyberbullying, trolling and cyberstalking. Studies have shown that people in digital environments feel less constrained to express themselves and act differently than they would face-to-face (Wachs and Wright, 2019^[19]; Wachs and Wright, 2018^[20]; Wang et al., 2022^[18]).

Cyberbullying, PIU and PSMU are associated with mental health problems

Since the early days of the Internet, parents, doctors and researchers have worried about the psychological impacts of computer-mediated communications and the potential risks they create for people's mental health (Kiesler, Siegel and McGuire, 1984^[21]). Public health authorities and the international policy community have identified online victimisation and cyberbullying, particularly for youth, as a significant risk (OECD, 2021^[22]). The literature does not use one consistent definition of cyberbullying. However, cyberbullying is generally associated with three main features: repeated, intentional aggressive behaviour; a power imbalance between perpetrator and victim; and use of online media. Early studies argued that cyberbullying was simply bullying in a digital environment, but researchers have noted that some features manifest themselves differently in digital environments. Repetition, for example, takes on a different meaning because cyberbullying acts can be disseminated widely. As a result, even if the perpetrator does not cyberbully again, the exponential effect of sharing creates a sense of repetition for the victim (Campbell and Bauman, 2018^[24]; Gottschalk, 2022^[23]).

Cyberbullying is related to decreased life satisfaction and several mental health problems, including depression and psychological distress (Hamm et al., 2015^[27]; Brailovskaia, Teismann and Margraf, 2018^[26]; Giumetti and Kowalski, 2022^[25]). Notably, research suggests that cyberbullying may have a more pronounced association with mental health problems than face-to-face bullying (Baier et al., 2019^[28]). Recent research indicates that engagement in digital self-harm, including self-cyberbullying, significantly raises the likelihood of suicidal thoughts and suicide attempts. Adolescents who engage in anonymous self-cyberbullying are 15 times more likely to attempt suicide (Patchin, Hinduja and Meldrum, 2023^[29]).

Cyberbullying is mainly measured through self-assessments (Chun et al., 2020^[30]). However, some alternative sources of data, such as victims' complaints, have become accessible and valuable in understanding the prevalence and impact of cyberbullying.¹ Some surveys ask people to indicate if or how often they have experienced cyberbullying within a specified time (e.g. during the past couple of months). While the results of such surveys are easy to understand, these measures have limitations. For example, they presume that people fully understand the components of cyberbullying and bias, such as response tendencies like acquiescence and social desirability.

Other surveys ask people to indicate if or how often they were involved in specific behaviours associated with cyberbullying. These surveys also make certain assumptions. They presume that people, when asked to indicate if and how often they have experienced cyberbullying, may be less willing to respond honestly because they do not want to identify themselves as a bully or a victim. They also assume people may indicate their involvement in specific behaviours associated with cyberbullying (Ybarra et al., 2012^[31]).

PIU has also received growing attention. While there is no common agreement about PIU, most definitions point to difficulties in everyday functioning, interpersonal relationships and emotional well-being because of Internet use (Aboujaoude, 2010^[33]; Spada, 2014^[34]; Aboujaoude and Starcevic, 2015^[32]). The notion of PIU is often associated with a variety of terms, including Internet addiction, excessive Internet use and compulsive Internet use. Numerous studies indicate that PIU is associated with hostility and mental health disorders. These include depression, anxiety, attention deficit hyperactivity disorder (ADHD) symptoms and obsessive-compulsive symptoms in adults and youth (Carli et al., 2013^[37]; Masi et al., 2021^[35]; Nguyen et al., 2022^[36]).

The measures most frequently used to assess PIU are based on self-reported questionnaires. These include aspects such as loss of control, withdrawal symptoms, neglect of other activities, conflicts in interpersonal relationships and reduced sleep associated with using the Internet. Each measure has different criteria and cut-off points that determine whether a user is a problematic Internet user (Laconi, Rodgers and Chabrol, 2014^[38]; Aboujaoude and Starcevic, 2015^[32]). In practice, though, it is often difficult to disentangle PIU and underlying disorders (e.g. anxiety).

