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COMPULSION FOR CONNECTION

Exploring Problematic Social Media Use

Eetu Marttila

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ABSTRACT

Problematic social media use (PSMU) is characterized by compulsive and out of control use of social media platforms. PSMU is increasingly recognized as a significant issue with potential negative impacts on mental well-being and vulnerability to online harm. However, the current understanding of why certain individuals develop problematic use while others do not is limited, highlighting the need for further research to explore the social and behavioral factors that contribute to this issue.

This dissertation draws on a broad range of social scientific theories, such as theories on social belonging, the social identity theory, theories on loneliness and digital technologies, and crime opportunity theories, and it provides a comprehensive outlook on the development and outcomes of PSMU. The central aim of the research was to understand how the social needs and desire for connection—specifically, feelings of loneliness and identity-driven social media use—drive individuals toward PSMU.

The dissertation presents four research articles, each offering a unique perspective on PSMU. The articles were based on two longitudinal datasets collected in Finland in 2017–2020 and 2021–2023. The data were analyzed using statistical methods for panel data analysis. The results highlight that PSMU negatively impacts subjective wellbeing, with loneliness playing a mediating role. In addition, problematic use increases the risk of cybervictimization, and routinized online activities mediate this effect. Furthermore, identity-driven social media use significantly contributes to the development of PSMU, and individuals motivated by self-expression and social validation are more prone to problematic use. Finally, a reciprocal and dynamic relationship between PSMU and loneliness was identified.

This dissertation argues that PSMU is driven by unmet social needs, particularly the desire for social connection and identity validation. The research contributes to the growing body of literature on unhealthy online behaviors by identifying the drivers and consequences of excessive social media use. The results may help to recognize those who are at risk of becoming problematic users and to understand how problematic use can undermine their quality of life.

KEYWORDS: social media, problematic social media use, subjective well-being, cybercrime victimization, loneliness, social identity

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TIIVISTELMÄ

Sosiaalisen median ongelmakäytöllä viitataan pakonomaiseen ja hallitsemattomaan sosiaalisen median alustojen käyttöön. Aiempi tutkimus on osoittanut positiivisen yhteyden sosiaalisen median ongelmakäytön ja psykososiaalisten ongelmien välillä. Sosiaalisen median ongelmakäyttöön altistavia riskitekijöitä ja ongelmakäytön seurauksia ymmärretään kuitenkin edelleen verrattain heikosti.

Väitöskirjan tavoite on ymmärtää sosiaalisen median ongelmakäyttöä ennustavia tekijöitä sekä sen seurauksia. Tutkimuksessa sovelletaan teorioita ryhmiin kuulumisesta, sosiaalisen identiteetin teoriaa, yksinäisyyttä selittäviä teorioita ja rikollisuuden rutiiniaktiviteettiteorioita. Tutkimuksen pyrkii vastaamaan siihen, miten sosiaaliset tarpeet, kuten ryhmään kuulumisen ja sosiaalisen vuorovaikutuksen tarve selittävät ongelmakäyttöä ja sen seurauksia. Erityistä huomiota kiinnitetään identiteettiperustaiseen sosiaalisen median käyttöön ja yksinäisyyteen.

Väitöskirja koostuu neljästä empiirisestä artikkelista, jotka perustuvat Suomessa vuosina 2017–2020 ja 2021–2023 kerättyihin pitkittäistutkimusaineistoihin. Analyysissä hyödynnettiin pitkittäisaineistoille sopivia tilastotieteellisiä menetelmiä. Tulosten mukaan ongelmakäyttö on yhteydessä alentuneeseen elämääntyytyväisyyteen, jota selittää koettu yksinäisyys. Lisäksi ongelmakäyttö lisää verkkorikosten uhriksi joutumisen riskiä, mitä selittävät verkkoympäristössä tapahtuvan sosiaalisen vuorovaikutuksen tavat. Identiteettiperustainen sosiaalisen median käyttö lisäsi ongelmakäyttöä yli ajan, ja etenkin silloin kun pyrkimyksenä oli esittää itsestä mahdollisimman positiivinen kuva muille käyttäjille. Viimeisessä tutkimuksessa osoitettiin, että yksinäisyydellä ja ongelmakäytöllä on vastavuoroinen ja toisiaan vahvista yhteys.

Tutkimuksen keskeinen väite on, että ihmisten ryhmään kuulumisen tarve ja sosiaalisen median alustoilla tapahtuvasta vuorovaikutuksesta saatavat positiiviset kokemukset selittävät monin tavoin sekä ongelmakäytön kehittymistä että ongelmakäytön negatiivisia seurauksia. Tutkimusten tulosten perusteella voidaan tunnistaa yksilöitä, joiden ongelmakäytön riski on kohonnut, ja ymmärtää miten ja miksi ongelmakäyttö voi olla yhteydessä heikompaan hyvinvointiin.

ASIASANAT: sosiaalinen media, sosiaalisen median ongelmakäyttö, hyvinvointi, verkkorikollisuus, yksinäisyys, sosiaalinen identiteetti

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This thesis deals with the problematic use of social media. My personal problem lately has been this thesis. The problem is now solved and I no longer suffer from problematic use (of word processor). I am grateful to everyone who was involved in solving this problem.

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Thank you, Aurora. Thank you for your love, thank you for your kindness, and thank you for your presence. Thank you for walking this path with me. You know which path I am talking about.

Helsinki, October 2024
Eetu Marttila

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List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

I Marttila, E., Koivula, A., & Räsänen, P. (2021). Does excessive social media use decrease subjective well-being? A longitudinal analysis of the relationship between problematic use, loneliness and life satisfaction. *Telematics and Informatics*, *59*, Article 101556.

II Marttila, E., Koivula, A., & Räsänen, P. (2021). Cybercrime victimization and problematic social media use: Findings from a nationally representative panel study. *American Journal of Criminal Justice*, *46*(6), 862–881.

III Marttila, E., Koivula, A., & Räsänen, P. (2024). Identification with online networks, problematic social media use, and the moderating role of self-presentation: A longitudinal study [Manuscript submitted for publication].

IV Marttila, E., Koivula, A., Savolainen, I., Sirola, A., & Oksanen, A. (2024). The dynamic and reciprocal relationship between problematic internet use and loneliness: A longitudinal study [Manuscript submitted for publication].

1 Introduction

social media is
social media is toxic
social media is fake
social media is dying
social media is bad for you
social media is a plague
social media is cancer
social media is isolation
social media is making me anxious
social media is not reality

—Google Search (March 22, 2024)

Is social media making us miserable and doomed? Based on my Google Search's autocompleted suggestions, it certainly seems so. Of course, a clever reader can point out that these predictions are influenced not only by search phrases that are popular among other Google users but also by my search history and online activities (Graham, 2023). Considering that the subject of this study is excessive social media use, Google's search algorithm has probably figured out that I am interested in the darker side of social media use, and the suggestions' pessimistic tone is expected. However, the pessimistic view of social media's influence on individuals' well-being and society at large goes far beyond my petty (re)search habits. Within the past two decades, an endless number of gloomy articles, essays, and books have been written on social media's negative effects, and the sentiment toward digital technologies has turned quite bleak.

The public's attitudes toward emerging technologies are often packed with great expectations but also with great pessimism. This is a recurring theme throughout history, and every new media technology—from the printing press to newspapers, radio, movies, television, and video games—have been met with high hopes of advancing society and addressing societal challenges, as well as fears of moral degradation and potential damage to the social fabric (Bayer et al., 2020). With regard to online digital technologies, attitudes have swung from one extreme to another, oscillating between boundless optimism and profound moral panic. For

example, although the Internet was initially greeted with optimism about the possibilities for connection, information sharing, and the new ways of thinking that it facilitated, the potentially negative effects of its use, such as reduced social activities and decreased psychological well-being, were already being debated in the late 1990s (e.g., Kraut et al., 1998). Over the past two decades, there has been a particular focus on the impact of social media and smartphones, and research on the social and psychological consequences of social media use continues to grow.

Currently, evidence of the effects of social media use is mixed and often contradictory (Valkenburg, 2022). In the popular scientific literature, alarms have been raised that social media and smartphones are particularly dangerous for adolescents, who are no longer able to learn essential social skills and are becoming more anxious, depressed, and lonely than previous generations (e.g., Haidt, 2024; Twenge, 2017). In a similar vein, research has associated social media use with a long list of negative consequences, ranging from exposure to harmful or hateful content (e.g., Hawdon et al., 2015; Räsänen et al., 2016), cybercrime victimization (e.g., Milani et al., 2022), body image issues (e.g., de Valle et al., 2021), and political polarization (e.g., Brady et al., 2017, 2020) to mood disorders and decreased well-being (e.g., Valkenburg, 2022). On the other hand, social media use has been associated with multiple positive outcomes, and individuals are using social media to maintain their existing social networks and to create new connections (e.g., Ellison et al., 2014), to satisfy their need to belong (e.g., Oldemburgo de Mello, 2024), to receive social support (e.g., Meshi & Ellithorpe, 2021; Tang et al., 2016), and to experiment with various identities (e.g., Keipi et al., 2016).

In discussions about the positive and negative effects of social media, the issue of its overuse or social media addiction is frequently raised in public debates and popular science literature (e.g., Lembke, 2021). Today, it is common knowledge that social media platforms are competing for user's attention and aim to keep individuals engaged, and it is not rare to hear someone describe themselves as "being addicted to social media." The idea that one can become addicted to the Internet also has a rather long history, as it was first introduced in the late 1990s and early 2000s (e.g., Caplan, 2003; Young, 1998), and the addictive nature of online technologies has generated a significant amount of controversy ever since. Research in the past decades has confirmed that certain individuals may use social media in a compulsive manner, which damages their social relationships and well-being (Griffiths, 2017), and that although non-compulsive social media use can be beneficial, the consequences of excessive use are described as negative and more severe (Moretta et al., 2022). For example, those who have a tendency toward excessive use are less satisfied with their lives and are likelier to be depressed or anxious (e.g., Cunningham et al., 2021; Shannon et al., 2020; Wu et al., 2024b; Yigiter et al., 2023). Estimates of the prevalence of excessive use depend on how problem use is

operationalized and measured, ranging from 5% to 25% in different populations (Cheng et al., 2022). In this dissertation, I adopt the term *problematic social media use* (PSMU) to assess the excessive and uncontrolled use of social media platforms (e.g., Varona et al., 2022).

Despite the rising interest in PSMU, there is no consensus over why some individuals create maladaptive usage styles whereas others do not (Sun & Zhang, 2021). In everyday discussions about the addictive nature of social media, emphasis is often placed on technological elements of social media platforms, such as algorithms, likes, notifications, and infinite scrolling. These features are designed to increase user engagement and make social media use as pleasurable and rewarding as possible (e.g., Holte et al., 2023; Montag, 2019). The important point here, however, is that these technical features are thoroughly social, as they tap into basic human needs for social connection, validation, and belonging (Bayer et al., 2020). Individuals might use social media to alleviate boredom and seek information, but another primary motivation is to create new social connections, keep up with existing ones, and gain social rewards (e.g., Ellison et al., 2014; Lindström et al., 2021; Stockdale & Coyne, 2020). Therefore, it is important to understand how these essential needs and the motivation to satisfy them are associated with PSMU.

In this dissertation, I aim to explore both the development and consequences of PSMU. Drawing on a wide range of social scientific literature—that includes theories on social belonging (Baumeister & Leary, 1995), social identity theory (SIT; Tajfel & Turner, 2004), loneliness and digital technologies (Nowland et al., 2018; O'Day & Heimberg, 2021), and crime opportunity (Leukfeldt & Yar, 2016)—the dissertation consists of four research articles that each provide a unique but complementary perspective on PSMU. The overarching objective is to examine how social needs and the aim of satisfying them relate to PSMU. First, the dissertation examines the effects of PSMU on subjective well-being and cybercrime victimization. Additionally, it explores whether these effects are indirect through loneliness and social interactions on social media platforms. This is reflected in the first research question:

1. How is PSMU associated with life satisfaction and cybervictimization?

Second, the dissertation explores how the search for social connection and the drive to satisfy social needs contribute to the development of PSMU. Additionally, it examines how the same social processes that lead to PSMU may be reinforced by it, creating a cycle of compulsive behavior. These aims are reflected in the second and third research questions:

2. How does identity-driven social media use contribute to the development of PSMU?
3. How is loneliness associated with PSMU?

To answer these questions, the dissertation utilizes two longitudinal datasets that were collected in Finland in 2017–2020 and 2021–2023. In **Article I,** we investigated how PSMU affects life satisfaction and whether this effect is mediated by loneliness. In **Article II**, we explored how PSMU increases the risk of cybervictimization and considered routinized online social interactions as potential mediators. In **Article III**, we examined the contribution of identity-driven social media use to the development of PSMU, with a focus on how individuals' perceptions of their social media behaviors influence this relationship. In **Article IV**, we presented a problematic use–loneliness model to explore the dynamic, reciprocal relationship between PSMU and loneliness over time. In all articles, statistical methods for cross-sectional and panel data analysis were applied to explore both the development of PSMU and its consequences.

The research suggests that the fundamental need to belong and social rewards derived from online interactions are key to understanding the development and consequences of PSMU. First, the results show that the negative outcomes of PSMU are indirect, so that a decrease in life satisfaction is an indirect outcome of loneliness. Also, an increase in cybervictimization is mediated by routinized online social interaction patterns. Second, strong identification with online social networks and the rewards obtained from them increases the risk of overuse. Third, those who are lonely may use social media excessively to satisfy their fundamental need to belong. Furthermore, the results show a reciprocal relationship between loneliness and PSMU over time. The compulsion for social connection evolves into a compulsion to engage with social media, ultimately reinforcing loneliness and intensifying the unmet need for connection.

The dissertation is arranged as follows. Chapter 2 provides a broader context for the study, discusses the rise of social media platforms, and explores what is currently known about the relationship between social media and well-being. Chapter 3 defines the concept of PSMU, presents earlier findings on the consequences of PSMU, and describes how the need to belong and to connect are important social processes that may explain the development of PSMU. Also, the reciprocal dynamics between PSMU and these processes are discussed. Chapter 4 provides the aims of the research, presents data, measures, and statistical methods, and discusses research ethics. Chapter 5 provides a summary of the articles' most important findings. Chapter 6 then discusses these findings in more depth. Chapter 7 provides a conclusion for the study.

2 Contextualizing Social Media Use

2.1 Social media platforms

Over the past few decades, digital information and communication technologies have transformed various aspects of daily life, including work, education, and social interactions. The Advanced Research Projects Agency Network (ARPANET), the modern Internet's predecessor, was created in the late 1960s by government officials for sharing information over long distances, but its messaging abilities were quickly adapted for more informal use as a means for social interactions between users (Hafner & Lyon, 2003). The early text-based interactions in the 1970s laid the groundwork for the current digital culture, and as bulletin board systems, online forums, message boards, and other modern Internet technologies were developed in the 1980s and 1990s, the possibility of digitally mediated social interaction reached the masses (Ryan, 2010). The latest major paradigm shift was the development of the first social networking services in the late 1990s and early 2000s (boyd & Ellison, 2007), which together with the advent of smartphones revolutionized the ways people interact with each other over the Internet.

As Turner (2006) described in his history on the digital revolution, the early years of the Internet were characterized by the ideology of decentralization, freedom, and flattening social hierarchies. During this early period, academics, activists, and investors alike believed that the new digital technologies would propel humankind toward a prosperous and harmonious era, which would make the old institutions obsolete. As the Internet became more mainstream during the early 1990s, the early ethos of openness and decentralization clashed with, but also merged into, the principles of the new economy and networked information society. From the mid to late 1990s, billions in venture capital were invested in the technological sector and startups in the US, creating the so-called dot-com boom (Srnicek, 2017), which was driven by new companies that either took control of existing markets (i.e., Amazon and e-commerce) or created entirely novel markets (i.e., Google and search engines) (Vallas & Schor, 2020).

The digital transformation of the economy continued in the early 2000s with the so-called social Internet, and new interactive technologies, such as blogs, social networking sites, and video-sharing sites, were introduced (van Dijck, 2013). During

this phase, digital platforms emerged as a new technological paradigm that began to transform both social and economic interactions (Poell et al., 2019). Digital platforms are typically defined as *programmable digital architectures* that organize social and economic relations among individuals, organizations, companies, and public institutions (Lehdonvirta, 2022; van Dijck et al., 2018). However, the current digital infrastructure is increasingly concentrated in the hands of a few major technology companies, such as Alphabet, