DOI: 10.1002/jad.12286

RESEARCH ARTICLE





Adolescents' mental health in the social-media era: The role of offline and online need-based experiences

Marlies Van de Caste	ele ¹ 💿	Nele Flamant ¹	Koen Ponnet ²	Bart Soenens ¹	
Valerie Van Hees ³	Maarte	n Vansteenkiste ¹			

¹Department of Developmental, Personality and Social Psychology, Ghent University, Ghent, Belgium

²Media Innovation and Communication Technology, Ghent University, Ghent, Belgium

³Support Centre Inclusive Higher Education (SIHO), Ghent, Belgium

Correspondence

Marlies Van de Casteele, Department of Developmental, Personality and Social Psychology, Ghent University, Ghent, Belgium. Email: marlies.vandecasteele@ugent.be

Funding information

Vlaamse regering; Fonds Wetenschappelijk Onderzoek; Research Foundation Flanders, Grant/Award Number: 11D6923N

Abstract

Introduction: Debate about the precise role of social media use (SMU) in the mental health of today's adolescents is still ongoing. The present study adds to the literature by focusing on adolescents' experiences during SMU and in their offline activities through the lens of basic psychological needs, which are central to self-determination theory.

Methods: To examine the joint and supplementary effects of need-experiences in the offline and SMU domain (i.e., SMU satisfaction, offline satisfaction, SMU frustration, offline frustration) on several indicators of adolescents' mental health (i.e., vitality, life satisfaction, sleep quality, anxiety, and depression), polynomial regression analyses were used. Three cross-sectional samples were collected in Belgium, including early to mid-adolescents during the COVID-pandemic (Sample 1; N = 447; $M_{age} = 14.26$; 54.4% female) as well as postpandemic (Sample 2; N = 179, $M_{age} = 15.25$; 54.2% female), and among college students in postpandemic times (Sample 3; N = 4977; $M_{age} = 20.72$; 69.1% female).

Results: The results showed that need-experiences common to both domains were a robust factor associated with mental health. This finding was obtained across all samples and outcomes, with need satisfaction playing a beneficial and need frustration a harmful role. We further found that offline need-experiences serve as a more crucial predictor of adolescents' mental health than need experiences on social media.

Conclusions: Adolescents' experiences of need satisfaction and need frustration on social media and in offline activities are central to their mental health. However, only relying on SMU as a single source of need satisfaction may not be recommended, given that offline experiences seem to be more decisive.

KEYWORDS

adolescent development: mental health, adolescent relationships: media and technology

1 | INTRODUCTION

Although the ubiquitous availability of social media apps, such as Instagram, TikTok, or Snapchat, shapes the daily interactions of today's youth (Nesi et al., 2022), the precise nature of associations between their social media use (SMU) and mental health is still a topic of ongoing investigation. Until recently, both public and academic debates have been largely dominated by a panic-based narrative (see Orben, 2020), with increases in emotional problems among adolescents being attributed to their intensive use of digital technology like social media (see Vuorre et al., 2021, for counter arguments). This negative portrayal of social media is now countered by reviews and meta-analyses showing that the effects of SMU on the mental health of youth are both inconsistent and small (e.g., Meier & Reinecke, 2020; Odgers & Jensen, 2020; Valkenburg et al., 2022) and by qualitative studies concluding that SMU comes with both advantages and pitfalls (e.g., Popat & Tarrant, 2022; Scott et al., 2022).

© 2023 Foundation for Professionals in Services to Adolescents.

To obtain a deeper and more nuanced understanding of adolescents' and emerging adults' SMU, several scholars have advocated a perspective where social media is being recognized as a unique and important digital developmental context for youth (e.g., Nesi et al., 2022; Rigby, 2023). Similar to nondigital environments such as school and the family context, social media may yield opportunities but also risks depending on the nature and valence of the experiences encountered in that environment. Moreover, social media are not stand-alone contexts but are interwoven with face-to-face developmental tasks and interactions (Subrahmanyam et al., 2006). Yet, few studies have applied traditional developmental theories to SMU (Ehrenreich et al., 2021) or explored adolescents' SMU experiences simultaneously with experiences in the offline context (Odgers & Jensen, 2020). Therefore, it is unclear whether adolescents' experiences with SMU have supplementary implications for adolescents' general mental health on top of their overall experiences across the digital and offline contexts. To overcome this gap, it is important to focus on psychological processes that are common to digital and rnondigital contexts and fundamental to adolescents' mental health. According to self-determination theory (SDT; Ryan, 2023; Ryan & Deci, 2017), a macro-theory on motivation, psychological growth, and mental health, both offline and virtual environments offer opportunities for satisfaction of the basic needs for autonomy, competence, and relatedness, but may also involve threats to these same needs, which are considered integral to adolescents' mental health (Vansteenkiste et al., 2020, 2023). A growing body of work examines the role of these psychological needs in diverse virtual environments (Rigby, 2023), such as online games (Adachi & Rigby, 2023), internet use (Shen et al., 2013), streaming platforms (Erdmann & Dienlin, 2022) and online education (Hsu et al., 2019). However, adolescents' need-based experiences have not yet been examined systematically in the context of social media (Parent, 2023; Schneider et al., 2021). In this study, we aim to advance this field by considering the joint and supplementary roles of need-based experiences in SMU and offline domains in adolescents' and emerging adults' mental health.

1.1 Basic psychological needs and youths' mental health

2 WILEY-Foundation

Consistent with the principles of positive psychology and the viewpoint embraced by the WHO (Topp et al., 2015), the term mental health is considered to encompass not only the absence of distress, such as anxiety and depression (categorized as "emotional problems"), but also the presence of positive indicators of wellness, including aspects such as vitality, life satisfaction, and flourishing (referred to as "well-being"). To account for variation in emotional problems and well-being, it is maintained within SDT that the satisfaction and frustration of three basic psychological needs, namely autonomy, competence, and relatedness, plays a central role (Vansteenkiste et al., 2020, 2023). *Autonomy* encompasses a sense of psychological freedom and choice in one's actions, thinking, and feeling. *Competence* includes feeling of effectiveness and mastery and the capacity to reach desired goals. *Relatedness* refers to a sense of belonging and the experience of mutual and warm relationships. SDT states that these three needs represent essential nutrients for psychological functioning, meaning that, when satisfied, they are associated with greater well-being and growth, while their active frustration increases risk for psychology (Vansteenkiste et al., 2020, 2023).

This dual-process model of need-satisfaction and -frustration is expected to apply across adolescence and even across the lifespan (Rodríguez-Meirinhos et al., 2020; Soenens & Vansteenkiste, 2023). This claim may seem strong because adolescence is a long and intensive developmental period marked by rapid transformations in the biological, cognitive, social, and emotional domains (Lerner & Steinberg, 2009). There are considerable differences between the developmental tasks faced by youth in early-to-middle adolescence and emerging adults. Whereas early and middle adolescents need to come to terms with the bodily changes caused by puberty, engage in initial steps in individuation from their parents, and develop a strong orientation to peers (with accompanying risks for peer conformity), emerging adults experiment with different lifestyles, face important decisions in terms of education and career, and develop greater intimacy in romantic relationships. According to SDT, satisfaction of the basic psychological needs provides adolescents with the mental energy, flexibility, and resilience needed to cope with this great diversity of developmental tasks (Ryan & Deci, 2017; Soenens & Vansteenkiste, 2023). Moreover, there are also commonalities between the developmental tasks of early-to-middle adolescence and emerging adulthood. In both developmental periods, youth widen their network of social relationships and deepen the quality of their intimate relationships (i.e., a matter of relatedness), master important new knowledge and skills through education or work (i.e., a matter of competence), and gradually develop a clearer and more authentic identity (i.e., a matter of autonomy). Hence, experiences of autonomy, relatedness, and competence remain essential through adolescence even though they may manifest in slightly different ways depending on the developmental tasks that are central in an adolescent's life at a given moment (Soenens & Vansteenkiste, 2023).

Consistent with SDT's assumption that the satisfaction and frustration of the basic psychological needs is crucial for mental health across adolescence research conducted across various stages within adolescence, including early, middle, and late adolescence, has revealed robust links between psychological need satisfaction, psychosocial adjustment (Luyckx et al., 2009) and overall well-being (Luyckx et al., 2009; Véronneau et al., 2005) and between psychological need frustration, impaired resolution of developmental tasks such as emotion regulation (Emery et al., 2016), identity development (Cordeiro

et al., 2018), and diverse indicators of ill-being, including depression, eating problems, and even suicidal ideation (Campbell et al., 2018; Nieto-Casado et al., in press; Vandenkerckhove et al., 2019). One study directly comparing early (12–14 years) with middle (15–17 years) adolescents showed no differences in the strength of the relationship between need satisfaction and well-being and need frustration and emotional problems (Rodríguez-Meirinhos et al., 2020).

Although associations between the basic needs and mental health are similar across the different periods within adolescence and even across the life span, the sources of need satisfaction may vary as a function of age (Soenens & Vansteenkiste, 2023). To illustrate, while younger children mainly rely on need support from people in the social environment, from adolescence onwards, individuals become more aware and proficient in self-selecting activities, relational partners, and contexts that allow for a better realization of their need for autonomy, competence and relatedness (Laporte et al., 2021; Soenens et al., 2019). Particularly during emerging adulthood, youth have more opportunities and freedom to craft their own need-based experiences, thereby being comparatively less dependent on the social environment for need-relevant inputs than early adolescents. Indeed, whereas the school context may provide fewer opportunities for proactive crafting of need-satisfying experiences in early and middle adolescence due to the strict organization of secondary education, the school context affords more room for independence in the search for need satisfaction for emerging adults due to the increased choice, independence, and flexibility in higher education. In addition to offline contexts such as school, digital environments including social media represent important sources of adolescents' experiences of autonomy, competence, and relatedness (Parent, 2023).

1.1.1 Across contexts: Need-experiences during SMU

Satisfaction of the psychological needs has been found to predict better adjustment and well-being across various contexts, such as school, leisure, and sports (Emery et al., 2016). Given that adolescents grow up in a digitally centered society, there has been increasing research interest in adolescents' need fulfillment in the context of social media (e.g., Rigby, 2023). SMU entails both opportunities for need satisfaction and risks for need frustration. To illustrate, although adolescents' ongoing interactions with peers on social media may foster relatedness, the implicit social norms to be available 24/7 can come with pressure and thus be autonomy frustrating (Beyens et al., 2016). Table 1 presents an overview of potential affordances and pitfalls of SMU through the lens of the basic psychologineeds (see also Parent, 2023; Schneider et al., 2021). The key point is that the degree to which SMU contributes to mental health (or forestalls it) likely depends on adolescents' experiences of need satisfaction and frustration on these platforms.

Although need-based experiences seem integral to SMU of youth, only few empirical studies examined their effects on mental health, with especially the need for relatedness being studied. One study showed that, among early adolescents, need satisfaction during internet use is related to longer and more frequent internet use and positive affect (Shen et al., 2013). Among school-aged adolescents a composite score of need satisfaction in online friendships was positively related to general life satisfaction (Ang et al., 2015). Relatedness satisfaction during Facebook use was found to be beneficial for late adolescents' overall sense of connection (Sheldon et al., 2011). Further, in a study with emerging adults, the degree of autonomy experienced during SMU was found to matter more for mental health than the frequency and the type of SMU (e.g., Liking, Sharing) (Manuoğlu & Uysal, 2020).