Since online communication through social media has become central in the lives of adults and adolescents, scholars have also proposed measures of PSMU. As definitions of PIU are broad and consider all uses of the Internet, including gaming and social media use, PSMU and PIU measures correspond. Thus, the same set of diagnostic criteria and self-reported questionnaires are used when measuring PIU and PSMU. A problematic social media user is identified



when people report feelings including preoccupation, the wish to escape, deception, displacement and conflict because of social media use (Van Den Eijnden, Lemmens and Valkenburg, 2016_[40]).

PSMU is consistently associated with attention deficits, sleep problems and feelings of exclusion in young people (Van Rooij et al., 2018_[42]; Boer et al., 2020_[41]; Dekkers and van Hoorn, 2022_[43]). Studies also indicate that PSMU is associated with serious mental health problems, including depression, anxiety and stress (Raudsepp and Kais, 2019_[46]; Malaeb et al., 2021_[45]; Shannon et al., 2022_[44]). One study suggests that fear of missing out, i.e. “concern that others are having rewarding experiences from which one is absent”, is a factor that induces PSMU (Fioravanti et al., 2021_[47]).

Immersive technologies bring new opportunities for mental health but can also exacerbate the risks

Immersive technologies have characteristics that enable hyper-realistic experiences, and make users feel like they are in another environment, transcending distance, time and scale. For example, “presence” – or the sense of communicating without mediation in virtual realities – is unique to immersive digital environments. In other words, someone experiencing presence no longer feels like part of an artificially constructed environment but rather part of the physical world (Tjostheim and Waterworth, 2022_[48]). Another unique feature is the sense of embodiment – experiences with avatars or virtual bodies may feel like real bodily experiences. These unique characteristics of immersive technologies bring new opportunities for mental health (see Chapter 4 on virtual reality) but can also exacerbate the risks.

The hyper-realistic experiences made possible by immersive technologies have opened up promising opportunities for improving mental health. Health interventions using virtual reality (VR) have been successful as a supportive treatment for anxiety, phobias and other psychiatric disorders (Rus-Calafell et al., 2018_[50]; Cieřlik et al., 2020_[51]; Segawa et al., 2020_[52]; Hatta et al., 2022_[53]).² For example, exposure therapy – which allows people to confront their fears in a safe space – has been shown to be effective at overcoming mental health problems (Carl et al., 2019_[54]). In addition, these technologies allow for a real-time assessment of physiological indicators like heart rate, skin responses and eye movements. In so doing, they enhance the efficiency of health interventions by relating them to features of the virtual environment (Bell et al., 2020_[55]).

The psychological and physical sensations produced by hyper-realistic experiences in immersive environments may also make the feelings they evoke more intense, amplifying the effects of negative behaviours in digital environments (Heller, 2020_[56]). As with other types of digital environments, immersive environments enable people to communicate and interact. Thus, people face many of the same types of challenges, such as harassment, bullying and other negative behaviours. In immersive environments, users interact through avatars, which can both lead to new forms of harassment such as “embodied harassment”, or harassment that occurs as users experience embodiment in social VR (Freeman et al., 2022_[57]).

Research on negative behaviours in immersive environments is still at an early stage. One study found that hugging and cuddling between avatar bodies without consent is perceived as harassment in immersive environments, while they are considered to be positive behaviour in traditional online gaming (Freeman et al., 2022_[57]). Another study found that users of one popular VR social app are exposed to negative behaviour, including cyberbullying, every seven minutes (Center for Countering Digital Hate, 2021_[58]).

One concern from the emerging literature in this area is that gender-based, racial, ethnic, religious and homophobic targeting are common. Furthermore, the integration of generative AI and immersive technologies will speed up content creation. This facilitates the development of experiences that may encourage negative behaviour (Lorenz, Perset and Berryhill, 2023_[60]; DataHub YouTube channel, 20 July 2023_[59]). One study found that nearly half of female VR users (49%) reported experiencing at least one incident of sexual harassment, while 28% of men reported facing racist or homophobic comments (Outlaw, 2018_[61]).

