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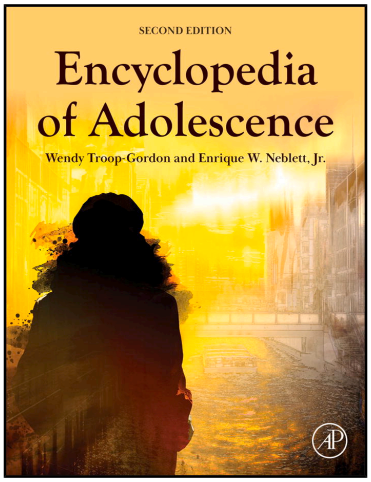
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# Social media use

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## Key points

- Social media is an important developmental context for adolescents, with potential opportunities and risks.
- Social media influences and is influenced by adolescents' cognitive, emotional, social, and behavioral development in both positive and negative ways.
- Risk factors that exist in the offline lives of adolescents are frequently reflected in and sometimes intensified through adolescents' engagement with social media.
- The use of social media can sometimes decrease or alleviate offline risks for adolescents.

## Abstract

Adolescents worldwide are immersed in a digital media-saturated environment. Digital and social media contexts interact with micro-, meso-, and macro-systems, exerting a significant influence on adolescent development. Adolescents actively build and curate their online environments to meet their developmental needs, creating both opportunities and risks. In this article, we explore how social media can both enhance and encumber developmental tasks including identity, relatedness, sexuality, autonomy and agency, and learning and exploration, as well as associations between social media and adolescent physical and mental health. We note how most research has been conducted in high income countries with youth that have almost unlimited access to online platforms but how many youth in low and middle income countries still face important digital divides. Throughout, we highlight how offline and online strengths and vulnerabilities interact with social media in bidirectional, complex and heterogeneous ways. The article concludes with a summary of research and methodological issues for consideration.

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## Introduction

Social media has emerged as a pivotal developmental context in the lives of adolescents, presenting a dynamic landscape teeming with both promise and peril. Impacts are bidirectional: social media both impacts and is impacted by the cognitive, emotional, social, and behavioral development of adolescents. In this article, we will delve deeper into this complex interplay. We will point out how offline challenges faced by adolescents often find their echoes and amplifications online in social media, and how, in some cases, social media use leads to its own distinct risks. We will also explore how the adaptive use of social media has the potential to mitigate or alleviate some offline risks and offer many opportunities for youth.

## What is social media?

**Digital media** refers broadly to content that can be recorded, transmitted, or accessed with digital devices (Chandler and Munday, 2020), fostering bi-directional information exchange and engagement. Digital media serves a wide range of purposes, including entertainment and leisure, socializing and building relationships, information and education, and community and citizenship (see Ladder of Online Participation, Livingstone et al., 2019).

**Social media** is a subset of digital media that can be defined as "computer-mediated communication channels that allow users to engage in social interaction with broad and narrow audiences in real time or asynchronously" (Bayer et al., 2020, p. 316). Users assume the roles of both creators and consumers of content, enabling messages to flow in multiple directions. Compared to other forms of digital media, social media platforms offer adolescents a digital environment where they can express their identities, share personal stories, voice their opinions, and engage with entertaining and informational content.

Social media trends are constantly evolving, and the popularity of platforms can change rapidly due to various factors such as user preferences, new platform releases, and shifts in cultural and technological landscapes. Adolescents are typically the early adopters of social media platforms, and their patterns of social media use can change quickly. Another challenge in the study of social media is heterogeneity in adolescents' conceptions of whether a platform can be defined as such (for example, YouTube or Spotify) (van der Wal et al., 2022). In addition, adolescents often have multiple accounts in the same platform (Anderson and Jiang, 2018; van Driel et al., 2019). As of 2022, the most popular online platforms for adolescents aged 13−17 years in the USA were YouTube, TikTok, Instagram, Snapchat and Facebook (Pew Research Center, 2022). Comparable data at a global scale are lacking. However, it is important to consider that instant messaging platforms such as Whatsapp and WeChat are also extremely popular in many regions of the world, and are considered social media by most youth (We Are Social, DataReportal & Meltwater, 2024).

Furthermore, social media facilitates **scalable sociality** (Borgerson and Miller, 2016), allowing individuals to connect and interact on various levels in the same or different platforms: one can send direct messages to a close friend but also broadcast an opinion to a large public audience. For example, Instagram is mainly used for positive self-presentation to a large audience (Burke and Kraut, 2016; Waterloo et al., 2018). In contrast, WhatsApp and Snapchat are mainly used to communicate privately with close others such as friends (Phua et al., 2017; Vaterlaus et al., 2016; Waterloo et al., 2018).

Adolescents' social media practices are varied. These variations manifest across individual adolescents, as well as within and across platforms. It follows, therefore, that social media's impact on adolescent development is similarly varied. At the same time, social media platforms share features and affordances (Davis, 2023; Moreno and Uhls, 2019) that can provide a useful lens to understand how adolescent development is transformed (Nesi et al., 2018a,b), in positive and negative ways, in the online world.

## Social media use interacts with broader contexts

Adolescents worldwide are immersed in a digital media-saturated environment (UNICEF, 2017) whose importance was highlighted during the COVID-19 pandemic (Kiraly et al., 2020; Madigan et al., 2022). As a result, social media and other online spaces have become a salient developmental context for today's adolescents (Davis, 2023; Vannucci and Ohannessian, 2019; Weinstein and James, 2022a). Digital and offline spaces represent *distinct but interdependent* contexts that shape adolescents' behavior (Nesi et al., 2020).