Overall, this steadily growing literature suggests that need satisfaction during SMU has some mental health benefits. However, three noticeable shortcomings should be addressed. First, in spite of the dominant negative discourse surrounding social media (e.g., Orben, 2020), the potentially detrimental role of need frustration was largely overlooked in prior research. Second, need-based experiences in SMU have been exclusively studied in isolation from other (offline) life contexts. Third, although adolescents and emerging adults are among the most active users of social media (Anderson & Jiang, 2018; Digimeter, 2023), and despite arguments that social media are a key source of need satisfaction in these age groups (Parent, 2023), systematic research focusing on these age-groups is limited.

1.2 | The joint and supplementary roles of need-experiences in SMU and offline

To obtain a contextualized and balanced understanding of the role of social media in adolescents' mental health, it is important to investigate the need-experiences during SMU in conjunction with need-based experiences during their offline activities such as school, family time, and leisure. That is, by considering the role of need-experiences on social media and in offline activities, a better light can be shed on their joint and supplementary role in the association with mental health. Need experiences of young people are likely to coincide in both domains because their SMU is closely intertwined with their faceto-face habits and interactions. The idea that need-based experiences on social media may carry over to some extent to those in the offline domain (and vice versa) aligns with early theorizing on SMU. For example, co-construction theory (Subrahmanyam et al., 2006) states that adolescents' online and offline worlds are "psychologically continuous"

TABLE 1	Nonexhaustive	overview c	of need-based	experiences	on social	media.
---------	---------------	------------	---------------	-------------	-----------	--------

	Autonomy	Competence	Relatedness
Need satisfaction social media use (SMU)	Experiencing psychological freedom and authenticity in one's encounters and choices on social media	Feeling a sense of mastery in your online skills (e.g., communication, digital skills), receiving peer feedback, or gathering knowledge of social media.	Experiencing positive and reciprocal contact with others online or to feel part of a group or community on social media.
	 Related concepts/opportunities SMU: Coconstruction of environment (i.e., SMU to meet values/desires; e.g., Subrahmanyam et al. [2008]) Developing a sense of self (West et al., 2023) by broadening perspective, exploring, and so on. Facilitating choice (West et al., 2023) such as access to like-mined or inspirational profiles/pages/content (e.g., For you page TikTok, Pinterest) Self-governance such as personal control, planning, emotion regulation (West et al., 2023) 	 Related concepts/opportunities SMU: Access to knowledge/informative content (e.g., Schaeffer, 2021) Digital/communication skills (e.g., Jashari et al., 2022) Positive peer feedback (e.g., Marengo et al., 2021) 	 Related concepts/opportunities SMU: Accessibility, convenience, and flexibility of online interactions (Scott et al., 2022) Community feeling or support groups (e.g., Berger et al., 2021) Development and maintain social relationships (e.g., Taylor et al., 2021) Stimulates connectivity (e.g., Stuart et al., 2021)
Need frustration SMU	Experiencing psychological pressure, lack of choice, or inauthenticity in one's online encounters and behaviors.	Lacking any sense of mastery in your online skills, feeling disappointed compared to others, or receiving negative feedback.	Feeling excluded, lonely, or alienated due to online encounters or when using social media as such.
	 Related concepts/pitfalls SMU: External forces motivating use (West et al., 2023) such as coercive social norms (e.g., 24/7 availability; Scott et al., 2019) or peer pressure (e.g., Anderson & Jiang, 2018) Compulsive and nonintentional use (West et al., 2023) Nomophobia (i.e., fear of being without a phone) and continuous checking habits (e.g., Throuvala et al., 2019) Positivity bias (e.g., hinders authenticity, Schreurs and Vandenbosch, 2022) 	 Related concepts/pitfalls SMU: Risks of anonymity/remoteness for negative comments (e.g., Walther, 2022) Upward self-comparison (e.g., Faelens et al., 2021) Digital status seeking (i.e., extensively seeking online indicators of peer approval; e.g., Nesi and Prinstein, 2019) 	 Related concepts/pitfalls SMU: Cyberbullying (i.e., being bullied online; e.g., Giumetti et al., 2022) Electronic partner surveillance (i.e., monitoring your partner online; e.g., Schokkenbroek et al., 2022) Fear of missing out (i.e., online observing that others have fun and feeling left out; e.g., Tandon et al., 2021) Phubbing (i.e., being ignored due to others' preoccupation online; e.g., Xu et al., 2022) Social media ostracism (e.g., Schneider et al., 2017)

(Subrahmanyam et al., 2008, p. 421) as adolescents face similar developmental tasks in both domains. To illustrate, individuals with high offline resources have been found to benefit from time online (Kraut et al., 2002), while especially those who struggle offline (e.g., bullying, emotional problems) encounter more adversity online (e.g., cyberbullying, seeking negative content) (Odgers & Jensen, 2020). Also, research based on SDT has shown that people typically report similar need-based experiences across life domains, as reflected in rather strong correlations between domain-specific need satisfactions (i.e., family, school, and friendship) in adolescence (Milyavskaya et al., 2009). In that vein, one study in the context of general internet use, found that adolescents with high need satisfaction in daily life were more likely to also benefit from need satisfaction perceived online in terms of their general well-being (Wang et al., 2015).

Assuming that there is substantial convergence between adolescents' need-based experiences during SMU and in offline contexts, an important question becomes whether SMU need-based experiences play a supplementary role in adolescents' mental health. Taking into account adolescents' overall or joint need-based experiences (across the social media and offline contexts), do their need-experiences in the context of SMU or their offline need-based experiences yield surplus value in the association with their mental health? Two alternative hypotheses are possible. Given the substantial time investment and centrality of social media in adolescents' daily lives, their experiences on social media might yield additional predictive validity for their mental health. Rigby and Ryan (2011) and Rigby (2023) argued that virtual environments like gaming are "built to satisfy" adolescents' basic needs. Moreover, the instant and continuous access to smartphones provides adolescents with immediate and regular opportunities for need satisfaction. Whereas this density in online need satisfaction (Rigby & Ryan, 2011) might foster well-being, potential increased exposure to need-frustrating experiences during SMU may play a

supplementary undermining role in adolescents' mental health and even increase risk for psychopathology above and beyond the overall need frustration they experience in life (Anderson & Jiang, 2018).

Alternatively, need satisfaction in the offline domain might still be the most determining factor in terms of adolescents' mental health and growth. For example, the displacement hypothesis (Neuman, 1988) states that, as there are only 24 h per day, the time people devote to digital interactions automatically comes at the expense of other—possibly richer or more meaningful—face-to-face interactions and activities. Indeed, some studies indicate that social media seems—for at least some —adolescents a less preferred source of need satisfaction. For example, Scott et al. (2022) found that emerging adults attribute more control to social media (e.g., choosing when and how to reply), but at the cost of nonverbal cues causing misinterpretations and conflict. Similarly, Sheldon et al. (2011) argued that Facebook use might offer an easy social route, yet it would not replace real-life social relationships. Some scholars even suggest that experiences during SMU are typically more superficial and short-lived than individuals' experiences in the "real world" (e.g., Twenge et al., 2019). If this is the case, then offline need-based experiences (instead of SMU need-based experiences) playing a supplementary role in adolescents' mental health relative to their overall need-based experiences.

The relative importance of one domain over the other might also depend on developmental and contextual differences. Given that emerging adults typically have more freedom in how they spend their time in general, younger adolescents with a more prestructured time schedule (i.e., due to school and family structures) might see social media as the context of choice to craft their need-experiences. Additionally, the domain of social media may gain importance during periods when other opportunities are limited, such as during the COVID-19 pandemic, exam periods, or in long-distance relationships (e.g., Scott et al., 2022). Indeed, adolescents were found to more frequently turn to social media during the pandemic (e.g., Hamilton et al., 2021). Moreover, adolescents report that social media helped them to cope with the negative impact of the pandemic and restrictions by satisfying their need for connection, entertainment, and learning information (Keles et al., 2023). A review study, however, highlighted mixed results with some studies showing a positive link between SMU and mental health during the pandemic, but others demonstrating that prolonged SMU during the pandemic was associated with more symptoms of anxiety and depression (Draženović et al., 2023).

2 | THE PRESENT RESEARCH

The aim of this study is to examine the joint and supplementary roles of need-based experiences (both satisfaction and frustration) in social media and offline contexts in adolescents' general mental health. We hypothesized that adolescents' overall need satisfaction, that is, the need satisfaction common to the social media and offline domains, will relate positively to well-being (i.e., vitality, life satisfaction, and sleep quality) and negatively to emotional problems (i.e., depression and anxiety). Conversely, the need frustration that is common to both domains is expected to relate to lower well-being and higher emotional problems. Second, in a more explorative manner, we examined whether experiences in one of both domains. Given the lack of systematic previous research on this issue and the argument in favor of both domains, we refrained from formulating directional hypotheses but were open to both possibilities. Moreover, to test whether the relative importance of one domain over the other is dependent on developmental or contextual differences, three independent samples were collected that differed in age (i.e., mid-adolescents and college students) and context (i.e., within and outside COVID-19 pandemic). These three samples allowed for an internal replication of the findings, thereby shedding light on the robustness of the findings.

3 | METHODS

3.1 Participants and procedure

The demographic characteristics of the three independent samples appear in Table 2. The first two samples include young to middle adolescents, while the third sample includes emerging adults (i.e., college students).

The first sample was collected in January 2022, during the omicron-wave of the COVID-19 pandemic in Belgium (Sciensano, 2023). Adolescents were contacted via their parents who had participated in a different study and voluntarily provided their informed consent to contact their child(ren) for participation in this study. The sample consists of 447 participants, aged between 10 and 18 years, with a mean of 14.26. The majority (54%) of the sample identified as female, 35.3% as male and 10.3% as nonbinary.

The second sample was collected in October–November 2022 as part of a course of developmental psychology at Ghent University where college students were trained and instructed to recruit one participant (excluding relatives, acquaintances).

TABLE 2	Socio-demographic	composition	of the	three	samples
---------	-------------------	-------------	--------	-------	---------

Sample	1 (January, 2022)		2 (November, 2022)		3 (October–December, 2022)			
Total sample size	<i>N</i> = 447		<i>N</i> = 179		N = 4 977			
	Ν	%	Ν	%	Ν	%		
Gender identification								
Male	158	35.3	80	44.7	1410	28.4		
Female	243	54.4	97	54.2	3436	69.2		
Nonbinary	46	10.3	2	1.1	121	2.4		
Age								
Mean	14.26	/	15.25	/	20.72	/		
SD	2.326	/	1.689	/	1.99	/		
Range	10–18	/	12–19	/	17–25	/		
Education type								
Primary	73	16.5	/	/	/	/		
Secondary—academic	291	65.7	132	73.7	/	/		
Secondary—technical or vocational	79	17.8	47	26.3	/	/		
Higher—professional bachelor	/	/	/	/	1985	39.0		
Higher—academic bachelor or master	/	/	/	/	2945	59.3		
Higher—other	/	/	/	/	39	0.8		

All participants gave their written consent, as well as one of their parents for participants under 16 years. The sample consists of 179 participants with a mean age of 15.25 years old (range 12–19). The majority (54.2%) of the sample identified as female, 44.7% as male and 1.1% as nonbinary.

The data-collection of the third sample is part of an initiative of the Flemish government to monitor the mental health, resilience, and motivation to study of college students in Flanders (Belgium), which is called the Mental Health Monitor (Welzijnsmonitor). The Monitor is based on a definition of "mental health as more than the absence of emotional problems and mental disorders" and serves a twofold goal. First, to provide an evolving annual and multiyear image of the mental health, resilience, and motivation to study of higher education students using an online questionnaire (referred to as the core of the questionnaire). Second, to explore the factors associated with these outcomes using three submodules. Each participant gets randomly distributed to one of these three submodules. The third sample in this study was assigned to the social media module, which involved SMU in college students. Hence, this representative sample of older adolescents and emerging adults (i.e., college students) allowed us to examine whether the findings obtained among adolescents would get replicated. All students with a degree contract who are taking a master's, vocational, bachelor's, higher master's or higher bachelor's degree in the academic year 2022-2023 in a Flemish university or college, received an invitation via their student email address in the period between October 1 and December 31, 2022, containing a personal link for voluntary participation. Each participant completed the stem (N = 21,847) of which 1/3 got assigned to the submodule on social media (N = 5900). For the purpose of the present study, only participants in the age range of 173125 were withheld, totaling Sample 3 at 4977. The mean age of this sample was 20.72 years. The majority (69.1%) identified as female, 28.4% identified as male and 2.4% identified as nonbinary.

Together, the three samples cover early adolescence to emerging adulthood. The strength of Sample 1 is that it includes young and middle adolescents in during the COVID-19 pandemic (i.e., Omicron wave, lockdown), but made use of a shorter scale to measure need experiences in SMU and offline (see Section 3.2). Complementing Sample 1, Sample 2 involved a similar age group, this time being collected postpandemic and including a more extensive set of items to measure SMU and offline need-experiences. Finally, different from the first two samples, Sample 3 was both larger and representative of college students in Flanders and made use of the same scale to assess need-relevant experiences as in Sample 2. All samples included indicators of well-being (i.e., vitality, life satisfaction, and sleep quality) and emotional problems (i.e., anxiety, depression) but the data for Sample 3 regarding students' emotional problems were not made available yet by the project partner on the moment the manuscript was finalized.

3.2 | Measures

3.2.1 | Need-based experiences

To measure the basic psychological needs in the offline and SMU domain, an adjusted version of the basic psychological need satisfaction and frustration scale (BPNSFS; Chen et al., 2015) was used. The items were slightly adapted to make them useful for both life domains. Although the item for each domain were identical, the stem was domain-specific (i.e., *When I used social media in the past month...., When I was offline for the past month....*). Items can be found in the Supporting Information S1, pp. 2–4. Items were answered on a five-point Likert scale varying from 1 "not at all applicable" to 5 "completely applicable." In Sample 1, a short 12-item version was tested with three items per subscale (i.e., SMU satisfaction, SMU frustration, offline satisfaction, offline frustration). In Samples 2 and 3, a 24-item version was used, involving 6 items per construct. In line with the guidelines of manual of the BPNSFS (Van der Kaap-Deeder et al., 2020), in Samples 1 and 2 we used the phrasing of the child version, while in Sample 3, we aligned the items with the adult phrasing. Four aggregated scores were created, involving both need satisfaction and need frustration on social media and in the offline domain. All subscales showed acceptable internal consistencies across studies; satisfaction offline ($\alpha_1 = .61$, $\alpha_2 = .79$, $\alpha_3 = .84$), SMU satisfaction ($\alpha_1 = .60$, $\alpha_2 = .74$, $\alpha_3 = .83$), and SMU frustration ($\alpha_1 = .61$, $\alpha_2 = .75$, $\alpha_3 = .83$).

Foundation

WILEY

3.2.2 | Vitality

A shortened three-item version of the subjective vitality scale (Ryan & Frederick, 1997) was used to measure vitality in all samples (e.g., *Right now I feel very much alive*), with slight differences in wording for Sample 2 (see Supporting Information S1, p. 11). All participants indicated their agreement on a five-point Likert scale from 1 "not at all true" to 5 "very much true." In Samples 1 (α = .90) and 3 (α = .93) a very good reliability was found and in Sample 2 (α = .77) the reliability was acceptable.

3.2.3 | Life satisfaction

In Samples 1 and 2, life satisfaction was measured using three items of the satisfaction with life scale (Pavot & Diener, 1993), while in Sample 3 a single item was used (i.e., *I am satisfied with my life*). Participants indicated their agreement on a five-point Likert scale (1 "not at all true"–5 "very much true"). Cronbach's α in Sample 1 ($\alpha = 86$) and Sample 2 ($\alpha = 83$) were good.

3.2.4 | Anxiety

In Samples 1 and 2, anxiety was measured using the six-item version of the state-trait anxiety inventory (Marteau & Bekker, 1992; e.g., *I felt tense*). Participants were asked to indicate their agreement on a four-point Likert scale ranging from 1 "seldom or never" to 4 "most of the time, continuously." Cronbach's α showed good reliability in both samples ($\alpha_1 = .84, \alpha_2 = .81$).

3.2.5 | Depression

To measure symptoms of depression, the depression subscale of the inventory of depression and anxiety (Watson et al., 2007) was used in Samples 1 and 2. The six items (e.g., *I felt depressed*) were answered on a four-point Likert scale ranging from 1 "seldom or never" to 4 "most of the time, continuously". Both samples showed good internal consistencies ($\alpha_1 = .79$, $\alpha_2 = .79$).

3.2.6 | Sleep quality

Participants reported on their sleep quality over the past month using a single item (i.e., *How would you rate your sleep quality?*) which was answered on a four-point Likert scale ranging from 1 "very poor" to 4 "very good" (Buysse et al., 1989).

3.3 | Data-analysis

-WILEY-Foundation

This study employed polynomial regression analysis using the RSA package (Schönbrodt et al., 2018) in R (version 4.2.2) to examine how the degree and direction of (in)congruence in need-based experiences in the SMU and offline domains relates to adolescents' mental health. Given that we are interested in both the joint effects of need-experiences across domains as well as the supplementary role of domain-specific need satisfaction, reflecting incongruence between both domains, this type of analyses is considered most appropriate to evaluate our hypotheses. First, with regard to examining the joint effects, other types of regression analyses often fail to account for shared predictive value between predictors, given that predictors are simultaneously introduced in the regressions as independent variables that then must compete for unique variance. Although this is interesting for some types of research questions, for the purpose of this study, it is more realistic to assume that both domains are characterized by a common dynamic that has predictive value in itself. Second, with regard to examining the incongruencies between domains, most studies use difference scores. However, polynomial regressions with RSA are often argued to be a better alternative, given that difference scores have several methodological issues (e.g., ambiguous interpretation, reliability issues; see e.g., Edwards, 2002). Third, RSA allows us to visualize the relationship between the types of (in) congruence and the outcome variables in a three-dimensional surface, thus providing a visual insight in the interactive interplay between domain-specific need dynamics (Schönbrodt et al., 2018).

The steps described in Barranti et al. (2017) to conduct polynomial regression analyses were followed and repeated in all three samples (see also Van Petegem et al., 2020). We began by examining mean level differences in need experiences between both domains and inspecting the percentual level of discrepancy. The latter was done by examining the frequency of observations in which scores in the SMU domain were half a standard deviation above or below the offline domain, with scores falling within this range considered nondiscrepant or equal (Shanock et al., 2010). Interpersonal variation in these domain scores justifies the use of polynomial regression analyses (Shanock et al., 2010). Next, in each sample, two series of polynomial regression analyses were performed, thereby either including two satisfaction or the two frustration scores as predictors. By regressing each outcome on the main effects of offline satisfaction (or frustration), (*b*1) SMU satisfaction (or frustration) (*b*2), their squared terms (*b*3 and *b*5), and the interaction between both independent variables (*b*4). These coefficients are not interpreted directly but were then used to calculate four new parameters ($a1-a4^1$) and a response surface pattern to interpret the results from the polynomial regression analysis (Barranti et al., 2017).

As displayed in Figure 1, the response surface is a three-dimensional figure representing the expected outcome values for each possible combination of offline and SMU satisfaction (or frustration). Offline satisfaction (or frustration) is presented on the x-axis and SMU satisfaction (or frustration) on the y-axis. The square inside the 3D-cube is the response surface, which shows the expected values for the mental health outcome when offline and SMU satisfaction (or frustration) are both high (i.e., back corner) or low (i.e., front corner), when offline is high while SMU is low (i.e., right corner), when SMU is high while offline is low (i.e., left corner), and all other combinations in between.

The slope and curvature across two lines are crucial when interpreting this figure. The first line is the line of congruence (LOC), which represents the expected values for the outcome if the scores in the offline domain were equal to the SMU domain. The slope on this line can be positive (i.e., equal and high scores on both domains) or negative (i.e., equal and low scores on both domains) and is numerically expressed by the *a*1 parameter. A significant *a*1 reveals a linear common or shared effect between both domains and the outcomes, either on the high- or low-end. The curvature on the LOC is represented by *a*2 and indicates whether the relationship between the agreement in both domains and the outcome variable is linear or curvilinear. In line with our hypotheses regarding the joint effects of SMU and offline satisfaction (or frustration), especially the *a*1 parameter is of interest in the present study.

The second line is the line of incongruence (LOIC), which shows how the discrepancies between the two domains (i.e., SMU/offline) are related to the outcomes. On this line, the cases where scores offline are fully opposite to SMU are plotted (i.e., perfect disagreement). The curvature along this line is used to interpret the degree of discrepancy, with a significant a4 indicating a discrepancy effect independent of the direction (SMU > offline or vice versa). The slope along the LOC or a3 tells us to what extent the direction of the discrepancy matters, such that the outcome is affected more when the discrepancy is in one direction (e.g., SMU > offline) or the other (e.g., SMU < offline). The discrepancy effect then reflects the supplementary value of an independent variable (e.g., SMU need satisfaction) in comparison with the shared value between both independent variables (e.g., SMU and off-line need satisfaction).

¹The RSA coefficients are calculated as following: a1 = b1 + b2; a2 = b3 + b4 + b5; a3 = b1 - b2; a4 = b3 - b4 + b5.



