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Social media interventions to improve well-being

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Concerns about the negative effect of social media on well-being have generated much interest around the development of social media interventions, which aim to change users' interactions with social media to improve well-being. To aid the effective study and design of such interventions, we introduce a new theoretical approach, guided by self-determination theory. We review current interventions and categorize them by the context in which they intervene: social media platforms, devices, users, families and society. Drawing on established behavioural change models, we then evaluate how social media use affects the core psychological needs of autonomy, competence and relatedness. We propose theoretically grounded design features that can be applied to maximize the effectiveness of future interventions. In response to the increasing calls for interventions to counteract social media risks, our recommendations will inform future research in academia and industry, with practical applications to enhance well-being in this digital age.

Concerns about social media's effect on well-being have intensified in recent years[1]. Social media has introduced new social pressures, such as constant connectivity, and may amplify the risk of certain harms, including sleep disturbances[2,3]. This is especially the case for adolescents, who are both more vulnerable to experiencing drops in well-being and more sensitive to the negative effects of social media[4,5]. In response to these growing concerns, there is increasing pressure to develop policy-level interventions and to motivate young people to intervene individually to assuage the effect of social media on their own lives[6].

Behavioural science researchers and the broader technology industry have attempted to address social media's well-being effects by developing social media interventions (SMIs): tools or strategies that intend to change users' interactions with social media to improve well-being as a primary outcome[7,8]. One popular example is the use of smartphone apps to block or regulate access to social media platforms. Frequently, these SMIs aim to enhance 'digital well-being', defined as the experience of "optimal balance between the benefits and drawbacks obtained from mobile connectivity"[9].

Surprisingly little work to date has systematically studied, evaluated and informed the design of SMIs. Although extensive research has examined the relationship between social media and well-being, particularly for adolescents, this has often found mixed results[10–13]. These studies also crucially lack the ability to support causal conclusions[14]. As SMIs often directly manipulate social media usage, they offer an exciting opportunity to extend beyond the limitations of much of this current research literature and causally examine how aspects of social media affect well-being[15]. By developing new approaches for enhancing well-being, these interventions also offer a potential antidote for social media's harmful effects[16]. Furthermore, they can be applied across the population or targeted to particularly vulnerable populations, such as adolescents[17].

Although SMIs have considerable potential both to advance research and to develop practical well-being solutions, so far, development has been carried out by researchers, industry professionals, governments or organizations without a systematic theoretical foundation or integration of efforts. This has created a fractured literature spanning several fields, with variation in how interventions are designed and evaluated[7,9,12,18,19]. Furthermore, current interventions are often developed rapidly, increasing the risk of a high-availability, low-evidence-base crisis, similar to that found in digital mental health care, where thousands of unsupported interventions exist in the public marketplace[20,21]. To avoid a similar result and ensure that SMIs reach their full potential for improving well-being and advancing our

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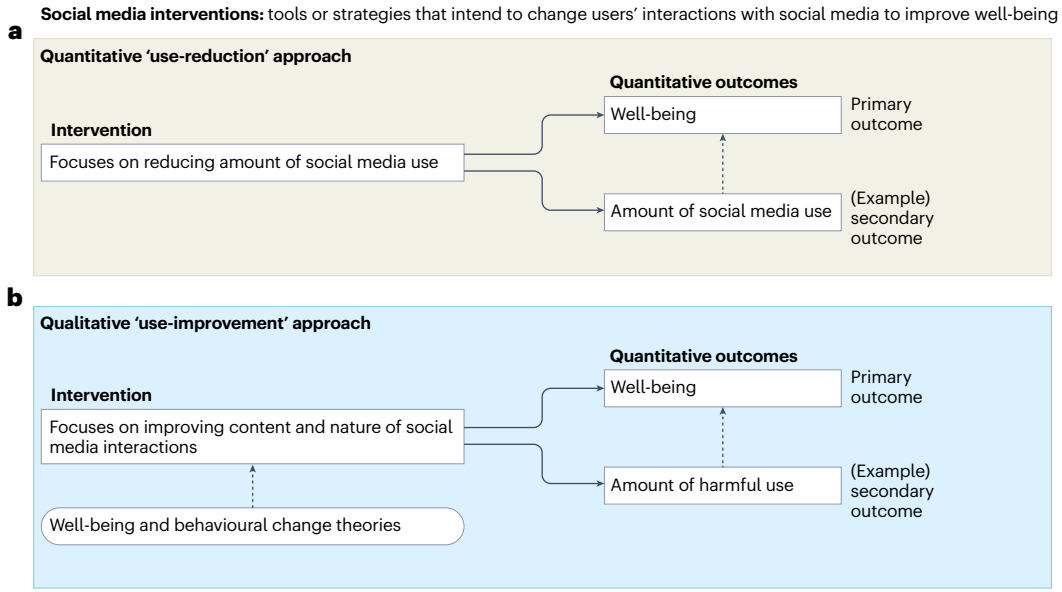

Fig. 1 | Qualitative and quantitative approaches to SMIs. a, Use-reduction interventions include most existing SMIs, which aim to enhance well-being by reducing the time users spend on social media. **b**, Use-improvement interventions represent an emerging approach for SMIs, which focuses on improving the nature of social media interactions to improve well-being. Taking a qualitative approach, these interventions may also integrate psychological theory to create theoretically grounded well-being interventions.

understanding of social media's effects, it is necessary to conceptualize a more robust understanding of the approaches used to target well-being and how these align with relevant psychological theory[5].

Currently, one of the most successful theoretical approaches to help to target and design interventions is self-determination theory, which focuses on humans' need for autonomy, competence and relatedness as a foundation for well-being[22]. Self-determination theory has been used across many disciplines, including behavioural change and technology design research, and can help to guide our understanding of what needs to be considered to properly design interventions that address users' psychological needs to change social media behaviours[23,24].

In this Perspective, we integrate previous research across the behavioural sciences and technology design to propose a cohesive approach for conceptualizing, targeting and designing SMIs, considering both quantitative and qualitative intervention designs. We review the intervention landscape, considering how different interventions interact with a range of user contexts. We then consider how self-determination theory offers a theoretical framework that helps researchers to understand what aspects of social media use to target with their interventions and how these can be best designed, particularly for adolescent users. As SMIs show promise to address a societal challenge that concerns researchers, policymakers and the public, outlining a road map for robust behavioural science research in this space is crucial to allow these interventions to reach their full potential.

Defining SMIs

We define SMIs as any tools or strategies that aim to modify users' interactions with social media platforms to improve well-being. Our scope is therefore limited to interventions that (1) target social media behaviours and (2) focus on well-being as a primary outcome. In this, we include experimental research manipulating social media, and tools developed to change users' social media behaviours, to improve well-being. This definition aligns with research defining SMIs as behavioural interventions that focus on changing social media use (for example, Plackett et al.[18]) and distinguishes these from mental health interventions deployed via social media (for example, Kruzan et al.[25]), which have sometimes also been referred to as SMIs. Currently, these SMIs often take a use-reduction approach, aiming to reduce social media use to quantitively increase well-being (for example, increased life satisfaction scores). Although well-being is their target outcome, these SMIs often include other usage-based measures, such as decreases in the amount of social media use, as secondary quantitative outcomes (outlined in Fig. 1). As an emerging alternative to these use-reduction SMIs, some recent interventions also take a qualitative use-improvement approach, which aims to change the content users engage with and/or the nature of their social media interactions (for example, bullying versus connecting with friends) to enhance well-being[26]. Importantly, such qualitative approaches may still target the same quantitative well-being outcomes (for example, increased life satisfaction) as use-reduction interventions to measure efficacy. Figure 1 outlines these two intervention approaches.

Contexts of SMI

SMIs have been developed to target a broad range of user contexts or "spheres of experience"[7,24]. These contexts range from specific, such as manipulating features of social media platforms, to broad, such as societal reforms that aim to change social media use and well-being at the population level. We reviewed SMIs that target social media behaviours to improve well-being, categorizing them by the context at which they intervene to change users' social media behaviours.

We found that SMIs target five distinct contexts (Fig. 2): social media platforms, devices, persons/users, families/close communities and societies. Importantly, the five contexts are not mutually exclusive, and users may engage in interventions across these contexts simultaneously (for example, platform- and society-level interventions; see ref. 24 for further discussion).

Understanding SMIs through this contextual lens has two advantages. First, it allows us to engage in a granular analysis of the SMI space, breaking down the relationship between social media use and well-being into different levels of user experience[9,24]. Second, it provides a parsimonious approach to reviewing the current evidence while still being conceptually inclusive for both qualitative and quantitative interventions across a diverse range of sources, ranging from academia

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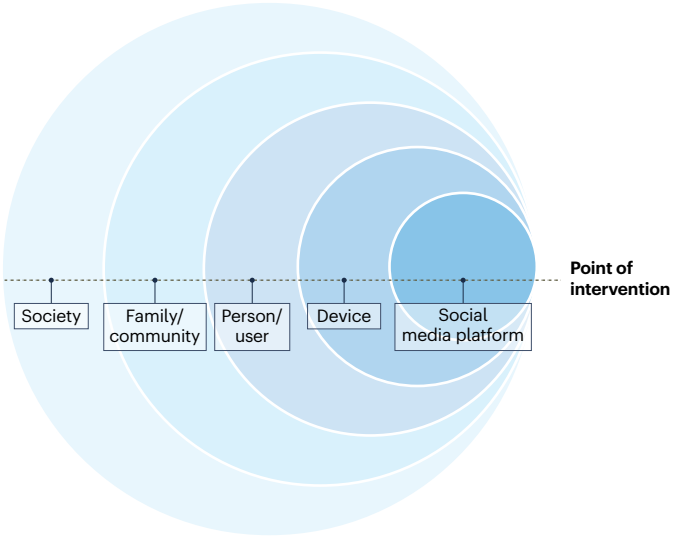

Point of intervention	Overview	General example
1. Social media platform	Interventions that manipulate features of social media platforms to enhance well-being	Experimental studies that manipulate social media features (such as the number of likes) and measure well-being outcomes
2. Device (features and apps)	Interventions that operate within devices such as smartphones and use device features to change social media use and enhance well-being	Screentime reports (features), intervention apps (apps)
3. Person/user	Interventions that social media behaviours within the context of the user's life to enhance overall well-being	Digital detox
4. Family/close community	Interventions that aim to change individual social media behaviours within the family unit or close social circles to enhance well-being	Parental social media rules
5. Society	Broad-level interventions that aim to systematically enhance well-being by changing social media behaviours	School phone bans

Fig. 2 | A contextual approach for SMIs. The different contexts in which SMIs intervene. Each context represents a different level of user experience, in which SMIs are deployed to change social media interactions and enhance user well-being. General examples and explanations of SMIs are from our review of interventions across the five contexts.

to industry[7,27,28]. We review the empirical evidence for interventions in each context below, providing examples and briefly discussing their effect on well-being.