The digital context is where an increased proportion of adolescents' development takes place (Senekal et al., 2023). The **neo-ecological theory** (Navarro and Tudge, 2022), a modification of Bronfenbrenner's (1977) model, asserts that digital contexts interact with micro-, meso-, and macro-systems, exerting a significant influence on adolescent development. Digital contexts influence (and are influenced by) an adolescent's cognitive, emotional, social, and behavioral development in both positive and negative ways.

Thus, adolescents today navigate a "hybrid ecosystem" (Granic et al., 2020) that intricately links online and offline concerns and contexts. Risk factors that exist in the offline lives of adolescents are frequently reflected or intensified when they engage with social media. Experiences on social media that cause problems, arguments, or difficulties within face-to-face contexts can spill over to offline lives (George et al., 2020). At the same time, the use of social media can sometimes decrease or alleviate offline risks. Online experiences can also present opportunities that transfer to the offline environment (for example, strengthening of relationships).

## Adolescent developmental tasks in the online world

Adolescents actively build and curate their online environments to meet their developmental needs (Davis, 2010, 2012; Nesi et al., 2020; Subrahmanyam and Greenfield, 2008), creating both opportunities and risks (American Psychological Association, 2023; Office of the Surgeon General (OSG), 2023). Effects are multifaceted and highly variable, depending on individual differences in susceptibilities and strengths, and contextual factors, such as how social media is used and what activities social media is replacing or creating (Davis, 2023; Valkenburg and Peter, 2013). Various aspects (features, affordances, and cultures) of digital and social media (Davis, 2023; Nesi et al., 2018a,b) and individual differences in susceptibility to them (Valkenburg and Peter, 2013) interact and ultimately transform the developmental tasks of adolescence.

### Identity exploration, affirmation and self-expression

Social media platforms facilitate self-expression through features such as liking, disliking, posting, and boosting content (Granic et al., 2020). Social media environments encourage and provide opportunities for curated self-presentations while also promoting self-disclosure (Valkenburg and Peter, 2008; Weinstein and James, 2022a). Adolescents deliberately construct their online identity (Gardner and Davis, 2013; Marwick and boyd, 2011), and carefully consider multiple factors before deciding what to share on social media, including their willingness to self-disclose and their anticipation of how various audiences might react (Davis, 2023; Weinstein and James, 2022a). Furthermore, adolescents commonly evaluate and adapt their social identities through comparison and feedback from others (Valkenburg and Peter, 2011). Social media plays a crucial role in supporting the identity exploration process, offering various mechanisms for feedback and engagement with others.

Social media can support the development of self-concept (Blomfield Neira and Barber, 2014; Davis, 2013) and identity. Adolescents use social media to connect with others who share similar interests and identities, which is especially valuable for marginalized youth. This ability to find like-minded individuals can offer crucial support and validation for those who might feel marginalized in their offline lives. For instance, the majority of girls of color report encountering positive or identity-affirming content related to race across social media platforms (Nesi et al., 2023).

At the same time, social media platforms are spaces of constant surveillance by peers, corporations, and bad actors (Santer et al., 2021). As adolescents explore their identities online and engage on social media, they generate a permanent digital trace (or footprint) of their activities, interests and interactions. This puts pressure on adolescents to continuously balance the gains in terms of social connectedness, autonomy, and identity exploration with choices about publicly disclosing and losing control of personal information and permanent records (Santer et al., 2021). Adolescents are more likely than adults to relinquish privacy and security in order to obtain social validation and a sense of belonging on social media platforms (Yau and Reich, 2019).

While social media can be a supportive context for adolescent identity expression (Cyr et al., 2015; Gardner and Davis, 2013), it can also introduce distinct challenges concerning identity development (Cyr et al., 2015). **Context collapse** (Marwick and boyd, 2011), where various audiences such as friends, teachers and parents blend together, might blur boundaries and pose challenges to self-presentation (Weinstein and James, 2022a), and identity management (Darr and Doss, 2022), despite the fact that adolescents value authenticity (the consistency between their online and offline behaviors) (Davis, 2014). To work around these tensions, adolescents typically maintain several accounts on the same platform (Davis, 2023; Weinstein and James, 2022a,b). For example, adolescents know that their main Instagram accounts are seen by multiple audiences so many of them create spam (or Finstas, "fake" Instagram accounts) where they express more honestly with a close group of friends, typically by sharing negative emotions and being critical of themselves (Darr and Doss, 2022). Using privacy controls and features such as private stories on Snapchat and close friends on Instagram are additional ways that adolescents manage which audiences can access their social media content.

Increased use of social media, along with intense engagement and investment in it, has been linked to lower self-esteem among adolescents (Blomfield Neira and Barber, 2014; Twenge et al., 2018). Additionally, cyberbullying victims (see section on Cyberbullying for a broader discussion) tend to have lower self-esteem compared to those who have not experienced such victimization online (Hébert et al., 2016). The long-term effects of cyberbullying can lead to negative cognitive schemas, resulting in negative outcomes such as body image concerns and depression (Calvete et al., 2015). Social media's facilitation of social comparison can also lead to increased self-concept and body image concerns and depressive symptoms (Choukas-Bradley et al., 2022), highlighting the significant role of body image as a reference point for adolescent self-esteem (Calvete et al., 2015).