Evidence suggests that negative behaviours in digital environments are on the rise and they disproportionately affect girls

The associations between negative behaviours in digital environments and mental health are a growing concern. Numerous studies highlight their prevalence across countries and regions (Livingstone, 2013_[65]; Hamm et al., 2015_[27]; Inchley et al., 2020_[63]; Smahel et al., 2020_[64]; OECD, 2021_[62]). While internationally comparable data on negative behaviours in digital environments are limited, evidence suggests that some demographic groups experience the Internet



and social media differently.³ This Spotlight analyses recent data from the Health Behaviour in School-aged Children: WHO Collaborative Cross-National Study (HBSC),⁴ currently the most comprehensive cross-national study reporting indicators on cyberbullying and PSMU in youth.⁵

The latest HBSC data cover 44 countries and regions, including 28 OECD countries in 2021-22.⁶ The data show an increase in the prevalence of PSMU and cyberbullying from 2017-22. Average rates of PSMU increased by 49%,⁷ while victimisation (26%) and perpetration of cyberbullying (25%) also rose.⁸ The data also show significant variation in the prevalence of cyberbullying and PSMU across countries and regions. In 2021-22, the prevalence of cyberbullying victims among boys was as low as 6% in Spain, while it reached 32% in Lithuania. Similarly, the prevalence of PSMU ranged from 4% among boys in the Netherlands to 25% among girls in Romania (Inchley et al., 2023^[66]).

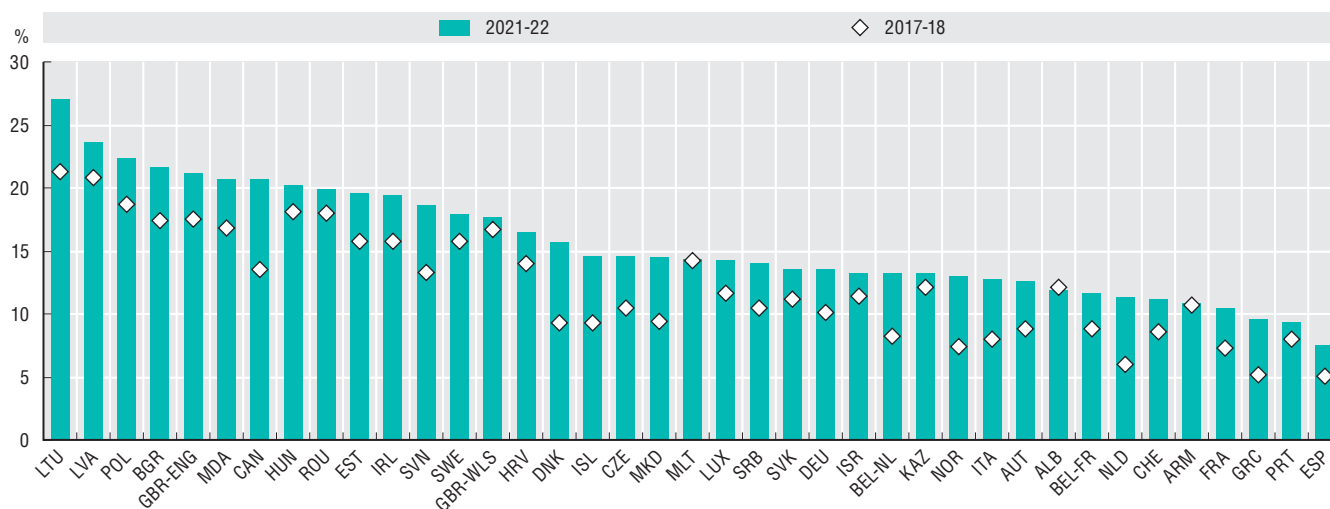
Cyberbullying is becoming more prevalent across countries, with girls experiencing higher rates than boys

Online and offline risks are interrelated. Negative behaviours off line, such as aggression, bullying and harassment, seem to carry over into digital environments. HBSC data from the 2017-18 for 11-, 13-, and 15-year-olds show that countries with the highest rates of bullying, such as Lithuania, Latvia and Türkiye, also emerged as countries with relatively high rates of cyberbullying. In most countries and regions, bullying victimisation rates were higher than cyberbullying rates, and boys were on average slightly more bullied than girls.

In the countries and regions analysed, the data suggest that, on average, cyberbullying is becoming more prevalent (Figure 2.S.1) and that girls are more cyberbullied than boys. The percentage of girls who reported being victims of cyberbullying at least once in the past couple of months was significantly greater than boys in more than half of the countries and regions analysed in 2021-22. Among OECD countries where girls were cyberbullied more than boys, the gap between cyberbullied girls and boys ranged from almost 1 percentage point in Norway to just over 6 percentage points in France.