Social media platform

SMIs targeting the social media platform context directly manipulate features of social media platforms to change users' behaviour and improve well-being. Examples include manipulating platform features, such as browsing balanced or less-idealized Instagram feeds, which has been found to mitigate the effects of negative social comparison[29]. Other platform interventions include altering or removing certain features in the social media environment. For instance, using the 'hide like count' feature on Instagram has been associated with lower risk of developing an eating disorder[30]. Using strategies to curate Twitter feeds (for example, feed filters) was also found to increase users' sense of agency over their usage[31].

Most social media platforms also allow users to enable in-app time limits to restrict the amount of time spent on platforms; however, the effectiveness of this SMI for enhancing well-being has not been examined. Importantly, as social media platforms are often private companies, the degree to which external researchers can manipulate the social media environment remains limited. Although these SMIs probably receive extensive internal testing within companies, these data are often unavailable to the public[32].

Device

Intervening within the broader context of users' devices, device SMIs are interventions that manipulate device features to change behaviours related to social media use to improve well-being. We found two different types of interventions in this context: (1) those that rely on features built into devices (feature-based, such as screen-time reports) and (2) those that can be downloaded onto devices (app-based, such as apps that reward users when they successfully refrain from using social media apps).

A common example of feature-based SMIs is built-in screen-time reports (for example, iOS screen time or Android Digital Wellbeing). Although these reports are frequently used in correlational studies to examine associations between screen time and well-being, their efficacy as stand-alone interventions (that is, how engaging with one's screen time affects social media behaviours and well-being) is less researched[33,34]. Some qualitative research has found that users may engage screen-time reports to monitor their personal technology use and improve their digital well-being[15]. Other feature-based SMIs whose well-being effects have been researched include 'batching' notifications (delivering notifications in batches), which positively affected well-being outcomes such as mood[35], and disabling notifications, which increased negative well-being outcomes, such as fear of missing out (FOMO)[36]. Similarly, silencing notifications has been associated with increased phone checking and anxiety for some users[37]. Research has

also examined the effect of workshops introducing participants to several device SMIs, finding that these improved feelings of digital self-control, with most participants continuing to engage interventions several months after being introduced to them[38].

App-based SMIs include apps that can be downloaded onto various devices (for example, smartphones and tablets) and have been previously classified as "digital self-control tools"[19,39]. These apps generally take a use-reduction approach, and have also been classified according to their main features, which include (1) blocking, removing or restricting access to social media platforms; (2) tracking or visualizing users' social media usage; (3) encouraging users to set goals around their social media usage; or (4) providing positive or negative incentives for certain social media behaviours[40]. A recent meta-analysis examined the effectiveness of these app-based SMIs in reducing time spent on devices, finding a small to medium effect[19]. However, their effectiveness for changing well-being outcomes was not analysed. In this review, researchers also cited several ongoing challenges in the way these interventions have been designed, which limit their potential. These include the need to consider users' unique contexts and goals[41], the poor application of behavioural change theory across studies and interventions[42], and the need to reconceptualize outcome measures of these tools to include theoretically informed measures of well-being[19,43].

Experimental studies examining how individual SMI apps affect well-being are rare. One exception is a six-week intervention using the one sec app, which found increased satisfaction with overall digital consumption[44]. However, this was a field study of a self-selected sample of app users and did not measure any potential confounds (for example, other SMIs that participants engaged during the study period), making it difficult to isolate the well-being effects of the app itself. This speaks to two potential challenges in experimental studies testing SMIs: sampling bias (that is, only recruiting users who are highly motivated to change their behaviours) and establishing causality (that is, isolating the effect of one SMI from other confounds or strategies used by participants).

Person/user

Beyond the level of social media platforms or devices, interventions may also address social media behaviours within the users' broader life context. We deem these person/user-level interventions as they target the user, or individual person, to change social media behaviours and improve well-being. One widely researched example, based on the use-reduction approach, is abstinence from electronic devices, or 'digital detoxing'. A recent review found mixed support for this intervention, with studies finding both positive and negative effects on well-being[8]. Experimental studies have also examined detox-based SMIs for specific social media platforms, with mixed findings. For example, one study found that abstaining from Facebook for five days led to lowered cortisol and lower life satisfaction[45], whereas another found that four weeks of abstinence did not affect loneliness or affective well-being[46].

Other person-level approaches include reducing (rather than abstaining from) one's daily social media use. Experimental studies have found that limiting usage to 10 min per day[47] and 30 min per day[48] improved well-being outcomes such as symptoms of depression and loneliness. A recent randomized controlled trial with youth also found that limiting usage to 1 h per day reduced symptoms of anxiety and depression, citing the need for these types of SMIs to include realistic time limits for users to be effective[49]. Although these studies suggest that use-reduction approaches hold some promise, a recent meta-analysis reviewing experimental detox/reduction approaches found that the overall effect of these interventions on mental health outcomes was not different from zero[50]. The validity of detox SMI studies has also been questioned due to negative public perceptions of social media use and the potential for this to produce demand characteristics for participants[46].

Family/community

Moving beyond individual contexts, family/close-community interventions aim to change individual social media behaviours within the context of the family unit or close communities. A common example of these SMIs is parental rules around social media use. In the context of preadolescents (10–12-year-olds), for example, having clear parental rules around social media use was associated with preadolescents spending less time on social media, fewer appearance comparisons and better mental health[51]. Recent qualitative research has also explored perspectives on smartphone usage agreements, which involve parents and children collectively setting rules on smartphone usage within the family[52]. Although overall perspectives were mixed, these agreement-based SMIs were recognized as a valuable tool for raising parents' awareness around children's social media use. Recent work has also highlighted the importance of autonomy in developing rules around social media use to improve well-being for adolescents, with autonomy-supportive behaviours (for example, offering a choice over different social media rules) being associated with less concealment of technology use in this population[6].

Other group-based SMIs include collective abstinence from social media. These may be informal, such as friends putting smartphones into a pile or locking them away, or more formalized, such as social media support groups. For example, Internet and Technology Addicts Anonymous uses the 12-step model to help users to recover from internet addiction, although its efficacy for enhancing well-being has not been researched[53].

Society

At the population level, interventions may also systematically change social media behaviours to collectively improve well-being. One example of this SMI is public regulation, where governments or institutions use legislative approaches to change social media use at the population level[54,55]. A well-researched use-reduction example is school smartphone bans, where schools ban students from using phones during school hours. Research on this SMI has primarily focused on academic outcomes rather than well-being, with inconsistent results across countries[56,57]. In some cases, these bans have been found to decrease bullying; however, research on well-being outcomes is generally limited[58,59].

Non-legislative approaches also exist at a societal level and include SMIs that embody more qualitative approaches, such as digital well-being and social media literacy programmes, which may be delivered to teachers or directly to students to improve their social media use[26]. Recent research on this SMI found that enrolling teachers in digital well-being programmes did not affect students' self-reported life satisfaction[60]. Social movements may also be considered non-legislative societal-level SMIs that encourage users to reduce their social media behaviours (for example, the Log Off movement[61]), although again their effect on well-being has not been researched.

Overview of SMI research

In addition to reviewing each contextual level of SMIs, we integrated findings across the whole review to provide an overview of the current intervention landscape. Overall, we found that empirical evaluation of SMIs has been limited to a small body of academic research, which has concentrated on select intervention strategies such as digital detoxes. By contrast, industry development has focused on device apps, and policy approaches target societal or school contexts, with both areas lacking empirical research. Generally, there appears to be very little communication between fields, leading to fragmented intervention development and deployment.

Where there has been some empirical evaluation of SMIs (for example, experimental studies), the evidence for robust well-being effects is inconclusive. These findings are supported by

meta-analyses of both empirical and industry interventions finding that the efficacy of many SMIs is limited and highlighting the need for better intervention design (for example, by incorporating behavioural change theories), both within experimental research and for industry-developed tools[19,50].

The limited efficacy of current SMIs should also be considered in light of their approach to targeting well-being outcomes. Currently, most interventions embody a use-reduction approach, which focuses on reducing the quantity of social media use as a way to improve well-being. As we outlined in Fig. 1, this use-reduction approach is inherently quantitative and assumes a causal relationship between social media use time or screen time and well-being, where reducing the quantity of social media use will lead to quantitative changes in well-being. However, the evidence for this relationship remains mixed, despite extensive research across a range of populations[11,62,63]. Moreover, this approach conflicts with current models of digital well-being, which emphasize the need to balance both the positive and negative effects of technology within users' lives[9]. Echoing this, recent research has highlighted the need to focus on improving the quality, rather than the quantity, of social media use, with experts isolating several qualitative harms young people may encounter on social media[64]. Given the limited evidence for existing use-reduction interventions, such use-improvement interventions may represent an exciting new avenue for SMIs that can improve social media interactions by addressing threats to well-being within social media environments, such as harmful content or negative interactions. Although we identified some existing evidence for these interventions (for example, platform-based modifications (social media platform) and digital literacy programmes (society)), their development has generally been limited, especially compared with use-reduction SMIs. However, recent legislative developments (for example, Online Safety Act 2023 (ref. 54) (UK) and Kids Online Safety Act 2024 (ref. 55) (USA)) suggest that such qualitative interventions are gaining momentum and represent an important area for future research in the SMI space.

Finally, although SMIs are often characterized as behavioural change interventions with psychological outcomes, there is an ongoing lack of theoretical work underpinning their development, in relation to both behavioural change and well-being[7,19]. This has made consistent evaluation of interventions difficult, as definitions of well-being and outcome measures fluctuate across the reviewed research, and evaluations are often not done in a controlled way. Harnessing theories of behavioural change is therefore an essential step in developing theoretically grounded intervention approaches. Embedding SMIs within established psychological theory may also aid a broader shift towards qualitative use-improvement interventions, which can target theoretical mechanisms of well-being to improve the nature of users' social media interactions.

To address the above limitations, we propose a theoretical framework for SMIs, informed by self-determination theory, to develop a more robust empirical approach that demonstrates how to identify relevant intervention targets and ensure that interventions are effectively designed to enhance well-being.

Theoretical foundations for SMIs

Although previous social media research has proposed several theoretical approaches to well-being[7,65], this work has focused on well-being in relation to social media generally rather than in the context of behavioural change interventions. A new approach is therefore needed to conceptualize well-being in the context of SMIs, where well-being is an outcome of behavioural change and additionally relies on users' motivation to change social media behaviours. To address this, we leveraged self-determination theory, which considers well-being in the context of behavioural change interventions, setting out a clear framework for how motivation, behavioural change and well-being interact[22,66–68].

Developing this framework, we first outline how a theoretically grounded approach can illustrate which aspects of the social media environment can be targeted to improve well-being. Next, we explain how this theoretical approach can inform effective intervention design for SMIs that successfully improve well-being through behavioural change[24,69,70]. To demonstrate the practical value of this theoretical approach, we conclude with a brief example that outlines how SMIs (using both use-reduction and use-improvement approaches) can be designed for adolescent users. This in-depth theoretical application allows us to develop a robust foundation for SMIs to ensure they reach their full potential as interventions aiming to improve well-being across society.

Theoretically informed intervention targets

Self-determination theory proposes that individuals have three core psychological needs, or 'energizing states', that must be satisfied to experience well-being. These needs are (1) autonomy, the need to have agency and feel aligned with one's goals; (2) competence, the need to feel capable and effective; and (3) relatedness, the need to feel connected to others and have a sense of belonging. Environments that facilitate the satisfaction of these needs are seen to be conducive to well-being, and there is evidence to support the relationship between need satisfaction and well-being in environments such as the workplace[71]. By contrast, when an environment frustrates these needs, this threatens well-being and diminishes psychological flourishing[72,73]. In the context of social media, the extent to which individuals' interactions with social media satisfy or frustrate these core needs may influence their experience of well-being. We outline key examples in Table 1.

Importantly, social media may simultaneously satisfy some needs (for example, enabling social connection (relatedness)) while frustrating others (for example, sharing misinformation (competence))[74–76] or satisfy and frustrate the same need simultaneously. To illustrate the latter, an adolescent may feel that sharing content on Instagram allows for self-expression (that is, satisfying autonomy), while also feeling a lack of control over their Instagram usage due to 'addictive' features such as reels (that is, frustrating autonomy). This need-based model of well-being may explain why social media use can be both beneficial and detrimental to well-being even within an individual context, as using social media may simultaneously satisfy and frustrate core needs[77,78].

For interventions, understanding social media use through the lens of need satisfaction may help to guide the development of intervention targets within the social media environment[79]. That is, interventions may (1) focus on amplifying need satisfaction (for example, ensuring that social media facilitates autonomy satisfaction through self-presentation, content choice and audience control) and/or (2) address areas of need frustration (for example, reducing autonomy frustration by challenging constant connectivity, removing 'addictive' features and minimizing external feedback features such as likes). Examining social media through the lens of need satisfaction also provides a more nuanced view of social media use that allows interventions to target healthier use. That is, instead of taking a use-reduction approach, SMIs may consider users' psychological needs to improve the nature of online interactions and content (that is, engage a use-improvement approach) so that social media environments enhance well-being.

We note that the examples in Table 1 focus on need satisfaction and frustration within the online social media context as these relate most directly to SMIs and the concept of digital well-being[9]. However, the degree to which users' offline needs are satisfied (that is, the degree to which the individual's offline experiences support agency and control (autonomy), mastery and efficacy (competence), and connection and belonging (relatedness)) may also contribute to their overall well-being[80,81]. Taking this domain-based model into account, interventions may like to consider a dual approach that aims to satisfy

Table 1 | Psychological need satisfaction and frustration in social media contexts

Psychological need	Need satisfaction in the context of social media	Need frustration in the context of social media
Autonomy	Allows for curated and controlled self-presentation, enabling identity exploration Provides choice over content engagement and allows for a co-created online environment (for example, selecting or removing content according to preferences) Facilitates control over audience and social network (for example, selecting followers or friends)	Limits agency over technology by creating social pressure to be constantly online Contains 'addictive' features that enable habit-forming behaviours and drive automatic (rather than volitional) use Creates pressure for certain types of self-presentation and shifts motivation for these from self-driven (intrinsic) to externally motivated (extrinsic) (for example, sharing personal content for likes rather than self-expression)
Competence	Enables skill development in communication and social connection Enables access to educational or informative content that enhances feelings of learning and general competency Provides positive feedback channels that allow feelings of mastery over self-presentation and identity formation	Enables negative social feedback such as upwards social comparisons, which lead to feelings of inadequacy Allows access to harmful content (for example, violence), exacerbating feelings of helplessness or overwhelm Facilitates transmission of misinformation, leading to feelings of frustration and inefficacy
Relatedness	Provides opportunities to connect with peers, receive validation and share experiences Enables the development of communities and safe spaces for self-disclosure and personal discussions Facilitates belonging through connections with like-minded others and consistent communication	Allows access to social information, which can intensify exclusion, loneliness and FOMO May reduce meaningful social connections through constant availability and online pressures Creates a heightened risk of negative social experiences such as cyber-bullying or trolling

Adapted with permission from ref. 80, Wiley. The psychological needs outlined here have been discussed in depth in previous literature[79,85].

users' needs across both online and offline contexts to holistically enhance well-being. As an example, a school-based SMI may target the online need for relatedness by allowing students to connect via online communities outside of school hours, while targeting offline relatedness by teaching person-to-person communication skills during school time. Within our contextual model, certain SMIs may also lend themselves to targeting either online or offline needs. For example, SMIs at the social media platform or device level may be better placed to target online needs, whereas those at the person, family or society level may better facilitate offline need satisfaction.

Theoretically informed intervention design

In addition to guiding the identification of key intervention targets, research examining self-determination theory in a behavioural context outlines a mechanistic model of behavioural change that may be applied to ensure that people are motivated to use interventions and, in turn, change their social media behaviours[69]. According to self-determination theory, this behavioural change process is driven by motivation, which SMIs may harness to encourage individuals to change their behaviours around social media use[23,79].

Simplified, the quality of individuals' motivation for behavioural change may be influenced by the degree to which an intervention supports their core psychological needs[82]. Motivation for behavioural change can be extrinsic, driven by external outcomes, or intrinsic, driven by inherent interest and enjoyment, with autonomously driven, intrinsic motivation being considered as higher-quality motivation for sustained behavioural change[83] (see Extended Data Fig. 1 for an in-depth overview). Critically, if an intervention is designed to support all three core needs, this should foster highly autonomous motivation that enables sustained behavioural change to ultimately enhance well-being[23,67,84] (we outline this behavioural change mechanism in Fig. 3). Autonomous motivation is therefore considered to be the optimal form of motivation, while also being the most challenging to cultivate as it requires interventions to be designed to effectively support the satisfaction of all three needs simultaneously.

Much design research has examined how behavioural change interventions can be designed to specifically support need satisfaction (autonomy, competence and relatedness) for behavioural change[24,69,70]. Applying this research to SMIs, we outline how interventions can integrate key need-supporting features in Fig. 3. In this design framework, we present a step-by-step approach that integrates self-determination theory across the different stages of intervention conceptualization and design. In step 1 (Fig. 3a), a need-based approach may be used to establish the overall aim of the intervention and develop targets (that is, to address one of the various ways in which social media may satisfy or frustrate core needs). In step 2 (Fig. 3b), the SMI can be conceptualized at one of the context levels to meet this aim for a specific group of users (for example, device level and adolescents). Step 3 (Fig. 3c) then considers how the intervention may be designed to support users' core needs (that is, by integrating features that support autonomy, competence and relatedness). The implementation of these need-supportive features (that is, step 3) is critical for fostering autonomous motivation for behavioural change—that is, integrating these design features helps SMIs to target the motivation-driven mechanism (Fig. 3d) underlying behavioural change in this intervention context[70]. Importantly, these need-support features should be considered complementary such that one intervention may contain features across all three needs to best enhance motivation for behavioural change. Taken together, this three-step process represents a theoretically grounded framework for designing SMIs, integrating theories of psychological flourishing and behavioural change to illustrate how these interventions may best enhance well-being.

Practical application for adolescent users

Although the application of SMIs is broadly relevant for anyone concerned about social media's well-being effects, it is particularly relevant for adolescents, whose relationship with social media is facing increasing scrutiny[10,80,85]. To gain a better understanding of adolescents' use of SMIs, we held focus groups with adolescent social media users (Supplementary Information). From these discussions, we extracted five example interventions, across each context, which adolescents currently use to manage social media's well-being effects in their everyday lives. These include in-app time limits (social media platform), purpose-built apps (device), social media detox (person/user), parental social media rules (family/close community) and school phone bans (society). Having extracted these key examples, we consider each in light of our theoretical framework in Table 2, specifically outlining how these interventions may integrate features to support autonomy, competence and relatedness for adolescents (that is, applying step 3; Fig. 3). In doing so, we hope to aid designers in improving the design of these SMIs, some of which currently have millions of users but limited evidence-based support around efficacy. Of note, adolescents were often engaged in multiple interventions simultaneously, and, in addition to integrating these key design features, SMIs may be administered

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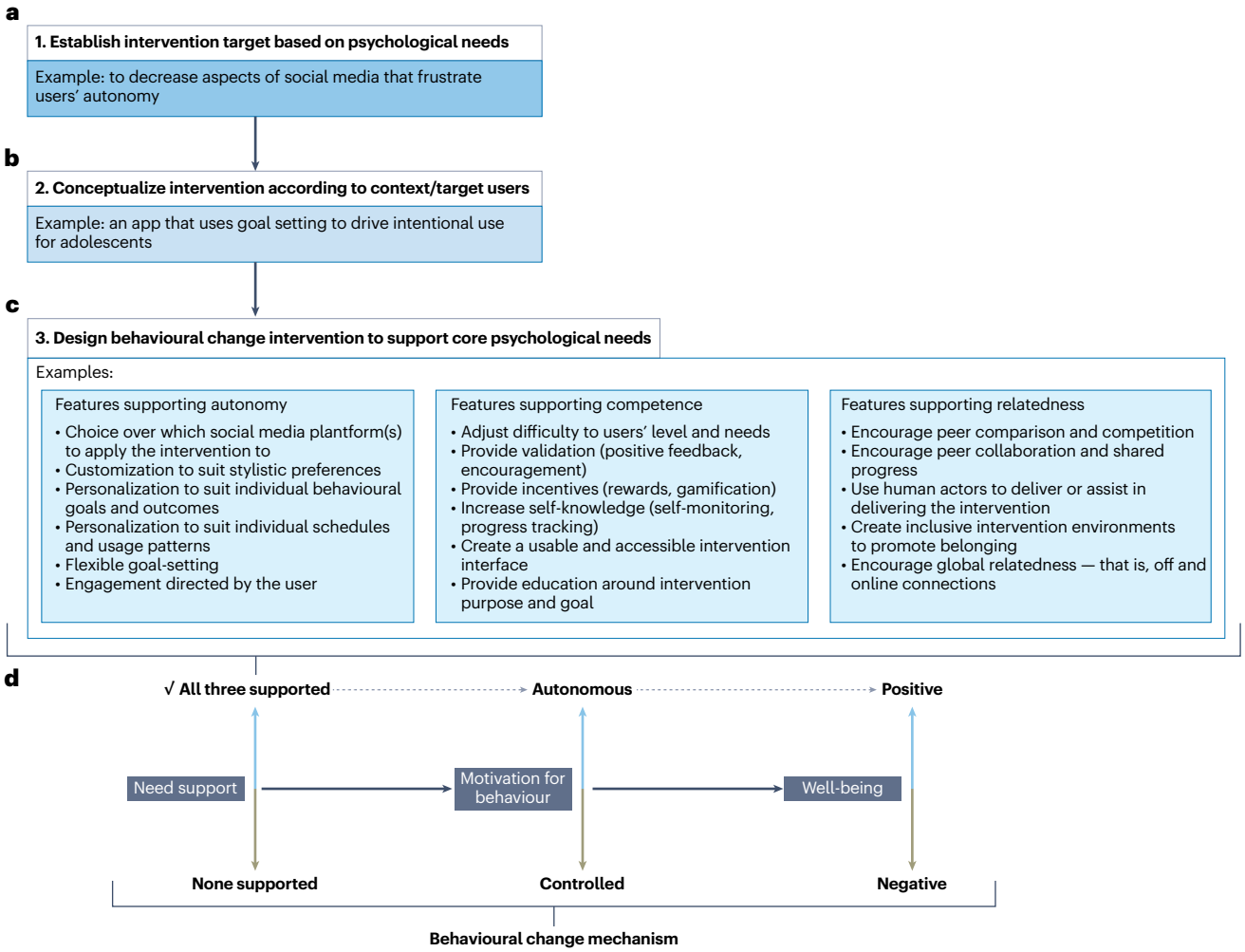

Fig. 3 | A step-by-step framework for designing theoretically informed SMIs. **a**, Step 1: self-determination theory may be applied to identify intervention targets based on the degree to which the social media environment satisfies or frustrates psychological needs (see Table 1 for further examples). **b**, Step 2: interventions may be conceptualized to address this need-based target (that is, to increase need satisfaction or decrease need frustration) and with respect to specific intervention contexts (for example, schools) and target users (for example, adolescents). **c**, Step 3: interventions may consider several need-supporting features for each psychological need, which can be integrated into the SMI design to support motivation for behavioural change. These design suggestions are based on ref's.70 review of prior work on behaviour change interventions inspired by self-determination theory. **d**, The behavioural change mechanism facilitated by the design of need-supportive interventions (that is, the implementation of step 3). According to self-determination theory, designing interventions to include features that support autonomy, competence and relatedness should enhance the likelihood of high-quality motivation for behavioural change and improved well-being. This spectrum of motivation is presented in further detail in Extended Data Fig. 1.

in conjunction (for example, in-app time limits and parental phone rules) to holistically enhance well-being.

Importantly, all of the example interventions that we extracted from our focus groups embodied a use-reduction approach rather than a use-improvement approach, reflecting the research to date, which has focused primarily on quantitative/use-reduction interventions. However, given the importance of also considering qualitative/use-improvement intervention approaches (and the potential of self-determination theory to aid this process), we have chosen to also provide alternative use-improvement examples at each contextual level in Table 2. These suggestions were informed by our discussions with adolescents, who identified several qualitative aspects of social media use that harmed their well-being (for example, distressing content, social comparison and 'addiction'). In highlighting new ways to improve social media use, we recognize social media's central role in adolescents' social lives, which means that SMIs focused on qualitatively improving social media interactions may be more acceptable for adolescent users than those encouraging reduced usage[77,86].

Conclusion

SMIs represent an exciting new avenue to studying the relationship between social media use and well-being. We propose a new theoretical approach for understanding and designing SMIs, adapting self-determination theory to identify mechanisms underlying the interaction between social media environments and well-being. In doing so, we highlight how interventions may support users' need for autonomy, competence and relatedness to foster autonomous motivation for effective behavioural change.

Our review was not exhaustive, given the rapid development of SMIs, and there may be several emerging examples for future research to address[19,40]. These will probably include interventions incorporating artificial intelligence tools, which are increasingly being developed in this space and may be particularly suited for the kind of qualitative/use-improvement SMIs outlined in Table 2 (ref. 87). Although the intersection between artificial intelligence and SMIs is an important area for future research, a considerable strength of our theoretical framework is that it will remain relevant for such emerging interventions, which will

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Table 2 | Guidelines for theoretically informed quantitative and qualitative SMIs

Context level	Psychological needs	Implementing need-support features for existing use-reduction interventions (quantitative)	Opportunities to develop new use-improvement interventions (qualitative)
Social media platform		**Example: in-app time limits (as on Instagram and TikTok)**	**Goal: to improve the social media environment at the platform level**
	Autonomy	Choice over when and on which apps to apply time limits	Remove 'addictive' features that enable habit-forming behaviours, allow for platform customization or personalization (for example, custom reactions and curated newsfeeds)
	Competence	Realistic time limits that reflect personal usage patterns	Reduce harmful or violent content within newsfeeds, promote educational or informative content (for example, TikTok's STEM feed), remove or reduce externalized reward metrics such as likes and views
	Relatedness	Allow usage patterns to be shared and compared across groups (for example, creating time-limit leader boards)	Strict platform guidelines and monitoring around bullying and trolling, development of 'safe' communities monitored by developmental or clinical experts
Device (features and apps)		**Example: using an app to block social media platforms**	**Goal: to qualitatively improve social media interactions within the device context**
	Autonomy	Customization of how apps are blocked or usage is changed—for example, locked, removed from device or replaced with an alternative activity	In-app notifications that encourage mindful use or goal setting, built-in device settings that allow for customizable use (for example, scheduling app access)
	Competence	Provide effective reward incentives for not using apps	Apps that enable monitoring and identification of harmful social media content
	Relatedness	Encourage shared 'blocking' challenges—that is, blocking apps with friends	More nuanced screen-time reports that track social features such as messaging or calls and prompt reflections on positive and negative social interactions
Person/user		**Example: social media 'detox' (such as deleting the TikTok app for a week)**	**Goal: to qualitatively improve users' social media interactions**
	Autonomy	Encourage goal setting for the purpose and outcomes of the detox	Psychoeducation practices encouraging self-reflection and emotion identification in the context of use (for example, how did this post make you feel), education around positive or authentic self-expression online using healthy role models as examples (for example, content creators)
	Competence	Gamify detox so that progress is rewarded (for example, point scoring or detox streaks)	Encourage the creation and consumption of skill-based, educational content online (for example, engaging with Booktok to increase reading)
	Relatedness	Encourage group detoxes that enable offline social interactions as a replacement behaviour	Education around FOMO and negative social comparison and protective strategies against these social risks, learning how to complement social media interactions with offline interactions
Family/close community		**Example: parental rules around social media use**	**Goal: to qualitatively improve the social media interactions within the family/group context**
	Autonomy	Align with both parents' safety needs and adolescents' social goals (that is, set usage limits while still allowing children to access their social networks within set times)	Challenge group/family norms around constant connectivity and reflect on intentional use
	Competence	Reward rule following with positive feedback and encouragement	Develop workshops for parents and children around digital literacy and safe usage
	Relatedness	Apply consistent rules across family and group members (that is, parents modelling social media behaviours for children)	Create peer support groups around usage and support, educate children on social online risks such as FOMO, trolling and bullying
Society		**Example: school ban on mobile phones**	**Goal: to qualitatively improve social media interactions at a societal level**
	Autonomy	Consult students in the design of social media policies to ensure engagement and alignment with students' learning goals	Challenge social norms around constant connectivity, provide education on habitual versus intentional use, create skill-based lessons on 'healthy' use and digital hygiene practices
	Competence	Encourage 'effective usage' windows where students can access devices for necessary communication—that is, pre and post school to contact parents	Deploy anti-misinformation campaigns teaching critical skills around identifying and interpreting misinformation online, embed digital and social media literacy in school curricula, encourage or teach students how to create educational or informative content
	Relatedness	Foster a sense of belonging in offline social settings (for example, school sport and cultural groups)	Public awareness campaigns around positive social media interactions (for example, inclusivity and community building), education around social media's role in creating positive social change (for example, the Black Lives Matter movement)

'Need-support features' refers to the ways in which existing use-reduction interventions can support autonomy, competence and relatedness in their design. The examples at each context level refer to existing examples of these use-reduction interventions currently used by the adolescents we interviewed. For use-improvement interventions, 'Goal' refers to the general goal that interventions may have at each context level. As these use-improvement opportunities are currently speculative, we did not include examples for these.

also need to be evaluated according to their ability to support users' psychological needs and motivations.

As technology becomes increasingly integrated into our social lives, the tension between social media's positive social effects and potential for harm reflects an ongoing societal challenge[88]. Our proposed vision for SMIs highlights their importance for future research on social media's effects, as well as their potential to help individual users to qualitatively redefine their social media usage to enhance, rather than inhibit, well-being. For researchers, technologists and policymakers working with interventions, we encourage the development of both use-reduction and use-improvement interventions, which prioritize social media users' psychological needs to minimize negative effects on well-being.

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Author contributions

A.S.: conceptualization, methodology, investigation, resources, data curation, writing—original draft, writing—review and editing, and visualization. A.O.: writing—review and editing, and supervision.

Competing interests

The authors declare no competing interests.

Additional information

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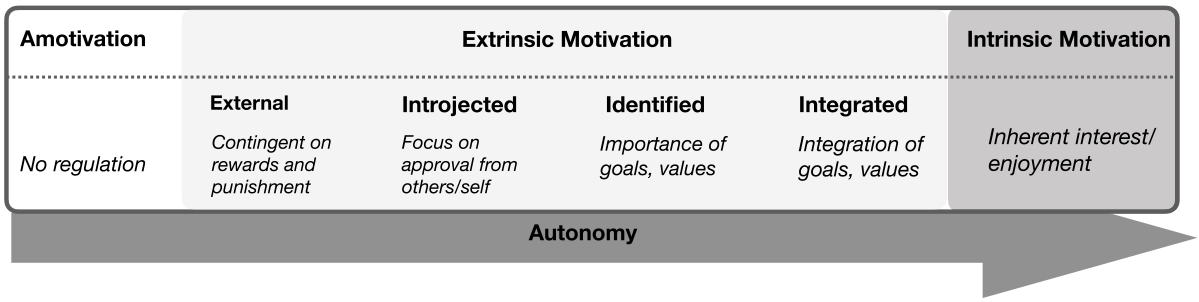
Social Media Interventions (SMIs): tools or strategies that intend to change users' interaction with social media to improve wellbeing



Types of Motivation	No motivation	Controlled	Moderately controlled	Moderately autonomous	Autonomous	Autonomous
Examples in an SMI context	*"I'm not interested in using an SMI"*	*"I have to use this SMI or I'll be punished"*	*"I should use this SMI because if I don't I'll feel bad about myself"*	*"I should use this SMI because it will help me be more productive"*	*"Using this SMI has made me feel better about my social media interactions"*	*"I enjoy using this SMI because it helps me use social media more intentionally"*

Extended Data Fig. 1 | Continuum of Motivation According to Self-Determination Theory. Adapted from Peters et al., 2018 and Ryan and Deci, 2000a.