### Relatedness and navigation of an increasingly complex social world

The transformation framework (Nesi et al., 2018a,b) posits that **affordances** of social media such as quantifiability, availability, and publicness transform interpersonal interactions and have the potential to alter the meaning and experience of social relationships in positive and negative ways. For example, while adolescents have always been concerned with popularity and status, the ability to *quantify* who has more likes and friends can promote social comparison, status-seeking antisocial behaviors and train algorithms to prioritize certain content. Given the capacity to be connected 24/7, social norms around typical *availability* have drastically changed: adolescents today may enjoy having permanent connection but also feel pressured to respond constantly (including in the middle of the night). Similarly, adolescents can chat over direct messages, which are more or less private, but can also chat in more public forums or even share screenshots of personal conversations. As a result, social media has been described as a "double-edged sword" when it comes to peer relationships and friendships (Choukas-Bradley et al., 2023).

Social media can support key adolescent developmental processes in terms of peer belonging, acceptance and forming and maintaining close friendships (Choukas-Bradley and Prinstein, 2014; Davis, 2012; Steinberg and Morris, 2001). For example, adolescents use social media to interact with their in-person friends (Reich et al., 2012; Valkenburg and Peter, 2009; Yau and Reich, 2018). Social media allows adolescents to maintain and extend friendships that they already have from other areas of their life, such as school, religious organizations, sports and other local activities. Reduced social cues can make it feel less intimidating to self-disclose, which may in some cases stimulate friendship closeness (see *stimulation hypothesis*, Valkenburg and Peter, 2007b). Social media also grants adolescents the opportunity to share real-time experiences constantly as well as the capacity to receive feedback and support, which can promote closeness (Pouwels et al., 2021). While earlier research found that communicating with strangers was typically not associated with friendship closeness (Valkenburg and Peter, 2007a; Wang et al., 2011), there is a recent interest in understanding the role of online-only friendships (close relationships with people one might never meet in person), an area that remains under-investigated. The capacity to find community online is particularly important for sexual and gender minority youth (SGM) (McInroy et al., 2019), youth with illnesses and disabilities (Zebracki, 2019), and other marginalized youth (Charmaraman et al., 2022).

Furthermore, social media can be a supportive environment to explore romance, friendship, and social status. **Social media features and affordances** such as "friending", sharing, posting, and giving feedback to others in the form of likes, allow adolescents to build and curate networks on social media that are more elaborate and diverse than offline peer groups (Granic et al., 2020; Lenhart, 2015). These networks can also be an important form of social support (American Psychological Association, 2023; Office of the Surgeon General (OSG), 2023). Adolescents who express themselves authentically to their peers show higher levels of wellbeing (Reinecke and Trepte, 2014) and self-esteem (Yau and Reich, 2019). Social media usage can positively impact friendships as it facilitates peer interactions and contributes to forming and nurturing both offline (Anderson and Jiang, 2018) and, increasingly, online-only friendships.

However, social media interactions may come at the expense of in-person contact with friends (Allcott et al., 2020; Verduyn et al., 2020) according to the *displacement hypothesis* (Verduyn et al., 2020; Kraut et al., 1998), although this hypothesis is not unequivocally supported (see e.g. Dienlin et al., 2017; Hall et al., 2019). For example, social media interactions with close friends (but not with acquaintances) are associated with higher levels of friendship closeness (Pouwels et al., 2021). However, social media interactions with acquaintances might displace in-person interactions with close friends. In addition, *digital social multitasking* (DSM; Yang and Christofferson, 2020) refers to using technology while engaged in social interactions. For example, it is common for adolescents to engage in phone use such as texting with other friends while having a meal with a group of friends. While DSM was traditionally seen as having negative effects on offline interactions, and dubbed *phubbing/technoference* (McDaniel and Coyne, 2016; Roberts and David, 2016), more recent proposals consider that shared phone-based activities can be part of, and even enhance, in-person interactions (Yang and Christofferson, 2020). Many youth are tolerant of friends engaging in DSM, which may reveal a shift in norms around social media use with the increasing integration of communication technologies into the social lives of youth (Yang and Christofferson, 2020).

Digital media's allowance for immediate and frequent contact with peers influences social norms around expectations to be constantly in touch in order to maintain friendships. For example, some adolescents now expect that a "good" friend should respond immediately to a message, even at night, and be constantly available (*availability stress*, Hall et al., 2021). If they do not receive immediate or sufficient (positive) comments or likes from close friends on these posts, they might experience *approval anxiety* (Hall et al., 2021) and feel stressed or concerned about their friendships (Beyens et al., 2016; Yau and Reich, 2018). Furthermore, since adolescents often use social media to showcase their friendships publicly by posting pictures with close friends, they might come across posts of friends attending events they were not invited to, leading to *feelings of missing out* (FOMO) and social exclusion (Nesi et al., 2018a,b; Rideout and Robb, 2018). These feelings of exclusion can be magnified by specific platform features such as tagging photos with certain friends and not others and Snapchat's Snap Maps, which might reveal a group of friends gathering in a common location (Weinstein and James, 2022a). Availability stress, approval anxiety and FOMO (in addition to connection overload and online vigilance) are forms of **digital stress** (Hall et al., 2021).

### *Cyberconflict and cyberbullying*

As adolescents develop relationships and social skills, peer conflict is somewhat inevitable, and ranges in severity. "Digital drama" is the colloquial term used to describe the often less severe everyday disagreements that happen between peers (Marwick & boyd, 2011). Digital drama is common as adolescents learn to build and maintain relationships. There are other hurtful online experiences, such as being excluded or being involved in other people's conflict. Certain affordances of the online environment, such as being able to post anonymously or **online disinhibition** (when people engage in self-disclosure or exhibit behaviors more frequently or intensely online than they typically would in face-to-face interactions (Suler, 2004)), can amplify minor disagreements. Among internet users aged 9 to 17, a range of 14%—36% encountered hurtful online peer behavior. The prevalence is higher among adolescents than children (Livingstone et al., 2017).