Figure 2.S.1. Cyberbullying rates have increased in nearly all countries

Share of youth (11-, 13- and 15-year-olds) who report being victims of cyberbullying at least once in the last couple of months, 2017-18 and 2021-22



Note: Regional codes: BEL-FR: Belgium (French speaking); BEL-NL: Belgium (Flemish speaking); GBR-ENG: England; GBR-SCT: Scotland; GBR-WLS: Wales.

Source: Authors' calculation based on the Health Behaviour in School-aged Children: World Health Organization Collaborative Cross-National (HBSC) Study, 2017-18 and 2021-22.

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Boys are more likely than girls to cyberbully others. On average, 14% of boys aged 11, 13, and 15 years in 2021-22 said they had cyberbullied others at least once in the last couple of months,⁸ compared with 9% of girls. Furthermore, in almost all of the countries and regions analysed, the rate of boys who reported cyberbullying others was greater than girls.

National safety centres that receive cyberbullying complaints may provide a complementary source of cyberbullying data. In Australia, for example, data from 2021-22 showed more complaints received about girls being cyberbullying victims (63.1%) than boys (31.8%) (eSafety Commissioner and ACMA, 2022^[67]).

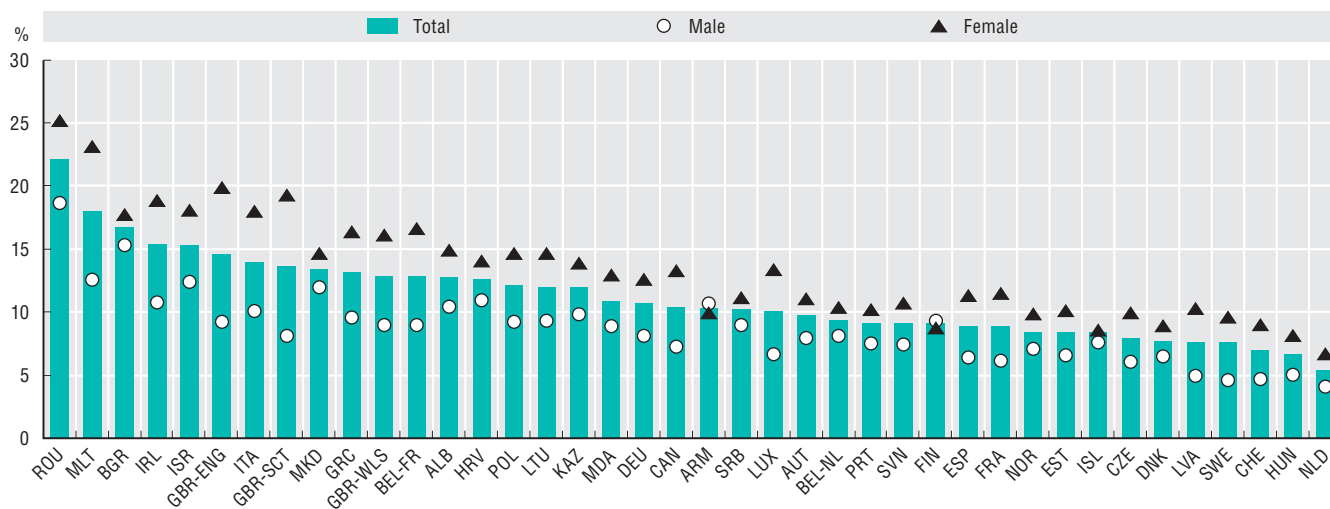


Girls are more likely than boys to be problematic users of social media and the gap is widening

Girls are more likely to communicate intensively with friends and others through instant messaging, social networks, e-mail and other forms of online communication than boys (Inchley et al., 2020_[63]).⁹ They are also more likely to be problematic social media users¹⁰ than boys. In 2021-22, the rate of girls identified as problematic social media users was significantly higher than boys in almost 80% of the countries and regions analysed (Figure 2.S.2) and the gender gap is widening. In 2017-18, the average gap between girls and boys identified as problematic users of social media stood at 1.5 percentage points, and in 2021-22 this gap expanded to 5 percentage points. Among the OECD countries analysed in 2021-22, Ireland had the highest overall PSMU rate with a notable gender difference.