FIGURE 1 Illustration of response surface with positioning of line of congruence (LOC) and line of incongruence (LOIC). Source: Adapted from Barranti et al. (2017, p. 468). [Color figure can be viewed at wileyonlinelibrary.com]

4 | RESULTS

4.1 Preliminary analyses

Descriptive statistics and correlates of the assessed variables are presented in Table 3. Across separate needs and samples, the average level of need satisfaction and need frustration is somewhat higher offline, compared to the SMU domain (see Supporting Information S1, pp. 12–13 for formal tests). Despite these mean-level differences, a substantial percentage of the participants reported higher need satisfaction and higher need frustration in the SMU, compared to the offline domain (i.e., respectively, 10%–26% and 10%–19%, for more detail see Supporting Information S1: Table S8). Apart from these betweendomain differences, within each domain, adolescents reported higher scores for need satisfaction than for need frustration. Further, adolescents also reported how much time they spend daily on social media. On a scale of 1 (>1 h/day) to 3 (<5 h day), Sample 2 on average used approximately 5 h per day, Sample 3 on average used approximately 4 h per day and Sample 1 on average around 2 h per day.

Overall, the domain-specific need satisfaction and domain-specific need frustration scores were positively correlated, while need satisfaction correlated negatively with need frustration within and across domains. Further, need satisfaction in both domains correlated positively with vitality, life satisfaction and sleep quality and negatively with depression and anxiety. An opposite correlation pattern was found for need frustration in both domains.

4.2 | Primary analyses

The results of the polynomial regression analyses and Response Surface Analysis are presented in Tables 4 (need satisfaction) and 5 (need frustration). In all regression models, we controlled for age, gender, education type, and self-reported daily time spend on social media by using the residual scores of the dependent variables (thus partialing out the variance of gender, age, education type, and duration of SMU) in the polynomial regression analyses (Barranti et al., 2017). Figures 2 and 3 will be used to illustrate the main findings, other response surface figures can be consulted in the Supporting Information S1, pp. 27–39.

4.2.1 | Need satisfaction

Across the three samples, all *a*1 parameters (i.e., 13/13) on the LOC, were found to be significant. For the well-being outcomes (i.e., vitality, life satisfaction, and sleep quality), these *a*1 parameters were positive, meaning that the highest values of well-being were found when need satisfaction was high in both domains, while the lowest values on well-being were found

Foundation for PSA-WILEY-

Variable	Sample	М	SD	Observed range	1.	2.	3.	4.	5.
1. Offline satisfaction	1	3.84	0.75	1–5	-	-	-	-	-
	2	3.86	0.57	1.5–5	-	-	-	-	-
	3	3.57	0.75	1–5	-	-	-	-	-
2. Offline frustration	1	2.33	0.87	1–5	55***	-	-	-	-
	2	2.34	0.66	1–5	51***	-	-	-	-
	3	2.32	0.82	1–5	45***	-	-	-	-
3. Social media use (SMU) satisfaction	1	3.57	0.77	1–5	.29***	24***	-	-	-
	2	3.80	0.56	2–5	.45***	42***	-	-	-
	3	3.05	0.80	1–5	.38***	10**	-	-	-
4. SMU frustration	1	1.99	0.77	1-4.33	39***	.57***	28***	-	-
	2	2.13	0.68	1–5	24**	.56***	35***	-	-
	3	2.04	0.77	1–5	23***	.58***	15**	-	-
5. Time on SMU	1	1.89	0.58	1–3	24***	.15**	.05	.18***	-
	2	2.51	0.52	1–3	00	.02	13	01	-
	3	2.02	0.57	1–3	11**	.17**	.17**	.16**	-
6. Vitality	1	2.87	1.14	1–5	.55***	49***	.30***	34***	21***
	2	2.93	0.78	1–5	.51***	43***	.41***	27***	.04
	3	2.92	1.10	1–5	.45***	46***	.20***	27***	16**
7. Life Satisfaction	1	3.41	1.03	1–5	.51***	46***	.22***	38***	26***
	2	3.69	0.59	1–5	.47***	62***	.37***	34***	04
	3	3.28	1.01	1–5	.47***	47***	.20***	30***	14**
8. Sleep Quality	1	2.57	0.84	1-4	.25***	24***	.22***	21***	12*
	2	2.85	0.62	1-4	.24***	32***	.27***	15*	02
	3	2.66	0.72	1-4	.29***	26***	.09***	17***	11**
9. Depression	1	1.86	0.69	1-4	53***	.57***	28***	.46***	.28***
	2	1.59	0.56	1-3.83	34***	.52***	42***	.39***	.01
10. Anxiety	1	2.15	0.70	1-4	52***	.53***	24***	.39***	.25***
	2	1.95	0.59	1-3.66	37***	.52***	42***	.39***	02

Note: The upper half of the figure shows the interrelationship between the independent variables and time on social media. The lower half of the figure shows the associations between the dependent variables.

p < .05; *p < .01; ***p < .001.

when adolescents experience low satisfaction in SMU and offline. As for the assessed emotional problems (i.e., anxiety and depression), negative *a*1 parameters were found, showing that the lowest values of emotional problems were observed when need satisfaction was high in both domains and the lowest values were found when need satisfaction was low. On top of this linear effect, in 5 out of the 13 cases, an additional, small curvature on the LOC was identified. Each of these significant relations involved a well-being outcome, with the results pointing out that the positive contribution of need satisfaction on an outcome increased somewhat steeper if adolescents had their needs highly met in both domains.

As for the incongruency effect, no significant *a*4 parameters were found, meaning that there is no evidence for domainincongruence that applies to both domains simultaneously. Yet, the *a*3 parameter on the LOIC was significant in 7 out of the 13 cases. If significant, the *a*3 parameters were positive for vitality, life satisfaction, and sleep quality, and negative for depression and anxiety. Despite the variability in these effects across samples, the findings all pointed to a similar direction: adolescents with higher levels of need satisfaction in the offline domain compared to the SMU domain, reported higher

WILEY- Foundation

VAN DE CASTEELE ET AL.

TABLE 4 Results of polynomial regression analysis with response surface analyses assessing mental health outcomes based on need satisfaction in social media use (SMU) and offline activities.

	Vitality			Life satisfaction			Sleep quality			Depression		Anxiety	
Sample	1	2	3	1	2	3	1	2	3	1	2	1	2
Polynomial regression coefficients													
b1 offline	.50***	.27***	.51***	.40***	.25***	.57***	.12*	.00	.18***	28***	11*	34***	08
b2 SMU	.22***	.17*	.04*	.16*	.10	.03	.16**	.20***	.00	10*	06	.10*	16**
b3 offline ²	.04	01	.06***	01	04	.04**	03	04	.01	.02	.04	.01	.05
$b4 \text{ offline} \times \text{SMU}$.02	02	.07***	.05	.04	.07***	.00	05	.04***	05	05	02	02
b5 SMU ²	.02	.00	02	.05	03	02	.01	.07	02*	.00	.05	04	.01
Response surface parameters													
al slope line of congruence (LOC)	.72***	.44***	.55***	.56***	.34***	.60***	.29***	.21***	.18***	38***	16***	44***	23***
a2 curve LOC	.08*	04	.11***	.09**	04	.09***	01	02	.03**	03	.04	05	.04
a3 slope line of incongruence (LOIC)	.28*	.10	.47***	.24*	.16	.53***	04	20	.18***	17*	05	24***	.08
a4 curve LOIC	.04	01	02	02	11	05	02	.08	05*	.07	.14	01	.08
R^2	.29***	.26***	.25***	.22***	.22***	.25***	.08***	.10**	.06***	.38***	.14***	.40***	.19***

Note: Significant a1 indicates a linear additive relationship between both SMU and offline satisfaction and the outcome, significant a2 indicates significant curvilinearity in the relationship between both SMU and offline satisfaction and the outcome.

p < .05; **p < .01; ***p < .001.

TABLE 5Results of polynomial regression analysis with response surface analyses assessing mental health outcomes based on need frustration in socialmedia use (SMU) and offline activities.

	Vitality			Life satisfaction			Sleep Quality			Depress	ion	Anxiety	
	1	2	3	1	2	3	1	2	3	1	2	1	2
Polynomial regression coefficients													
b1 offline	34***	26**	40***	26***	37***	40***	05	18*	14***	.19***	.22***	.21***	.16**
b2 SMU	14	08	02	19**	.01	07***	13*	01	03*	.16***	.05	.10*	.15**
b3 offline ²	05	06	02	03	.05	06***	07	02	03*	.08*	.07**	.05*	.01
<i>b</i> 4 offline x SMU	.21**	.15*	.08***	.10	.00	.09***	.17*	.04	.03	15***	02	12**	06
b5 SMU ²	.03	03	05**	.06	.06	05**	06	.01	-001	.08	01	.03	02
Response surface parameters													
<i>a</i> 1 slope line of congruence (LOC)	48***	34***	42***	46***	37***	47***	18**	19***	17***	.35***	.27***	.31***	.31**
a2 curve LOC	.19**	.07	.04	.13*	.11*	03	.04	.03	01	.00	.04	03	06
<i>a</i> 3 slope line of incongruence (LOIC)	20	18	38***	07	38**	33***	.09	17	10***	.03	.17*	.11	.02
a4 curve LOIC	22	23*	15***	09	.11	20***	30*	06	06*	.31***	.08	.20**	.05
R^2	.22***	.19***	.19***	.20***	.20***	.21***	.06***	.11***	.06***	.31***	.35***	.25***	.25**

*p < .05; **p < .01; ***p < .001.

values for well-being and lower values for depression and anxiety. This supplementary effect in favor of the offline domain indicates that the offline domain is somewhat more decisive for adolescents' mental health.

As a way of illustrating these multiple effects, Figure 2 presents the findings for the outcome of life satisfaction in Sample 3. First, the positive a1 effect can be seen on the LOC. Specifically, the highest values for life satisfaction (dark green) are found when both SMU satisfaction and offline satisfaction are high (back corner), while low scores on life satisfaction (medium red) are found if satisfaction in both domains is equally low (front corner). Second, a small curvature at the

11



FIGURE 2 Response surface for the polynomial regression of life satisfaction regressed on need satisfaction in Sample 3. (a) Response surface as a threedimensional figure. (b) Response surface is rotated to show the top view of the figure. On the *x*-axis, the values for offline satisfaction are depicted, on the *y*-axis the values for social media use (SMU) satisfaction. The expected scores on life satisfaction for each combination of SMU satisfaction and offline satisfaction are represented in the response surface by different colors varying from dark green (high life satisfaction) to dark red (low life satisfaction). The line of congruence (LOC) (a: front to back corner) and the line of incongruence (LOIC) (a: left to right corner) are shown in blue. Each dot in the figure represents a raw data point in Sample 3. Around the raw data points a bagplot is drawn, which is a bivariate extension of the boxplot, depicting the inner 50% of the data points (small oval) and the line separating outliers (large oval) (Rousseeuw et al., 1999). When interpreting the response surface, it is recommended to focus on the values within this bagplot. [Color figure can be viewed at wileyonlinelibrary.com]



FIGURE 3 Response surface for the polynomial regression of vitality regressed on need frustration in Sample 3. (a) Response surface as a threedimensional figure. (b) The response surface is rotated to show the top view of the figure. On the *x*-axis, the values for offline frustration are depicted, on the *y*-axis the values for social media use (SMU) frustration. The expected scores on vitality for each combination of SMU frustration and offline frustration are represented in the response surface by different colors varying from dark green (high life satisfaction) to dark red (low life satisfaction). The line of congruence (LOC) (Figure 1a: front to back corner) and the LOIC (Figure 1a: left to right corner) are shown in blue. Each dot in the figure represents a raw data point in Sample 3. Around the raw data points a bagplot is drawn, which is a bivariate extension of the boxplot, depicting the inner 50% of the data points (small oval) and the line separating outliers (large oval) (Rousseeuw et al., 1999). When interpreting the response surface, it is recommended to focus on the values within this bagplot. [Color figure can be viewed at wileyonlinelibrary.com]

high-end of the LOC (back corner) can be seen as well, demonstrating the positive *a*2 parameter. Thus, life satisfaction increases somewhat steeper towards the high end of the need satisfaction scale. Third, on the LOIC, high values (light green) are found when offline satisfaction is higher, while SMU satisfaction is lower. This reflects the positive *a*3 effect. Note that the lowest values (dark red) for life satisfaction are shown when SMU satisfaction is at highest, in combination with the lowest levels of offline satisfaction (Figure 2a, right corner, Figure 2b, upper right corner). Yet, one needs to be cautious in drawing strong conclusions regarding this *a*3 effect as the few data points involving the combination of high SMU and low offline need satisfaction fall outside of the bagplot (i.e., outliers).

4.2.2 | Need frustration

Again, *a*1 parameters were found to be significant in all samples, indicating linear effects on the LOC. Here, *a*1 parameters were negative in case of vitality, life satisfaction and sleep quality, and positive for anxiety and depression. Thus, when adolescents report equally high need frustration in the offline and SMU domain, they are more likely to experience less wellbeing and more emotional problems. In 3 out of 13 cases, a small curve on the LOC (i.e., significant *a*2 parameter) was found as well, suggesting that especially high levels of need frustration in both domains related to lowered vitality and life satisfaction.

As for the incongruency effects, in 7 out of 13 cases, the *a*4 parameter was significant, indicating that incongruence in either direction was more related to mental health. Thus, when need frustration in one domain is relatively higher compared to the other domain, this provides an incremental effect on vitality, life satisfaction, and sleep quality on top of their joint effects. However, in Sample 3, these effects should be interpreted against the background of a significant *a*3 parameter, indicating that the offline domain is particularly decisive. Thus, although domain-incongruence in need frustration as such is associated with poorer mental health, in Sample 3, the lowest score is found for youth when offline frustration is relatively higher compared to SMU frustration. Finally, in Sample 2 for life satisfaction and depression, only the a3 effect was significant, suggesting that when need frustration stems more from the offline domain, this was linked with lower life satisfaction and higher depression. Overall, the effects of incongruency for need frustration are more diverse compared to need satisfaction. This suggests that domain-incongruence itself has a surplus effect on mental health in the case of need frustration. Yet, if one of both domains plays a more decisive role, it is again the offline domain though.

Figure 3 demonstrates the effects for need frustration on vitality in Sample 3. First, the negative *a*1 effect can be seen on the LOC. The highest values for vitality (green) are found when both SMU frustration and offline frustration are low (front corner), while high scores on vitality (medium red) are expected if frustration in both domains is high (back corner). Second, in Figure 3a, a concave curvature can be seen on the LOIC, showing a supplementary effect on vitality when need frustration is relatively higher in the SMU domain compared to the offline domain (Figure 3a: right corner, Figure 3b: right side), and vice versa (Figure 3a: left corner, Figure 3b: bottom side). This represents the significant *a*4 effect. However, the lowest values on vitality (darker red) are found when the offline is relatively higher compared to the SMU domain, showing the effect of the significant *a*3 parameter. Note that the lowest expected values (dark red) for vitality are shown when SMU frustration is at highest, in combination with the lowest levels of offline frustration (Figure 3a.; right corner, Figure 3b, bottom right corner). However, no strong conclusions can be drawn for the combination of high SMU satisfaction and low offline satisfaction, as the few data points for this combination fall outside of the bagplot (i.e., outliers).

5 | DISCUSSION

In light of the considerable amount of time that young people spend on social media apps (Anderson & Jiang, 2018), it is crucial to investigate if such time investment yields any well-being benefits or, instead, inflicts harm and is associated with a heightened risk for emotional problems. To address this issue, the present study focused on adolescents' and emerging adults' subjective experiences during SMU and in their offline activities through the lens of basic psychological needs, which are central to SDT (Ryan, 2023; Vansteenkiste et al., 2020, 2023). To advance the literature on need-experiences on social media (Parent, 2023), we examined whether the satisfaction and frustration common to the offline and SMU domain would relate to adolescent mental health and whether domain-specific need experiences would yield supplementary value in relation to mental health. As the relative importance of the one domain compared to the other might differ depending on the developmental stage or contextual characteristics, three independent samples, involving both young and middle adolescents during lockdown (Sample 1) and in postpandemic times (Sample 2) and emerging adults during a postpandemic period (i.e., college students; Sample 3), were collected.

5.1 | Joint effects of SMU and off-line need experiences

The results of the present study show that the need-experiences common to both domains were robustly associated with adolescents' and emerging adults' general mental health. This finding was obtained across all samples and across all assessed outcomes, with need satisfaction playing a beneficial and need frustration a harmful role. In addition, supplementary analyses comparing "high users" (>5 h a day) with "moderate users" (<5 h a day) and examining the three basic needs separately demonstrated the consistency of these joint effects (see Supporting Information S1: Tables S9 and S10). The results suggest that adolescents benefit from having their basic psychological needs met, whether in offline or online social media environments (Ryan & Deci, 2017). In many cases, especially for need satisfaction, these joint effects were somewhat more pronounced in the sample collected during the pandemic (i.e., Sample 1) compared to the other two samples. This

Foundation for PSA-WILEY 13 observation is in line with the idea of need satisfaction as a source of resilience in distressing times (Vansteenkiste & Ryan, 2013) and with research on the basic psychological needs during the COVID-19 pandemic (see e.g., Vermote et al., 2022). It is important to note, however, that while the COVID sample is similar in age to Sample 2 (with a mean age of 14.26 compared to 15.25), it is unique in that it includes a subgroup of participants in primary education (16.50%), which complicates the ability to interpret differences between both samples purely in terms of either the pandemic or age effects.

In a limited number of cases, these effects appeared curvilinear with high levels of need satisfaction or need frustration coming with, respectively, additional benefits or costs than what can be expected on the basis of a pure linear association. Said differently, the effects of need-experiences do not seem to level off. On the contrary, if anything, they become more pronounced positive (in the case of satisfaction) or negative (in the case of frustration). Such findings are consistent with the overall argument in SDT's theory on the basic psychological needs, that the basic needs, when satisfied, should reliably produce benefits (Vansteenkiste et al., 2023).

The present findings also align with the emerging literature on need-experiences on social media (Parent, 2023; Schneider et al., 2021), by showing that more than the time spent, subjectively different experiences on social media (in conjunction to their offline activities) are more critical for mental health. Indeed, the correlational analyses had indicated that time spent as such was rather minimally related to mental health outcomes and the findings reported in polynomial regression analyses were controlled for time spent on social media. Thus, the observed effects of need-based experiences were a unique factor associated with mental health on top of the time spent on social media. Nevertheless, it should be noted that the samples differed considerably in the amount of time spent on social media. While other studies showed more SMU during the pandemic (e.g., Marciano et al., 2022), in this study, the COVID-sample reported the lowest amount of time on social media apps, followed by Sample 3 (i.e., college students) and Sample 2, which were collected postpandemic. Alternatively, this could be due to reporting bias, where younger adolescents tend to underestimate their time on social media apps, leading to less accurate self-reports (e.g., Parry et al., 2021).

Further, in all samples, the mean-level findings highlight that adolescents and emerging adults, on average, experience relatively more need satisfaction than need frustration when spending time on social media, which is also the case for each of the three needs separately (Supporting Information S1: Tables S11–S16). Yet, there is considerable variation around these average differences, which may help to understand previously found heterogeneous effects of SMU (e.g., see Valkenburg et al., 2021). For example, frustration with regard to the need for competence is visibly higher in all samples compared to autonomy and relatedness (Supporting Information S1: Table S7). This finding could indicate that youth are particularly susceptible for competence frustration on social media, which could stem from self-comparison or digital status seeking. These specific mechanisms relate to the satisfaction or frustration of basic psychological needs deserve attention in further research. Overall, the finding that SMU can provide adolescents with new opportunities for need satisfaction on top of their offline activities contradicts previous, more pessimistic portrayals of social media as a "guilty pleasure" (for analogy see Rigby, 2023) or "drug" (for analogy see Van den Abeele et al., 2022) that should be limited at all costs (see e.g., Przybylski et al., 2021).

5.2 Supplementary role of SMU and off-line need experiences

A second set of findings pertains to the supplementary role of domain-specific need-experiences on top of the need-experiences common to both domains. The most robust finding across the analyses involving need satisfaction and need frustration is that offline need-experiences appear a more critical, supplementary determinant for adolescents' general mental health than need experiences on social media. Specifically, significant incongruence effects for need satisfaction indicated that the reported mental health was even higher if offline need satisfaction was relatively higher compared to SMU satisfaction, but not the other way around. Such supplementary offline benefits were found in 7 of the 13 analyses. These findings are in line with prior studies indicating that adolescents' generally attribute more meaning to offline contact and pastimes (e.g., Scott et al., 2022; Twenge et al., 2019).

Interestingly, in the COVID-sample (Sample 1), where face-to-face activities were more limited, adolescents still managed to get their needs met relatively more in the offline domain and the incongruence effects also showed that these offline experiences were relatively more important. Moreover, the surplus effects were somewhat more pronounced for the emerging adults (i.e., Sample 3). This finding is consistent with the mean differences (see also Supporting Information S1, pp. 12–13), showing that, in the two adolescent samples (i.e., Samples 1 and 2), the scores on offline need satisfaction exceed the scores on social media need satisfaction by over half a standard deviation in 30% of adolescents (around 45% reports no differences), while this percentage increases up to 50% for emerging adults (around 40% reports no differences). Possibly, adolescents increasingly prefer "real life" sources of need satisfaction as they get older. Moreover, emerging adults have more opportunities for face-to-face need-satisfying activities compared to adolescents, who are exposed to more prestructured week schedules and more parental supervision. Another explanation might be that younger adolescents overestimate the

The latter difficulties to correctly forecast the benefits of SMU can perhaps be attributed to cognitive development and associated self-control, which is already better developed in older adolescents (Casey & Caudle, 2013). Nevertheless, in addition to age, the context of the pandemic may also play a role. The two early-to-middle adolescent samples also differed from each other, with the COVID-sample showing more discrepancy effects compared to the postcovid sample, which might suggest that "real life" need satisfaction is even more of vital importance in times of limited social contact and face-to-face activities.

Supplementary analyses on the needs for autonomy, competence, and relatedness separately (instead of composite scores), showed less evidence for discrepancy effects in terms of relatedness (see Supporting Information S1: Tables S11–S16). This could either suggest that relatedness is equally important in both domains or that both social media and offline contacts are more psychologically continuous or connected (e.g., Subrahmanyam et al., 2008), while this is less so for the need for autonomy and competence. Overall, it is important to note that these findings do not imply that social media are a "poor" source of mental health as such; rather, the results suggest that need-satisfying experiences on social media do not serve as a stand-alone source above the complementary role they play in relation to need experiences in the offline world, as captured by the congruency effect.

Interestingly, offline activities not only come with supplementary benefits when needs get satisfied, they also come with supplementary costs when needs get frustrated. Specifically, adolescents' mental health decreased more sharply once the values of offline need frustration were relatively higher than need frustrating experiences on SMU than the other way around. This means that adolescents who experience a lot of need frustration in their day-to-day encounters (e.g., school or leisure activities) are the most vulnerable to develop mental health issues. Yet, different from the findings for need satisfaction, also the deviation in the direction of SMU played a supplementary role in a few cases. That is, in 7 out of 13 analyses, evidence was found that mental health decreased more sharply once need frustration in either of both domains was discrepant from the need frustration in the other domain. Thus, if SMU frustration is somewhat more pronounced than offline frustration, or vice versa, mental health declines more easily.

The present findings help to nuance a panic-based view where social media are seen as the main culprit for changes in adolescents' mental health (see e.g., Orben, 2020 for counter arguments). If we had solely focused on the domain of social media, we may have erroneously concluded that need frustration in SMU as such should be "blamed" for adolescents' poor mental health. Yet, the simultaneous consideration of offline and SMU-related experiences allows for a much more nuanced viewpoint, thereby teasing apart the role of domain-overarching and domain-specific need frustrations in the association with mental health. On the other hand, the damage of need frustration on social media should not be overlooked. Rather, adolescents who experience need frustration in both domains were found to be most vulnerable for emotional problems, thereby constituting a subgroup that warrants targeted intervention efforts. One approach worth considering is examining underlying reasons why both domains fail to meet the needs of those adolescents (e.g., [cyber]bullying). Alternatively, it is plausible to direct attention towards enhancing adolescents' capacities for need-crafting (Laporte et al., 2021), meaning that adolescents increasingly develop the skill to consciously and proactively manage behavior towards improved need satisfaction, which is known to strengthen mental health and resilience (Van den Bogaard et al., 2023; Laporte et al., 2022). Intervention based on strengthening youth's resilience and skills could help them navigate through both social media and the offline domains.

5.3 Future directions

Although offline need-experiences were found to be relatively more decisive for adolescents' and emerging adults' general mental health than the need-experiences on SMU, the opposite may be true when considering specific outcomes within the domain of SMU. Need-based experiences during SMU may be more important to influence outcomes such as social media enjoyment, goal conflict, or symptoms of addiction. To illustrate, one study found that need satisfaction during internet use related to more internet use and more positive affect experienced online (Shen et al., 2013). For SMU specifically, some research within SDT examined outcomes as social media addiction (Gugliandolo et al., 2020; Masur et al., 2014) or well-being on social media (Chen et al., 2021). However, these studies used a general instead of domain-specific measure of need-experiences. Here as well, the interplay with offline need-based experiences is important. According to the needs-density hypothesis (Rigby & Ryan, 2011), problematic outcomes in the domain of SMU (such as addiction) are particularly likely when SMU need-experiences are out of touch with offline need-experiences. Adolescents who only manage to get their psychological needs met in the context of SMU and who experience a lack of need satisfaction (or even need frustration) offline may engage in SMU to compensate for the imbalance in their needs, thereby developing a very one-sided, perhaps even obsessive, preference for SMU (see Adachi & Rigby, 2023 for an overview of the gaming literature).

Second, an aggregated score of need satisfaction and frustration was used in the main analyses. Although we looked at autonomy, competence, and relatedness separately in each domain in the Supporting Information S1: Tables S11–S16, future studies could investigate direct relationships between a specific basic psychological need and certain outcomes. For example, in Table 1, we provide an overview of need-based experiences on social media with theoretically related concepts (e.g., relatedness frustration and fear of missing out). This table might inspire future research to examine need-specific dynamics.

Further, because polynomial regression analysis with RSA allows no more than two independent variables, the present study did not look at the interplay between need satisfaction and need frustration across both domains. As such, the idea of balance between domains (e.g., Milyavskaya et al., 2009) or compensation across domains cannot be directly concluded from this study. To address this, future studies can adopt other analysis techniques, for example, latent profile analyses or clustering techniques, which can study if different combinations of satisfaction and frustration in both domains are more vulnerable than others (see Li et al., 2020, for an example of offline need-experiences related to offline and SMU well-being).

A final issue for future research is to explore whether more interactive (e.g., gaming) or more passive types of media (e.g., TV/series watching) provide more reliable opportunities for need satisfaction (see Adachi & Rigby, 2023). Although social media are mostly considered as interactive in nature, a lot of time spent is typically more "passive consumption" (e.g., lurking, content watching; Verduyn et al., 2017). As no studies today directly compared active to passive media in terms of their relative contribution in the prediction of need satisfaction, future studies could differentiate these types of media consumption when studying need-based dynamics.

5.4 Limitations

MILEY-Foundation

This study has a number of shortcomings. First, to measure offline experiences, no instructions were given in regard to a specific life domain, instead leaving this purposefully open to contrast need-experiences offline with those on social media. The disadvantage of this choice is that the offline domain is presumably a more encompassing domain, compromising various subdomains (including family, school and leisure), which can explain the relatively stronger supplementary value of this domain. Thus, future research could assess need satisfactions in multiple predefined domains (e.g., school and leisure activities) and examine the joint and supplementary role of these offline domains relative to the social media domain.

Related to this issue, a second limitation is that the rating of need-based experiences in both life domains might have created an explicit comparison between both, thereby introducing measurement bias. When rating their need-experiences in the SMU domain, adolescents may have compared their offline and online experiences, thereby being inclined to rate the SMU domain more negatively (or vice versa). By randomizing the order of which domain is being offered to participants, the potential role of measurement bias could be examined.

Third, the present study is cross-sectional in nature and, hence, fails to shed light on the direction of effects. Future longitudinal, diary, or experience sampling studies could shed light on the reciprocal associations between need-based experiences and mental health (e.g., Odgers & Jensen, 2020). To test the causal role of need-based experiences, experimental work involving both need-supportive or need-crafting SMU conditions could be contrasted with similar offline conditions in association with mental health.

6 | CONCLUSIONS

Given that adolescents and emerging adults devote a considerable amount of time on social media apps, concerns have been raised whether this displaces more "meaningful" experiences, such as in the context of school, leisure, or family (e.g., Neuman, 1988). This concern, however, assumes that time on social media is by definition "wasted" or a "guilty pleasure" with no actual return in terms of real-world mental health (see Rigby, 2023 for analogy). Adopting three independent samples of adolescents and emerging adults, and a variety of well-being (i.e., vitality, life satisfaction, and sleep quality) and emotional problem (i.e., anxiety and depression) outcomes, the present study aimed to shed light on the joint and supplementary effects of need-based experiences in the "offline" domain versus the context of social media. On the one hand, the findings showed that SMU can be subjectively different depending on the experience of need satisfaction or frustration when spending time on social media, in conjunction with need-experiences in typical "offline" domains. On the other hand, a key finding is that youth seem to benefit more in terms of mental health when they experience relatively more need satisfaction and less need frustration stemming from offline sources compared to SMU. The latter findings were somewhat more pronounced for emerging adults compared to adolescents. A take-home message for research and practice is that looking at social media in isolation may lead to incomplete or inaccurate conclusions, and that adolescents' offline experiences should be considered to fully capture their joint and supplementary role in understanding adolescent mental health.

ACKNOWLEDGMENTS

This study was supported by the Research Foundation Flanders (Fund number: 11D6923N).

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

This study was approved by Ghent University's Ethical Committee Psychology and Educational Sciences (ID 2020–37, ID 2021–203) and by the University Hospital of Leuven (S62111).

ORCID

Marlies Van de Casteele D http://orcid.org/0000-0001-5496-8373

REFERENCES

- van den Abeele, M. M. P., Halfmann, A., & Lee, E. W. J. (2022). Drug, demon, or donut? Theorizing the relationship between social media use, digital wellbeing and digital disconnection. Current Opinion in Psychology, 45, 101295. https://doi.org/10.1016/j.copsyc.2021.12.007
- Adachi, P. J. C., & Rigby, S. C. (2023). Captivated by meaning: A self-determination theory perspective on motivation for entertainment media. In R. M. Ryan (Ed.), The Oxford handbook of self-determination theory. Oxford University Press.
- Anderson, M., & Jiang, J. (2018). Teens, social media and technology 2018. Pew Research Center: Internet, Science & Tech. https://www.pewresearch.org/ internet/2018/05/31/teens-social-media-technology2018/
- Ang, C. S., Abu Talib, M., Tan, K. A., Tan, J. P., & Yaacob, S. N. (2015). Understanding computer mediated communication attributes and life satisfaction from the perspectives of uses and gratifications and self-determination. *Computers in Human Behavior*, 49, 20–29. https://doi.org/10.1016/j.chb.2015. 02.037
- Barranti, M., Carlson, E. N., & Côté, S. (2017). How to test questions about similarity in personality and social psychology research. Social Psychological and Personality Science, 8(4), 465–475. https://doi.org/10.1177/1948550617698204
- Berger, M. N., Taba, M., Marino, J. L., Lim, M. S. C., Cooper, S. C., Lewis, L., Albury, K., Chung, K. S. K., Bateson, D., & Skinner, S. R. (2021). Social media's role in support networks among LGBTQ adolescents: A qualitative study. Sexual Health, 18(5), 421–431. https://doi.org/10.1071/sh21110
- Beyens, I., Frison, E., & Eggermont, S. (2016). "I don't want to miss a thing": Adolescents' fear of missing out and its relationship to adolescents' social needs, Facebook use, and Facebook related stress. Computers in Human Behavior, 64, 1–8. https://doi.org/10.1016/j.chb.2016.05.083
- Van den Bogaard, D., Soenens, B., Brenning, K., Flamant, N., Vansteenkiste, M. (2023). Can students learn to optimize their need-based experiences and mental health during a stressful period? Testing a need-crafting intervention in higher education. Article under review.
- Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. Psychiatry Research, 28(2), 193–213. https://doi.org/10.1016/01651781(89)90047-4
- Campbell, R., Boone, L., Vansteenkiste, M., & Soenens, B. (2018). Psychological need frustration as a transdiagnostic process in associations of self-critical perfectionism with depressive symptoms and eating pathology. *Journal of Clinical Psychology*, 74(10), 1775–1790. https://doi.org/10.1002/jclp.22628
- Casey, B. J., & Caudle, K. (2013). The teenage brain. Current Directions in Psychological Science, 22(2), 82-87. https://doi.org/10.1177/0963721413480170
- Chen, B., Van Assche, J., Vansteenkiste, M., Soenens, B., & Beyers, W. (2015). Does psychological need satisfaction matter when environmental or financial safety are at risk? *Journal of Happiness Studies*, 16(3), 745–766. https://doi.org/10.1007/s10902014-9532-5
- Chen, Y., Li, R., & Liu, X. (2021). How relatedness need satisfaction or frustration and motivation relate to well-being on social networking sites. *The American Journal of Psychology*, 134(2), 201–216. https://doi.org/10.5406/amerjpsyc.134.2.0201
- Cordeiro, P. M. G., Paixão, M. P., Lens, W., Lacante, M., & Luyckx, K. (2018). Parenting styles, identity development, and adjustment in career transitions: The mediating role of psychological needs. *Journal of Career Development*, 45(1), 83–97.
- Digimeter. (2023). imec.digimeter 2022 Digitale trends in Vlaanderen. In: www.imec.be; https://www.imec.be/sites/default/files/2023-03/imec_digimeter_ 2022.pdf
- Draženović, M., Vukušić Rukavina, T., & Machala Poplašen, L. (2023). Impact of social media use on mental health within adolescent and student populations during COVID-19 pandemic: Review. International Journal of Environmental Research and Public Health, 20(4), 3392. https://doi.org/10. 3390/ijerph20043392
- Edwards, J. R. (2002). Alternatives to difference scores: Polynomial regression analysis and response surface methodology. In F. Drasgow & N. W. Schmitt (Eds.), *Advances in measurement and data analysis* (pp. 350–400). Jossey-Bass.
- Emery, A. A., Heath, N. L., & Mills, D. J. (2016). Basic psychological need satisfaction, emotion dysregulation, and non-suicidal self-injury engagement in young adults: An application of self-determination theory. *Journal of Youth and Adolescence*, 45, 612–623.
- Erdmann, E., & Dienlin, T. (2022). Binge-watching, self-determination, and well-being. *Journal of Media Psychology*, 34(6), 383–394. https://doi.org/10.1027/ 18641105/a000334
- Faelens, L., Hoorelbeke, K., Cambier, R., Van Put, J., Van De Putte, E., De Raedt, R., & Koster, E. H. W. (2021). The relationship between Instagram use and indicators of mental health: A systematic review. Computers in Human Behavior Reports, 4, 100121. https://doi.org/10.1016/j.chbr.2021.100121
- Giumetti, G. W., Kowalski, R. M., & Feinn, R. S. (2022). Predictors and outcomes of cyberbullying among college students: A two wave study. *Aggressive Behavior*, *48*(1), 40–54. https://doi.org/10.1002/ab.21992
- Gugliandolo, M. C., Costa, S., Kuss, D. J., Cuzzocrea, F., & Verrastro, V. (2020). Technological addiction in adolescents: The interplay between parenting and psychological basic needs. *International Journal of Mental Health and Addiction*, 18(5), 1389–1402. https://doi.org/10.1007/s11469-019-00156-4

Foundation for PSA-WILEY- 17

- Hamilton, J. L., Nesi, J., & Choukas-Bradley, S. (2021). Reexamining social media and socioemotional well-being among adolescents through the lens of the COVID-19 pandemic: A theoretical review and directions for future research. *Perspectives on Psychological Science*, 17(3), 662–679. https://doi.org/10. 1177/17456916211014189
- Hsu, H. K., Wang, C., & Levesque-Bristol, C. (2019). Reexamining the impact of self-determination theory on learning outcomes in the online learning environment. *Education and Information Technologies*, 24(3), 2159–2174. https://doi.org/10.1007/s10639-019-09863-w
- Jashari, X., Fetaji, B., & Guetl, C. (2022). Assessment of digital skills in the context of social media. In J. Kacprzyk (Ed.), *Lecture notes in networks and systems* (pp. 467–479). Springer International Publishing. https://doi.org/10.1007/978-3-030-93904-5_47
- Van der Kaap-Deeder, J., Soenens, B., Ryan, R. M., & Vansteenkiste, M. (2020). Manual of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS). Ghent University.
- Keles, B., Grealish, A., & Leamy, M. (2023). The beauty and the beast of social media: An interpretative phenomenological analysis of the impact of adolescents' social media experiences on their mental health during the COVID-19 pandemic. Current Psychology (New Brunswick, N.J.), 1–17. https:// doi.org/10.1007/s12144-023-04271-3
- Kraut, R., Kiesler, S., Boneva, B., Cummings, J., Helgeson, V., & Crawford, A. (2002). Internet paradox revisited. Journal of Social Issues, 58(1), 49–74. https://doi.org/10.1111/1540-4560.00248
- Laporte, N., Soenens, B., Brenning, K., & Vansteenkiste, M. (2021). Adolescents as active managers of their own psychological needs: The role of psychological need crafting in adolescents' mental health. Journal of Adolescence, 88(1), 67–83. https://doi.org/10.1016/j.adolescence.2021.02.004
- Laporte, N., Soenens, B., Flamant, N., Vansteenkiste, M., Mabbe, E., & Brenning, K. (2022). The role of daily need crafting in daily fluctuations in adolescents' need-based and affective experiences. *Motivation and Emotion*, 46(2), 137–149. https://doi.org/10.1007/s11031-021-09921-2
- Lerner, R. M., & Steinberg, L. (2009). The scientific study of adolescent development: Historical and contemporary perspectives. In R. M. Lerner & L. Steinberg (Eds.), Handbook of adolescent psychology: Individual bases of adolescent development (pp. 3–14). John Wiley & Sons Inc. https://doi.org/ 10.1002/9780470479193.adlpsy001002
- Li, R., Chen, Y., Liu, H., & Yao, M. (2020). Need satisfaction and frustration profiles: Who benefits more on social networking sites? Personality and Individual Differences, 158, 109854. https://doi.org/10.1016/j.paid.2020.109854
- Luyckx, K., Vansteenkiste, M., Goossens, L., & Duriez, B. (2009). Basic need satisfaction and identity formation: Bridging self-determination theory and process-oriented identity research. Journal of Counseling Psychology, 56(2), 276–288.
- Manuoğlu, E., & Uysal, A. (2020). Motivation for different Facebook activities and well-being: A daily experience sampling study. *Psychology of Popular Media*, 9(4), 456–464. https://doi.org/10.1037/ppm0000262
- Marciano, L., Ostroumova, M., Schulz, P. J., & Camerini, A. L. (2022). Digital media use and adolescents' mental health during the COVID-19 pandemic: A systematic review and meta-analysis. Frontiers in Public Health, 9, 9. https://doi.org/10.3389/fpubh.2021.793868
- Marengo, D., Montag, C., Sindermann, C., Elhai, J. D., & Settanni, M. (2021). Examining the links between active Facebook use, received likes, self-esteem and happiness: A study using objective social media data. *Telematics and Informatics*, 58, 101523. https://doi.org/10.1016/j.tele.2020.101523
- Marteau, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger state—Trait anxiety inventory (STAI). British Journal of Clinical Psychology, 31(3), 301–306. https://doi.org/10.1111/j.20448260.1992.tb00997.x
- Masur, P. K., Reinecke, L., Ziegele, M., & Quiring, O. (2014). The interplay of intrinsic need satisfaction and Facebook specific motives in explaining addictive behavior on Facebook. *Computers in Human Behavior*, 39, 376–386. https://doi.org/10.1016/j.chb.2014.05.047
- Meier, A., & Reinecke, L. (2020). Computer-mediated communication, social media, and mental health: A conceptual and empirical meta-review. Communication Research, 48(8), 1182–1209. https://doi.org/10.1177/0093650220958224
- Milyavskaya, M., Gingras, I., Mageau, G. A., Koestner, R., Gagnon, H., Jianqun Fang, C., & Boiché, J. (2009). Balance across contexts: Importance of balanced need satisfaction across various life domains. *Personality and Social Psychology Bulletin*, 35(8), 1031–1045. https://doi.org/10.1177/ 0146167209337036
- Nesi, J., & Prinstein, M. J. (2019). In search of likes: Longitudinal associations between adolescents' digital status seeking and health-risk behaviors. Journal of Clinical Child & Adolescent Psychology, 48(5), 740–748. https://doi.org/10.1080/15374416.2018.1437733
- Nesi, J., Telzer, E. H., & Prinstein, M. J. (2022). Handbook of adolescent digital media use and mental health. Cambridge University Press.
- Neuman, S. B. (1988). The displacement effect: Assessing the relation between television viewing and reading performance. *Reading Research Quarterly*, 23(4), 414. https://doi.org/10.2307/747641
- Nieto-Casado, F. J., Vansteenkiste, M., Brenning, K., Oliva, A., Rodríguez-Meirinhos, A., & Antolín-Suárez, L. (in press). Basic psychological needs and suicidal ideation: Testing an integrative model in referred and non-referred adolescents. *Current Psychology*.
- Odgers, C. L., & Jensen, M. R. (2020). Annual research review: Adolescent mental health in the digital age: Facts, fears, and future directions. *Journal of Child Psychology and Psychiatry*, 61(3), 336–348. https://doi.org/10.1111/jcpp.13190
- Orben, A. (2020). The sisyphean cycle of technology panics. Perspectives on Psychological Science, 15(5), 1143-1157. https://doi.org/10.1177/ 1745691620919372
- Parent, N. (2023). Basic need satisfaction through social media engagement: A developmental framework for understanding adolescent social media use. Human Development, 67, 1–17. https://doi.org/10.1159/000529449
- Parry, D. A., Davidson, B. I., Sewall, C. J. R., Fisher, J. T., Mieczkowski, H., & Quintana, D. S. (2021). A systematic review and meta-analysis of discrepancies between logged and self-reported digital media use. *Nature Human Behaviour*, 5(11), 1535–1547. https://doi.org/10.1038/s41562-021-01117-5
- Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. Psychological Assessment, 5(2), 164–172. https://doi.org/10.1037/1040-3590.5.2.164
- Van Petegem, S., Antonietti, J. P., Eira Nunes, C., Kins, E., & Soenens, B. (2020). The relationship between maternal overprotection, adolescent internalizing and externalizing problems, and psychological need frustration: A multi-informant study using response surface analysis. *Journal of Youth and Adolescence*, 49(1), 162–177. https://doi.org/10.1007/s10964-019-01126-8
- Popat, A., & Tarrant, C. (2022). Exploring adolescents' perspectives on social media and mental health and well-being—A qualitative literature review. Clinical Child Psychology and Psychiatry, 28(1), 323–337. https://doi.org/10.1177/13591045221092884
- Przybylski, A. K., Nguyen, T. T., Law, W., & Weinstein, N. (2021). Does taking a short break from social media have a positive effect on well-being? Evidence from three preregistered field experiments. Journal of Technology in Behavioral Science, 6, 507–514. https://doi.org/10.1007/s41347-020-00189-w
- Rigby, C. S. (2023). Flourishing in digital environments: The case for self-determination theory as a beneficial framework for individuals, industry, and society. In R. M. Ryan (Ed.), The Oxford handbook of self-determination theory (pp. 1001–1020). Oxford University Press.
- Rigby, S. C., & Ryan, R. M. (2011). Glued to games: How video games draw us in and hold us spellbound. Praeger/ABC-CLIO.

Rodríguez-Meirinhos, A., Antolín-Suárez, L., Brenning, K., Vansteenkiste, M., & Oliva, A. (2020). A bright and a dark path to adolescents' functioning: The role of need satisfaction and need frustration across gender, age, and socioeconomic status. *Journal of Happiness Studies*, 21(1), 95–116. https://doi.org/ 10.1007/s10902-01800072-9

Foundation for PSA-WILEY 19

Rousseeuw, P. J., Ruts, I., & Tukey, J. W. (1999). The bagplot: A bivariate boxplot. The American Statistician, 53(4), 382–387. https://doi.org/10.1080/ 00031305.1999.10474494

Ryan, R. M. (2023). The Oxford handbook of self-determination theory. Oxford University Press.

- Ryan, R. M., & Deci, E. L. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness. Guilford Press.
- Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, 65(3), 529–565. https://doi.org/10.1111/j.1467-6494.1997.tb00326.x
- Schaeffer, K. (2021). Most U.S. teens who use cellphones do it to pass time, connect with others, learn new things. Pew Research Center. https://www.pewresearch.org/facttank/2019/08/23/most-u-s-teens-who-use-cellphones-do-it-to-pass-time-connect-with_others-learn-new-things/
- Schneider, F. M., Lutz, S., Halfmann, A., Meier, A., & Reinecke, L. (2021). How and when do mobile media demands impact well-being? Explicating the integrative model of mobile media use and need experiences (IM3UNE). Mobile Media & Communication, 10(2), 251–271. https://doi.org/10.1177/ 20501579211054928
- Schneider, F. M., Zwillich, B., Bindl, M. J., Hopp, F. R., Reich, S., & Vorderer, P. (2017). Social media ostracism: The effects of being excluded online. Computers in Human Behavior, 73, 385–393. https://doi.org/10.1016/j.chb.2017.03.052
- Schokkenbroek, J. M., Hardyns, W., & Ponnet, K. (2022). Phubbed and curious: The relation between partner phubbing and electronic partner surveillance. Computers in Human Behavior, 137, 107425. https://doi.org/10.1016/j.chb.2022.107425
- Schreurs, L., & Vandenbosch, L. (2022). Should I post my very best self? The within-person reciprocal associations between social media literacy, positivitybiased behaviors and adolescents' self-esteem. *Telematics and Informatics*, 73, 101865. https://doi.org/10.1016/j.tele.2022.101865
- Schönbrodt, F. D., Humberg, S., & Nestler, S. (2018). Testing similarity effects with dyadic response surface analysis. *European Journal of Personality*, 32(6), 627–641. https://doi.org/10.1002/per.2169
- Sciensano. (2023). Belgium COVID-19 dashboard—Sciensano. Looker Studio. https://lookerstudio.google.com/embed/reporting/c14a5cfc-cab7-4812-848c0369173148ab/page/ZwmOB
- Scott, H., Biello, S. M., & Woods, H. C. (2019). Identifying drivers for bedtime social media use despite sleep costs: The adolescent perspective. Sleep Health, 5(6), 539–545. https://doi.org/10.1016/j.sleh.2019.07.006
- Scott, R. A., Stuart, J., & Barber, B. L. (2022). Connecting with close friends online: A qualitative analysis of young adults' perceptions of online and offline social interactions with friends. Computers in Human Behavior Reports, 7, 100217. https://doi.org/10.1016/j.chbr.2022.100217
- Shanock, L. R., Baran, B. E., Gentry, W. A., Pattison, S. C., & Heggestad, E. D. (2010). Polynomial regression with response surface analysis: A powerful approach for examining moderation and overcoming limitations of difference scores. *Journal of Business and Psychology*, 25(4), 543–554. https://doi. org/10.1007/s10869-010-9183-4
- Sheldon, K. M., Abad, N., & Hinsch, C. (2011). A two-process view of Facebook use and relatedness need-satisfaction: Disconnection drives use, and connection rewards it. *Journal of Personality and Social Psychology*, 100(4), 766–775. https://doi.org/10.1037/a0022407
- Shen, C. X., Liu, R. D., & Wang, D. (2013). Why are children attracted to the Internet? The role of need satisfaction perceived online and perceived in daily real life. Computers in Human Behavior, 29(1), 185–192. https://doi.org/10.1016/j.chb.2012.08.004
- Soenens, B., & Vansteenkiste, M. (2023). A lifespan perspective on the importance of the basic psychological needs for psychosocial development. In R. M. Ryan (Ed.), *The Oxford handbook of self-determination theory* (pp. 458–490). Oxford University Press.
- Soenens, B., Vansteenkiste, M., & Beyers, W. (2019). Parenting adolescents. In M. H. Bornstein (Ed.), Handbook of parenting (3rd ed., Vol. 1: Children and Parenting), Routledge.
- Stuart, J., O'Donnell, K., O'Donnell, A., Scott, R., & Barber, B. (2021). Online social connection as a buffer of health anxiety and isolation during COVID-19. Cyberpsychology, Behavior and Social Networking, 24(8), 521–525. https://doi.org/10.1089/cyber.2020.0645
- Subrahmanyam, K., Reich, S. M., Waechter, N., & Espinoza, G. (2008). Online and offline social networks: Use of social networking sites by emerging adults. Journal of Applied Developmental Psychology, 29(6), 420–433. https://doi.org/10.1016/j.appdev.2008.07.003
- Subrahmanyam, K., Smahel, D., & Greenfield, P. (2006). Connecting developmental constructions to the Internet: Identity presentation and sexual exploration in online teen chat rooms. Developmental Psychology, 42(3), 395–406. https://doi.org/10.1037/00121649.42.3.395
- Tandon, A., Dhir, A., Almugren, I., AlNemer, G. N., & Mäntymäki, M. (2021). Fear of missing out (FoMO) among social media users: A systematic literature review, synthesis and framework for future research. *Internet Research*, 31(3), 782–821. https://doi.org/10.1108/intr-11-2019-0455
- Taylor, S. H., Zhao, P., & Bazarova, N. N. (2022). Social media and close relationships: A puzzle of connection and disconnection. *Current Opinion in Psychology*, 45, 101292. https://doi.org/10.1016/j.copsyc.2021.12.004
- Throuvala, M. A., Griffiths, M. D., Rennoldson, M., & Kuss, D. J. (2019). Motivational processes and dysfunctional mechanisms of social media use among adolescents: A qualitative focus group study. *Computers in Human Behavior*, 93, 164–175. https://doi.org/10.1016/j.chb.2018.12.012
- Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 well-being index: A systematic review of the literature. *Psychotherapy and Psychosomatics*, 84(3), 167–176.
- Twenge, J. M., Spitzberg, B. H., & Campbell, W. K. (2019). Less in-person social interaction with peers among U.S. adolescents in the 21st century and links to loneliness. *Journal of Social and Personal Relationships*, 36(6), 1892–1913. https://doi.org/10.1177/0265407519836170
- Valkenburg, P. M., Meier, A., & Beyens, I. (2022). Social media use and its impact on adolescent mental health: An umbrella review of the evidence. Current Opinion in Psychology, 44, 58–68. https://doi.org/10.1016/j.copsyc.2021.08.017
- Valkenburg, P. M., Pouwels, J. L., Beyens, I., Van Driel, I. I., & Keijsers, L. (2021). Adolescents' social media experiences and their self-esteem: A personspecific susceptibility perspective. *Technology, Mind, and Behavior*, 2(2). https://doi.org/10.1037/tmb0000037
- Vandenkerckhove, B., Soenens, B., Van Der Kaap-Deeder, J., Brenning, K., Luyten, P., & Vansteenkiste, M. (2019). The role of weekly need-based experiences and self-criticism in predicting weekly academic (mal)adjustment. *Learning and Individual Differences*, 69, 69–83. https://doi.org/10.1016/j. lindif.2018.11.009
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. Journal of Psychotherapy Integration, 23(3), 263–280. https://doi.org/10.1037/a0032359
- Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion*, 44(1), 1–31. https://doi.org/10.1007/s11031-019-09818-1
- Vansteenkiste, M., Soensens, B., & Ryan, R. M. (2023). Basic psychological needs theory: A conceptual and empirical review of key criteria. In R. M. Ryan (Ed.), The Oxford handbook of self-determination theory (pp. 85–123). Oxford University Press.

- Verduyn, P., Ybarra, O., Résibois, M., Jonides, J., & Kross, E. (2017). Do social network sites enhance or undermine subjective well-being? A critical review. Social Issues and Policy Review, 11(1), 274–302. https://doi.org/10.1111/sipr.12033
- Vermote, B., Waterschoot, J., Morbée, S., Van Der Kaap-Deeder, J., Schrooyen, C., Soenens, B., Ryan, R. M., & Vansteenkiste, M. (2021). Do psychological needs play a role in times of uncertainty? Associations with well-Being during the COVID-19 crisis. *Journal of Happiness Studies*, 23(1), 257–283. https://doi.org/10.1007/s10902-021-00398-x
- Véronneau, M. H., Koestner, R. F., & Abela, J. R. Z. (2005). Intrinsic need satisfaction and well being in children and adolescents: An application of the self-determination theory. *Journal of Social and Clinical Psychology*, 24(2), 280–292.
- Vuorre, M., Orben, A., & Przybylski, A. K. (2021). There is no evidence that associations between adolescents' digital technology engagement and mental health problems have increased. *Clinical Psychological Science*, 9(5), 823–835. https://doi.org/10.1177/2167702621994549
- Walther, J. B. (2022). Social media and online hate. Current Opinion in Psychology, 45, 101298. https://doi.org/10.1016/j.copsyc.2021.12.010
- Wang, L., Tao, T., Fan, C., & Gao, W. (2015). Does psychological need satisfaction perceived online enhance well-being? *PsyCh Journal*, 4(3), 146–154. https://doi.org/10.1002/pchj.98
- Watson, D., O'Hara, M. W., Simms, L. J., Kotov, R., Chmielewski, M., McDade-Montez, E. A., Gamez, W., & Stuart, S. (2007). Development and validation of the inventory of depression and anxiety symptoms (IDAS). *Psychological Assessment*, 19(3), 253–268. https://doi.org/10.1037/1040-3590.19.3.253
- West, M., Rice, S., & Vella-Brodrick, D. (2023). Mid-adolescents' social media use: Supporting and suppressing autonomy. *Journal of Adolescent Research*, 074355842311684. https://doi.org/10.1177/07435584231168402
- Xu, X. P., Liu, Q. Q., Li, Z. H., & Yang, W. X. (2022). The mediating role of loneliness and the moderating role of gender between peer phubbing and adolescent mobile social media addiction. *International Journal of Environmental Research and Public Health*, 19(16), 10176. https://doi.org/10.3390/ ijerph191610176

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Van de Casteele, M., Flamant, N., Ponnet, K., Soenens, B., Van Hees, V., & Vansteenkiste, M. (2023). Adolescents' mental health in the social-media era: The role of offline and online need-based experiences. *Journal of Adolescence*, 1–20. https://doi.org/10.1002/jad.12286