When harm is inflicted repeatedly and willfully against a target using digital devices it constitutes the most severe form of online conflict: cyberbullying (Hinduja and Patchin, 2015, p. 11). In contrast to digital drama, cyberbullying involves an intent to harm, a pattern of repeated interactions and power imbalance. While cyberbullying is not as frequent as digital drama, it is still prevalent among adolescents. In the USA, 23% of middle-schoolers and 16% of high-schoolers have been targets of cyberbullying (Basile et al., 2020). Up to 11% of middle and high schoolers across the United States admit to cyberbullying others (Patchin and Hinduja, 2019). Approximately 20% of early adolescents (aged 9 to 12) in the USA report encountering cyberbullying either as observers, targets, or aggressors (Patchin and Hinduja, 2022).

Cyberbullying is associated with serious negative outcomes (Kowalski et al., 2014; Nixon, 2014): both targets who have been cyberbullied and aggressors who cyberbully others face academic, emotional, psychological and behavioral struggles (Hinduja and Patchin, 2015). There is substantial overlap between being a target and being an aggressor, as some victims may retaliate in response to being bullied (Livingstone et al., 2017). Adolescents in each role report less social support, more loneliness, and lower psychological wellbeing (Stoilova et al., 2021b).

## Intimacy and Sexuality

Social media plays an important role in adolescent romantic relationships and sexual exploration and development (Maes et al., 2022). Adolescents turn to social media to explore their sexual and gender identities and questions, and also receive sexual socialization from peers, taking advantage of affordances of online spaces including anonymity and accessibility.

Adolescents use social media to engage in private romantic relational communication (Young et al., 2017), as well as in public displays of romantic affection and conflicts (Rueda et al., 2015). Adolescents frequently turn to digital media to access sexual and reproductive health information (Nikkelen et al., 2019). Increasingly, adolescents are sexting in instant messaging and social media platforms, which, like other aspects of adolescent sexuality, can be a positive experience with the right partner, or a negative experience that leads to negative outcomes with the wrong partner (Englander, 2019).

Despite these positives, sexual exploitation and digital dating abuse also occur on social media platforms, including digital monitoring and control, direct aggression, and sexual coercion (Reed et al., 2016). Girls are more likely than boys to be the targets of online gender-based violence and abuse (Bhatia et al., 2021; Reed et al., 2017).

### *Sexual and/or gender minority youth*

Lesbian, gay, bisexual, trans, queer, and other sexual and/or gender minority (LGBTQ+) adolescents might particularly benefit from online sources of information and exploration. Social media may serve as an informal educational platform for identity development, where LGBTQ+ youth may explore and learn with identity-specific resources and communities (Fox and Ralston, 2016). Due to persistent stigma surrounding LGBTQ+ identities, social media plays a pivotal role in helping youth shape and craft their online presence in a relatively secure environment, in ways that may not be feasible offline. The internet also serves as an efficient way for LGBTQ+ youth to access information about sexual health resources, offline services, and events related to their identities. Social media empowers LGBTQ+ youth to explore their identities, build relationships, access resources, and express themselves while maintaining control over their self-disclosure levels (Craig et al., 2021).

However, LGTBQ+ youth are also disproportionately more often victims of cyberbullying and its negative outcomes, including depression and suicidal thoughts and attempts (Hinduja and Patchin, 2020). LGTBQ+ youth are also more likely to be perpetrators of cyberbullying, likely as a result of being victimized themselves, revealing how peer harassment has an important retaliatory nature.

## Autonomy and agency

The experience of agency and autonomy takes on increasing significance as adolescents explore identities apart from their immediate family context. Indeed, autonomy is foundational to psychological flourishing during adolescence and beyond (Ryan and Deci, 2000). Digital contexts transform autonomy. In the current *smartphone bedroom culture*, online access has become more personal, more private and less supervised, opening up new opportunities for adolescents to assert their independence (UNICEF, 2017).

Still, adolescent online agency is limited by several factors. For one, adolescents' right to privacy and protection are not reliably secured by online platforms. Many social media platforms exhibit a design bias toward default publicness (Cho, 2018), which compels users to connect their online and offline identities, typically by using a government-issued form of identification (like a state ID or driver's license). This linkage of online and offline personal data supports tech companies' bottom line (the more information they have about users, the more they can charge third-party advertisers for access to it (Zuboff, 2019)), but it can place users at risk of having personal information shared with unintended audiences. This risk is particularly salient for youth with marginalized identities, such as LGBTQI+ youth who may experience negative repercussions if their identities are shared with certain audiences, such as family members to whom they have not yet come out (Cho, 2018).

Default publicness is an example of the power that platform design has to shape adolescents' experiences and behavior on social media (Gillespie, 2014, 2018; Noble, 2018; Zuboff, 2019). Algorithmic curation of social media feeds dictates who and what gets seen online, which can impact measures of popularity within peer groups, both online and offline (Davis, 2023; Weinstein and James, 2022a,b). Algorithms can also reflect and reinforce societal biases and ideologies, such as when TikTok was found to have promoted the content of white, affluent girls while affording less attention to the videos of Black girls (Kennedy, 2020).