Figure 2.S.2. Girls are problematic social media users more often than boys

Share of youth (11-, 13- and 15-year-olds) identified as PSMU, 2021-22



Notes: PSMU = problematic social media use. PSMU was assessed through the Social Media Disorder Scale (Van Den Eijnden, Lemmens and Valkenburg, 2016_[40]). Regional codes: BEL-FR: Belgium (French speaking); BEL-NL: Belgium (Flemish speaking); GBR-ENG: England; GBR-SCT: Scotland; GBR-WLS: Wales.

Source: Authors' calculation based on the Health Behaviour in School-aged Children: World Health Organization Collaborative Cross-National Study (HBSC) 2021-22.

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Age may also affect how girls and boys experience social media. Girls are more likely to be problematic social media users as they become teens. Prevalence of PSMU rose from 5% at age 11 to 10% at age 15 among girls, while among boys, the overall percentage remained relatively constant (6% and 7%, respectively) (Inchley et al., 2020_[63]).

Moderate use of digital technologies tends to be beneficial, but “overuse” may be detrimental

Time spent on line has increased, especially among youth, and sparked concerns about mental health and well-being (Bell, Bishop and Przybylski, 2015_[68]; Twigg, Duncan and Weich, 2020_[69]). One in three young people aged 11, 13, and 15 years are intensive users of online communications – that is, they communicate with friends and others on line via instant messaging, social networking or e-mail almost all of the time throughout the day (Inchley et al., 2020_[63]).¹¹ Early theories suggested that exposure to technology was directly proportional to harm, referred to as the “displacement hypothesis” (Neuman, 1988_[71]). This is now seen as an overly simplistic view, given that online communication offers many benefits for mental health and well-being. For example, it provides opportunities to create positive communities around similar identities and interests, and enables social-emotional support from peers, especially for marginalised people (Kardefelt-Winther, 2017_[72]; Ito et al., 2020_[73]; Charmaraman, Hernandez and Hodes, 2022_[74]).

More recently, the “Goldilocks hypothesis” (Przybylski and Weinstein, 2017_[75]) has gained support. This hypothesis indicates a curved association between the use of digital technologies, mental health and well-being (OECD, 2018_[76]). It suggests that a moderate use of digital technologies tends to be beneficial whereas “overuse” may be detrimental.



The relationship between the pervasive exposure to digital technologies, mental health and well-being is complex and bidirectional. To date, most evidence is correlational. Reviews of studies have found a mix of conflicting positive, negative and null associations (Seabrook, Kern and Rickard, 2016^[79]; Odgers and Jensen, 2020^[77]; Orben, 2020^[80]; Alonzo et al., 2021^[78]).¹² On average across OECD countries, 45% of students reported feeling nervous or anxious when they did not have their digital devices nearby. These students were also more likely to report lower satisfaction with life (OECD, 2023^[81]). Recent data from Canada indicate that increased smartphone use is linked to worse mental health (Asselin, Bilodeau and Khalid, 2024^[82]), and the frequency of social media use is positively associated with eating disorder symptoms as well as suicidal tendencies (Kerr and Kingsbury, 2023^[83]).

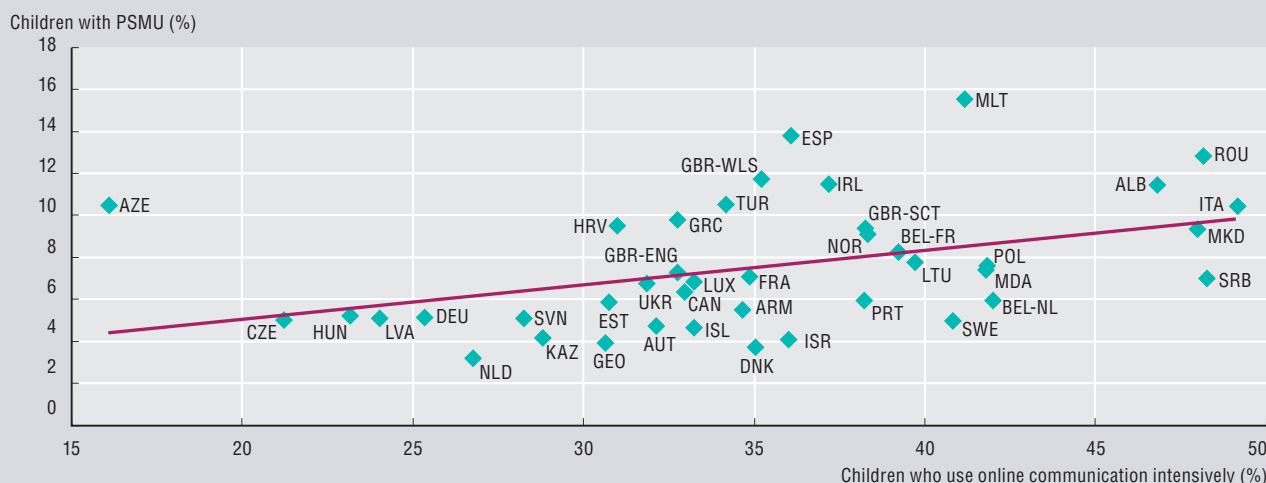
The use of digital technologies is not inherently harmful or beneficial as their impacts on mental health and well-being are likely to depend on many factors. These factors include the amount of time spent on line, the content consumed, the user's pre-existing vulnerabilities, and the cultural and socio-economic context (Hollis, Livingstone and Sonuga-Barke, 2020^[85]; Prinstein, Nesi and Telzer, 2020^[84]; Büchi, 2021^[1]; Valkenburg et al., 2022^[86]; APA, 2023^[3]; OSG, 2023^[4]). This complex and heterogeneous relationship is illustrated below (Box 2.S.1). The large variation in PSMU prevalence across countries at the same level of communication intensity suggests that other factors beyond time spent on line are at play.

Box 2.S.1. Is time spent on line associated with problematic behaviour?

Data from HBSC 2017-18 suggest that intensive users of online communication are more likely to experience PSMU, which is consistent with the “Goldilocks hypothesis”. However, it is unclear whether the intensive use of online communication is a cause or a consequence of PSMU. Of youth who use online media intensively, 11% were classified as problematic social media users. Meanwhile, the prevalence of PSMU among those who use online media less frequently hovered around 5% (Inchley et al., 2020^[63]). Countries with higher average rates of problematic social media users, such as Spain, also have higher percentages of users that use online communication intensively (Figure 2.S.3).

Figure 2.S.3. Evidence suggests that intensive use of online communication is associated with PSMU

Share of youth (11-, 13- and 15-year-olds) identified as PSMU vs. share of intensive users of online communication



Notes: PSMU = problematic social media use. Regional codes: BEL-FR: Belgium (French speaking); BEL-NL: Belgium (Flemish speaking); GBR-ENG: England; GBR-SCT: Scotland; GBR-WLS: Wales. The fitted line is based on an ordinary least squares (OLS) regression. The correlation coefficient between the share of youth identified as PSMU and who use online communication intensively is 0.16 (p-value<0.001, 222 865 observations). The R-squared value is 0.7.

Source: Authors' calculation based on the Health Behaviour in School-aged Children: World Health Organization Collaborative Cross-National Study (HBSC) 2017-18.

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This indicates insights can be gained from the experiences of countries with low prevalence rates of PSMU. It also confirms the need to collect longitudinal, more granular and beyond time-based data (e.g. activity or content-based) on digital technology use (Kardefelt-Winther, 2017^[72]). Several authors recognise variation around average relationships. Embracing heterogeneity approaches is an important avenue to improve understanding in this domain (Parry et al., 2022^[88]; Valkenburg et al., 2022^[86]; Valkenburg, Meier and Beyens, 2022^[87]).

Towards a policy agenda for fostering mental health in the digital age

As people spend an increasing amount of time on line, and digital environments become more immersive and “real”, policy makers need to address the risks of digital technologies for mental health. Groups that may be disproportionately affected by negative behaviours in digital environments, such as girls, should be supported. As this is an emerging area, governments may lack formal initiatives to prevent and address mental health problems in the digital age. Thus, a policy agenda to foster mental health should be mapped. In this respect, several areas seem especially promising.

Raise awareness about negative behaviours in digital environments and promote media literacy

Public policies on awareness raising and promotion of media literacy are crucial to prevent and manage cyberbullying (Gottschalk, 2022^[23]) and protect children in digital environments more generally (OECD, 2021^[22]). Victims need to know that how they are being treated is wrong, and that they can safely report perpetrators of cyberbullying and other forms of online aggression. Awareness-raising campaigns can help victims and bystanders (e.g. family members, friends and teachers) recognise negative behaviours. They can then report cyberbullying or develop coping strategies, such as blocking unwanted contacts (McDaid, Hewlett and Park, 2017^[89]). Promoting media literacy also has an important function in tackling PIU and PSMU (OSG, 2023^[4]). Media literacy skills are needed to understand how to safely navigate the Internet and immersive digital environments.

Promote safety by design

Governments can foster safety by design for youth by encouraging development and use of technologies that protect privacy, safety and security, and that limit contact with and access to age-inappropriate content (OECD, 2022^[90]). Firms increasingly embed user protections in their products and services to prevent and manage risks associated with negative behaviours in digital environments. Examples include mechanisms that block access to digital platforms after excessive use and AI-based filtering systems that flag negative messages. Immersive technologies can help develop mitigation mechanisms by preventing harassment. For example, some platforms allow for creation of invisible barriers around users, making it impossible to get within someone else’s “personal boundary”. Companies are also enabling parental control tools to limit content seen on line. Companies should analyse the impact of the design and functioning of their services, including their algorithmic systems, and be transparent about them. Public initiatives that support safety-by-design technologies can also promote mental health in digital ecosystems by minimising and addressing abusive behaviour.

Identify specificities of immersive environments that present risks for mental health

As immersive environments become common at home, school and work, policy makers must anticipate the potential benefits and challenges of these technologies to mental health. They must pay special attention to emerging debates about the need to adapt or develop new rules, regulations and approaches to deal with negative behaviours in immersive environments and the associated mental health risks. Public policies should consider gender differences in how bullying plays out in digital environments. They should focus on equipping vulnerable groups such as children, who are more susceptible to the influence of immersive experiences, with the skills to cope and adapt. Because immersive technologies are in the early stages of commercial adoption, this is a good opportunity to work constructively on the adaptation or development of regulations that allow positive and healthy online experiences. Public-private dialogue can help define rules that protect users, while also helping industry build trust in immersive environments.

Improve the evidence base on mental health and digital environments

The lack of a robust, cross-country comparable evidence base on mental health and digital environments is a challenge for researchers and policy makers. Establishing standard definitions is an important step forward. Many researchers have underlined, for example, the lack of consensus regarding definitions and measurement criteria for phenomena such as cyberbullying, PIU and PSMU (Laconi, Rodgers and Chabrol, 2014^[38]; Chun et al., 2020^[30]; Shannon et al., 2022^[44]) and the associated mental health problems. Researchers could determine the prevalence of cyberbullying and PSMU with



respect to gender, age and geographical region. This would help policy makers design and implement related policies and programmes, such as integrating cyberbullying and PSMU prevention measures, in educational systems and other relevant domains.

Engage in partnerships with a range of stakeholders to prevent and address negative behaviours in digital environments

Collaboration on mental health in general is a priority (McDaid, Hewlett and Park, 2017^[89]; OECD, 2023^[91], 2022^[92]) and this is likewise true in digital environments. Responses to mental health issues associated with negative behaviours in digital environments depend on partnerships between governments, firms and non-governmental organisations. By exchanging insights on programmes and policies that have (and have not) worked to address negative behaviours in digital environments, policy makers can tailor their activities to best support mental health in digital environments. Sharing information on the effectiveness of programmes and policies can help inform development of well-targeted policies. It may also help increase public willingness to invest in mental health promotion and prevention. The European Union and Australia are already taking innovative approaches in this area; they have national and subnational bodies that co-ordinate initiatives to tackle negative behaviours in digital environments associated with mental health risks.¹³



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Notes

1. The Australian eSafety Commissioner and the German Safer Internet Centre (specifically jugendschutz.net) regularly publish statistics on cyberbullying complaints in their annual reports. For further details, visit: www.esafety.gov.au/about-us/corporate-documents/annual-reports and www.jugendschutz.net/ueber-uns/jahresbericht.
2. It is important to note that available evidence is still insufficient to support virtual reality as a replacement for traditional treatments (Ciešlik et al., 2020^[51]).
3. Studies using small samples of data in the United States find that girls and lesbian, gay, bisexual, or questioning (LGBT) adolescents are more likely to be victims of cyberbullying (Rice et al., 2015^[97]; Alhajji, Bass and Dai, 2019^[98]).
4. The HBSC is a World Health Organization collaborative cross-national study collecting data about the health, well-being, social environment, and health behaviour of 11- to 15-year-old adolescents for over 30 years.
5. In the HBSC survey, the indicator on cyberbullying perpetration is measured through the following question: «In the past couple of months how often have you taken part in cyberbullying (e.g. sent mean instant messages, email or text messages; wall postings; created a website making fun of someone; posted unflattering or inappropriate pictures online without permission or shared them with others)?» Possible answers included: Haven’t; once or twice; 2-3 times per month; once a week or several times a week. The indicator on cyberbullying victimisation is measured through the following question: “In the past couple of months how often have you been cyberbullied (e.g. someone sent mean instant messages, email or text messages about you; wall postings; created a website making fun of you; posted unflattering or inappropriate pictures of you online without permission or shared them with others)?” Possible answers included: Haven’t; once or twice; 2-3 times per month; once a week or several times a week. The indicator on PSMU is measured through the Social Media Disorder Scale. The Social Media Disorder Scale includes 9 items covering: 1) preoccupation (“...have you regularly found that you can’t think of anything else but the moment that you will be able to use social media again?”); 2) tolerance (“... regularly felt dissatisfied because you wanted to spend more time on social media?”); 3) withdrawal (“... often felt bad when you could not use social media?”); 4) persistence (“... tried to spend less time on social media, but failed?”); 5) displacement (“... regularly neglected other activities (e.g. hobbies, sport) because you wanted to use social media?”); 6) problem (“... regularly had arguments with others because of your social media use?”); 7) deception (“... regularly lied to your parents or friends about the amount of time you spend on social media?”); 8) escape (“... often used social media to escape from negative feelings?”); and 9) conflict (“... had serious conflict with your parents, brother(s) or sister(s) because of your social media use?”). Problematic social media users are classified as participants who answered “yes” to six or more items of the Social Media Disorder Scale.
6. More information on participating countries and regions can be found in: www.uib.no/en/hbscdata/94931/participating-regions-survey-years.
7. PSMU is analysed in Albania, Armenia, Austria, Belgium (Flemish), Belgium (French), Canada, Croatia, Denmark, England, Estonia, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Moldova, North Macedonia, Romania, Scotland, Serbia, Slovenia, Spain, Sweden, Switzerland and Wales.



8. Cyberbullying victimisation and perpetration is analysed in Albania, Armenia, Austria, Belgium (Flemish), Belgium (French), Bulgaria, Canada, Croatia, the Czech Republic, Denmark, England, Estonia, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Moldova, North Macedonia, Romania, Scotland, Serbia, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland and Wales.
9. Consistent with the approach taken in the World Health Organization international report (Inchley et al., 2020_[63]), intensive users of online communication are people who reported having online contact with friends or others almost all the time throughout the day in the 2017/2018 HBSC survey. The term online communication refers to “sending and receiving text messages, emoticons, and photo, video or audio messages through instant messaging (e.g. WhatsApp), social network sites (e.g. Facebook) or e-mail (on a computer, laptop, tablet, or smartphone)”. More information on the survey can be found at: <https://hbsc.org>.
10. Consistent with the approach taken in the World Health Organization international report (Inchley et al., 2020_[63]), problematic social media users are classified as participants who answered “yes” to six or more items of the Social Media Disorder Scale. See endnote 5.
11. Intensive users of online communication are people who reported having online contact with friends or others almost all the time throughout the day in the 2017-18 and 2021-22 HBSC survey. See endnote 9.
12. Studies analysing smaller sample sizes in the Netherlands and United States find positive (although small) or null associations between intense social media use and mental health issues (Boer et al., 2022_[95]) (Coyne et al., 2020_[96]) (Charmaraman et al., 2022_[102]) (Ra et al., 2018_[99]) (Riehm et al., 2019_[100]). One study in the United Kingdom indicates that frequent engagement in social media platforms is associated with low levels of happiness, especially for girls (Twigg, Duncan and Weich, 2020_[69]).
13. More information about the Australian and European Union’s centres can be found at: www.esafety.gov.au and <https://digital-strategy.ec.europa.eu/en/policies/safer-internet-centres>.



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