Peer norms (e.g. trends and fashions about content type and frequency) are another important factor shaping adolescents' experience of agency and autonomy on social media. Many adolescents report approval anxiety (Hall et al., 2021) when they post something online, which is characterized by a felt pressure to post only what others would approve of (Lenhart, 2015; Twomey and O'Reilly, 2017). Approval anxiety can limit adolescents' authentic presentation online.

Prior research has found that when adolescents struggle to experience agency in their social media interactions, they are more likely to report lower levels of subjective well-being (Pitt et al., 2021). Researchers in the field of human-computer interaction (HCI) have begun exploring the use of interaction design to support adolescent agency on social media. For instance, Davis et al. (2023) designed *Locus*, a mobile application that reorients adolescents' social media use toward meaningful interactions by shaping how they embark on a social media session. The researchers tested a version of *Locus* that delivered question prompts designed to promote reflection and goal setting before adolescents open a social media app on their phone. Results from an open trial field deployment ($N = 54$) showed high adherence rates, with 80% of participants reporting that they opened their social media apps through the Locus app most of the time or all of the time during the course of the two-week study. Participants further reported that they engaged in more self-regulation behaviors during the course of their two weeks using the Locus app: participants reported increased self-control, decreased absentmindedness, and increased autonomy in relation to their social media use from pre-to post-deployment.

#### *Overuse/problematic media use*

Despite the many benefits of social media already discussed, it is clear that these technologies are designed to be particularly engaging and hard to put down. As a result, one of the main concerns about youth's use of social media is overuse or excessive media use, which interferes with activities that are necessary for optimal adolescent development (sleep, exercise, time outside and in-person interactions).

The majority of adolescents can be classified as active or intense users of social media (Boniel-Nissim and Alt, 2022). While many adolescents may feel their use constitutes an unhealthy habit, only a small percentage of youth meet criteria of truly problematic use (Domoff et al., 2022; Boniel-Nissim and Alt, 2022). Problematic social media use (PSMU) is characterized by excessive use that also *significantly disrupts functioning* (school achievement, relationships, wellbeing) (Andreassen, 2015; Cataldo et al., 2021; Domoff et al., 2020). PSMU is not a diagnosis and there is ongoing debate in our field about whether digital media overuse can be classified as a behavioral addiction (Perales and Muela, 2019; Domoff et al., 2020). Therefore we discourage the use of the term social media addiction.

In any case, all adolescents can benefit from support and scaffolding to find balance in their online and offline lives. For example, families may establish certain screen-free periods or spaces (such as during dinner and before going to bed (Hamilton and Lee, 2021)) or other guidelines to find balance. As part of **digital citizenship** training (i.e., skills and abilities needed for the responsible use of technology to learn, create, and participate; James et al., 2021, p. 12) in schools, teachers can also promote awareness of signs of dysregulated use and time management skills to find balance between online and offline experiences. Finally, platforms should offer tools and designs that make it easy for adolescents (and all users) to feel in control of their use.

### Learning and exploration

Adolescents look to social networks as a key source of information and advice during a critical developmental period (Best et al., 2014). Social media allows adolescents to learn and discover new interests, as well as keep up with news and current events. Social media makes it possible for students to connect, think, act, interact, and access ideas and resources in novel ways that are non-hierarchical and can connect formal and informal learning (Aragon and Davis, 2019; Bogiannidis et al., 2023; Ito et al., 2020). Adolescents are enthusiastic about the role of social media (and digital media more generally) in supporting informal learning, seeking information, videos and tutorials online (Cabello et al., 2019).

In addition to education, adolescents turn to social media for information on health, dieting, or physical fitness. Social media is particularly alluring for topics that are hard to discuss, including substance use and sexual health.

#### *Cognitive control and media multitasking*

Cognitive control undergoes profound development in adolescence (Luna et al., 2013), and may interact with social media use. **Media multitasking** is the act of concurrently using different forms of media, involving frequent switching between activities and platforms (Minear et al., 2013). Research indicates that young individuals spend approximately 7.5 h per day on online media, with 25%–50% of that time involving simultaneous use of multiple forms of media (Kong et al., 2023). The majority of adolescents experience more distraction as they spend more time using social media (Siebers et al., 2022).

Recent meta analyses with adolescents (Kong et al., 2023) and adults (Parry and le Roux, 2019) have found a moderate negative association between media multitasking and global cognitive control. Compared to individuals with lower levels of media multitasking, those with higher levels indicated more cognitive control challenges, especially when these were assessed through self-report (vs. performance on an experimental task; Parry and le Roux, 2019). Effects seem to be particular to inhibitory control (e.g. the capacity to regulate impulses) and working memory, since an association with cognitive flexibility (e.g. the capacity to switch between tasks) was not found (Kong et al., 2023).

As with other outcomes we have explored here, effects are small and heterogeneous (see section on Methodological issues for a broader discussion). For example, in a recent study, Siebers et al. (2022), found that while a majority of adolescents experienced distraction related to social media (82%), some did not experience any change (16%) and a small minority reported less distraction (2%). Furthermore, most studies are cross-sectional, which limits inferences about causality. While media multitasking might negatively impact cognitive control, it is also likely that individuals who have greater cognitive control challenges also struggle more to regulate their social media use.

## Physical health

Social media can impact several aspects of physical health that are key during the developmental period of adolescence, including sleep, physical activity, diet, and exposure to advertisements (see Bozzola et al., 2022 for review). The impact of social media on the physical health of adolescents depends on the nature and extent of their online engagement, as well as the specific content and interactions they encounter on these platforms.

One of the most robust findings in terms of negative social media impacts is on sleep. The combination of the stimulating nature of social media content, the exposure to screens and light, and the disruption of sleep routines can have detrimental effects on adolescent sleep quality and duration (Hale et al., 2018). Adolescents often use social media late into the night, which can lead to a delay in their bedtime. This delayed sleep onset can disrupt their sleep schedule and lead to inadequate sleep duration. Receiving notifications and engaging in online interactions during the night can further disrupt sleep by causing awakenings and making it difficult to return to sleep. In turn, inadequate sleep due to social media use can lead to daytime sleepiness, reduced attention span, decreased cognitive function, impaired academic performance, and contribute to emotion dysregulation and psychopathology (Hamilton and Lee, 2021; Scott and Woods, 2019).

Social media use can contribute to sedentary behavior, especially if being on screens displaces time that would otherwise be spent engaging in sports or outdoor activities. At the same time, there is evidence that social media can be a useful tool to raise awareness and motivate adolescents to engage in exercise. Adolescents can use social media to share their fitness goals and progress, creating a sense of accountability and finding community (Shimoga et al., 2019).

Social media platforms frequently expose adolescents to marketing of unhealthy products, including junk food, alcohol, tobacco and other substances (Radesky et al., 2020). Advertisers often employ digital marketing techniques that include sponsored content, influencers, and persuasive design techniques that may exploit youth's vulnerabilities and inexperience (Radesky et al., 2020). Moreover, advertisements often depict unrealistic beauty standards, success stories, and lifestyles, contributing to feelings of inadequacy and low self-esteem. Comprehensive regulation of social media advertising is currently lacking.

## Mental health

The impact of social media use on adolescent mental health is heavily debated (Odgers and Jensen, 2020; Orben and Przybylski, 2020; Twenge et al., 2020). Social media is part of the larger ecological context for youth (Navarro and Tudge, 2022), and will therefore interact and amplify both the strengths and vulnerabilities of youth, with positive and negative impacts on adolescent mental health (American Psychological Association, 2023; Office of the Surgeon General (OSG), 2023).

As discussed above, social media can bolster mental-health-promoting factors, such as relatedness and social connectedness, autonomy and agency, learning and exploration. Online help-seeking can serve as a gateway to initiate mental health care (Office of the Surgeon General (OSG), 2023; Schleider et al., 2020). For example, Ehrenreich and Underwood (2016) showed that girls experiencing internalizing symptoms were more inclined to seek and receive peer support online. Additionally, Best et al. (2014) observed that boys preferred accessing professional help online instead of face-to-face, possibly influenced by their comfort or discomfort with self-disclosure. Social media can be a powerful health communication tool maximizing exposure to positive messages about mental health and reduction of mental health stigma (Thompson et al., 2021).

At the same time, youth may face several risks to their mental health when they engage with social media. Paradoxically, youth with mental health concerns are both more likely to experience the negative effects of social media but also more likely to experience its benefits and turn to these platforms for support (Nesi et al., 2023; Sweeney et al., 2019). Adolescents facing mental health challenges exhibit specific patterns of engagement with the digital environment (Stoilova et al., 2021a). They seek out niche online communities or actively search for peer or professional support. Seeking understanding and support, adolescents connect with others who share similar experiences, providing and receiving reciprocal support within these online interactions. For example, adolescents who have experienced self-harm are more inclined to seek and provide online support to individuals facing similar issues compared to their peers who have not self-harmed (De Riggi et al., 2018).

Youth are sometimes exposed to problematic content online that encourages or promotes harmful behaviors like disorder eating or suicide/self harm (Jacob et al., 2017; Livingstone and Stoilova, 2021). This is especially likely in the niche online communities where youth might be participating to find a sense of validation and belonging. Collective norms in certain online communities may trigger or encourage their problems, ultimately exacerbating and intensifying their difficulties. Adolescents are likely seeking some of this content intentionally (Lewis and Michal, 2016).

Youth may also face harassment, hate speech or harmful content (Livingstone and Stoilova, 2021). Youth with underlying mental health disorders are more likely to encounter online content that is upsetting and triggering and contains inaccurate information (Stoilova et al., 2021a). This content is often amplified by algorithms (Perez Vallejos et al., 2021).

### Body image concerns and disordered eating

With its overemphasis on physical attractiveness and idealized body standards, social media is implicated in sustaining and promoting body dissatisfaction and disordered eating behaviors. **Social comparison** and appearance-related social media consciousness represent a source of distress for many adolescents. Sites such as Instagram have traditionally emphasized posting attractive self-images, a practice that is facilitated by the use of filters and other image editing software (Leaver et al., 2020). Scrolling through a feed of "highlight reels" can prompt adolescents to engage in negative social comparison, with deleterious effects on mental health outcomes (Choukas-Bradley et al., 2022; Maheux et al., 2022; Nesi and Prinstein, 2015). The association between technology-based social comparison and depressive symptoms appears to be particularly strong for girls and adolescents low in popularity (Nesi et al., 2017; Nesi and Prinstein, 2015).

In addition, social media includes content and affinity groups that are explicitly crafted to achieve a particular body shape or appearance, thereby shaping users' perceptions of their own body image. Content related to weight loss or exercise ("fitspiration") can amplify preoccupation with appearance and promote unhealthy behaviors, especially when it is not certified by health professionals. At the extreme, some content explicitly encourages eating disorders (such as pro-anorexia and bulimia groups) (Roberts et al., 2022).

Choukas-Bradley et al. (2022) propose that the intersection between adolescent developmental factors such as the salience of peer relationships, social media features such as popularity metrics and idealized images, content explicitly tailored for "fitness" and sociocultural gender socialization processes creates a "perfect storm" for intensifying girls' body image concerns. As this work shows, it is not just social media alone that can have negative effects but rather the interaction between social media, individual adolescents, and their social contexts.

## The challenge of finding a balance between over- and under-connection

**Digital wellbeing** can be defined as the "experience of optimal balance between the benefits and drawbacks obtained from mobile connectivity" (Vanden Abeele, 2021, p. 7). Digital well-being includes social connection, creativity, and empowerment. There is evidence for a "Goldilocks effect" where both insufficient and excessive social media use can be harmful, but use in moderation is advantageous (Przybylski and Weinstein, 2017; Shimoga et al., 2019). There are concerns at both ends of the spectrum (high and low levels of connectivity). On one hand, as we have reviewed above, studies predominantly conducted in the Global North document the experiences of youth who spend a large proportion of their time online and who are over-connected in some instances. On the other hand, there are also concerns for the youth who remain under-connected, whether they are part of under-resourced communities in high-income countries, or live in low- and middle-income countries in the Global South (Magis-Weinberg et al., under review). Globally, millions of adolescents still face **digital gaps** in access (to infrastructure, like broadband or device availability), use (how and why people use the Internet), and benefits/harms (the extent to which adolescents can use the internet effectively for online participation while avoiding risks) (Magis-Weinberg et al., 2021).

### Youth in global settings

While 90% of children and adolescents are growing-up in low- and middle-income countries (LMICs), only 5%–30% of research is done in these settings (Ghai et al., 2022). In addition, social media are cultural tools that shape and are shaped by cultural practices and norms (Manago and McKenzie, 2022). However, most studies do not incorporate a cultural lens, and thus our understanding of social media impacts in different cultures is restricted. The Global Kids Online Study (Global Kids Online, 2019) has been conducted since 2015 in countries including Albania, Argentina, Brazil, Bulgaria, Canada, Chile, Costa Rica, Ghana, India, Montenegro, New Zealand, the Philippines, Serbia, South Africa, and Uruguay to provide global comparative research on the risks and opportunities that children and adolescents (9–17 years of age) find in online spaces, and seeks to address the lack of research done on youth's lives in LMICs.

The majority of youth in LMICs face important digital gaps. In 2020, two-thirds of school aged-children did not have Internet access at home (United Nations Children's Fund and International Telecommunication Union, 2020). These youth experience gaps also in use and in the risks and opportunities associated with social media use (Magis-Weinberg et al., under review). In turn, digital gaps compound structural inequalities, including the more pronounced gender inequality that exists in LMICs (Dodel, 2021; UNICEF, 2017).

In LMICs, mobile connection predominates over desktop/broadband connection (Trucco and Palma, 2020). As a result, children and adolescents connect mostly through mobile devices, which favor the use of social media (vs. other activities), and which, in turn, is associated with lower online participation (Magis-Weinberg et al., 2021). Thus, in under-resourced settings, social media use is more common than other technology-based activities, such as seeking information, educational opportunities, or engaging with governmental agencies.

In LMICs, youth are adopting social media and other technologies quickly (in many cases before adults) and face heightened risks for online harms given offline vulnerabilities (Magis-Weinberg et al., 2021). In many of these settings, parents and teachers are ill-prepared to effectively support youth when they go online. The Global Kids Online study highlights the considerable variability across countries in terms of: online opportunities and risks, language of content, capacity of parents and teachers to support youth, the regulatory environment, and other barriers and inequalities (Global Kids Online, 2019).

Future studies should better consider how cultural influences and environments uniquely contribute to adolescents' digital experiences (Manago and McKenzie, 2022). Social media is part of the ecologies in which youth around the world explore their identities, including racial-ethnic, cultural and national identities (Charmaraman et al., 2022). On the one hand, social media provides a powerful platform for positive self-expression, exploration and amplification of marginalized youth voices around the world.

Youth can connect with others in their communities, learn about their groups, and share positive experiences. On the other hand, social media is also a source of exposure to discrimination and prejudice (Nesi et al., 2023). Online hate, racism and discrimination increases stress and negative outcomes for youth (Toro and Wang, 2023).

## Minimizing the negative and maximizing the positives

As we have reviewed, social media has many potential benefits for youth, including entertainment, socialization, education, information and community building (see the Ladder of Online Participation by Livingstone et al., 2019), as well as potential harms, such as exposure to harmful, age-inappropriate content or contact with adults and negative interactions with peers (see the 4Cs of Online Risk by Livingstone and Stoilova, 2021). Scaffolding and support at different levels (family, school, design, and regulation) are necessary for youth to realize the opportunities and manage the risks of online activities.

### *Family*

Family members influence one another's feelings, attitudes and behaviors around technology use (Davis et al., 2019; Liu et al., 2023). Parents and other caregivers are key to providing scaffolding and support around adolescents' social media experiences (Davis, 2023; Weinstein and James, 2022a,b). Parents should promote communication with their adolescent children about their online lives in ways that also respect adolescents' need for autonomy and independence. Monitoring can sometimes be appropriate, but it should be done in the context of regular and open communication between parents and their children. Parents' technology use is a complex and important piece of families' lives. Many parents themselves desire to change their own use, and adolescents are keenly aware of discrepancies between their parents' rules and their own technology habits (Davis et al., 2019). Parents also play a big role in modeling appropriate use of social media and other forms of digital media use (Liu et al., 2023). Parents are key in establishing boundaries that help adolescents regulate their use. However, when parents are overly restrictive, online opportunities can be curtailed.

### *Schools*

Schools have responded to "problems, parents, precedent, and policies" (Weinstein and James, 2022b, p. 366) with curricula and resources first focused on online safety with more of a protectionist approach that has become more encompassing of other digital citizenship skills, including finding balance, socio-emotional skills, and critical literacy (Cortesi et al., 2020). Schools are well-positioned to facilitate digital citizenship and social media literacy programs that can prepare youth to use social media in a safe and meaningful way, help them understand how social media interacts with their lives, and promote critical thinking skills (Magis-Weinberg et al., 2023). To date, several school programs exist with different approaches to promoting critical awareness, self-reflection, and behavioral change, although formal evaluation of their effectiveness remains scarce (Weinstein and James, 2022b, p. 366).

### *Design and regulation*

The design and regulation of the digital environment play major roles in ensuring that platforms foster age-appropriate and positive experiences for adolescents. Over the past decade, there has been a growing public demand for regulations that compel technology companies to take on more significant responsibilities in safeguarding and prioritizing the needs of youth (Magis-Weinberg et al., under review). These regulations aim to ensure that digital platforms are designed to be age-appropriate (Information Commissioner's Office, 2020), safe, and engaging (Livingstone and Pothong, 2021). Notable regulations include the United Kingdom's Online Safety Bill, the European Union's General Data Protection Regulation and Digital Services Act, and the United States' Children's Online Privacy Protection Act. A recent global initiative, General Comment 25 (GC25), was adopted by the United Nations Convention on the Rights of the Child, establishing that the rights of children and adolescents are applicable both online and offline (Third and Moody, 2021).

## Research and methodological issues

So far, research on the associations between social media use and adolescent wellbeing has relied largely on between-person, cross-sectional research with limited sample diversity and employed coarse measures of online experiences (i.e. screen-time) utilizing retrospective self-report, finding either null, negative but small effects or mixed findings (Odgers and Jensen, 2020; Orben, 2020; Parry et al., 2022). This area of research is currently undergoing methodological improvements that allow us to evaluate social media on a more fine-grained basis:

(1) Daily diary and ecological momentary assessments are better suited to capture adolescents' in-the-moment experiences multiple times over the course of a study. Compared to retrospective self-report, these methods may reduce recall bias and better capture the constant and real-time nature of social media use and associations with adolescent wellbeing (Jensen et al., 2019; Odgers and Jensen, 2020; van Roekel et al., 2019).

(2) Media effects in a population likely do not generalize to the individual (Valkenburg et al., 2021, 2022). Evidence suggests that while social media might be negative for a group of youth, it might be neutral or positive for other groups, depending on their

individual or group characteristics. Thus, effects may cancel out, resulting in small average within-person associations. To get around this issue, more recently, the field has incorporated person-specific, idiographic approaches that can better capture heterogeneity in effects (Griffioen et al., 2021; Marciano et al., 2022; Valkenburg et al., 2022).

(3) Researchers are advocating for combining subjective and objective approaches to measuring adolescents' social media experiences. This will allow the field to supplement self-report data with validated instruments that go beyond screen time and capture digital behaviors (e.g. problematic media use, digital stress, positive and negative online experiences). In addition, advancing technologies provide new opportunities to incorporate passive sensing (capturing screen time and other metrics of use directly from participants' smartphones, (for an example of lingustic feature analyses see McNeilly et al., 2023) or screen captures (Screenomics; Reeves et al., 2020). Finally, qualitative approaches are important to understand adolescents' experiences in more nuance and depth (van der Wal et al., 2022).

(4) To uncover developmental processes that unfold over time, researchers are conducting longitudinal studies (e.g., Coyne et al., 2020) and comparing different developmental periods of vulnerability (Magis-Weinberg et al., 2021; Orben and Blakemore, 2023). Furthermore, longitudinal and experimental approaches are needed to investigate causality and directionality (although it seems likely that the relationship of social media and adolescent wellbeing is bidirectional) (Flannery et al., 2023).

(5) There are increasing calls for (and examples of, see Kupferschmidt, 2023) research collaborations with social media platforms as a means to access high-quality, real-time data on large and diverse samples and also to develop effective interventions. Academic-industry collaborations that adhere to transparency, openness, and ethical standards and focus on benefiting youth can be fruitful avenues of future research (for a debate see Livingstone et al., 2023).

(6) Research should keep pace with an ever-evolving digital ecosystem, in which social media is in constant transformation and will increasingly incorporate features of the metaverse, virtual reality and artificial intelligence (Livingstone, 2022).

(7) It is crucial to understand how to best support youth to manage both the challenges and possibilities presented by social media. This task is made more complex due to the swift evolution of social media and digital technologies and variations in how youth use social media in diverse settings (Magis-Weinberg et al., under review). For a truly comprehensive understanding of the impacts of social media, research needs to increase diversity and representation of samples across and within countries (Magis-Weinberg et al., under review).

## Conclusion

Social media has arisen as a central backdrop for the developmental journeys of adolescents, unveiling a terrain filled with both opportunities and risks. The influence is a two-way exchange, where social media both affects and is affected by the cognitive, emotional, social, and behavioral maturation of adolescents. Social media use should be understood and studied in light of the micro-, meso- and macro-contexts in which youth grow up and develop. The study of social media is as dynamic as the platforms themselves; recent methodological improvements and a greater diversity of populations and issues being studied will continue to refine our understanding of social media's complex role in young people's lives.

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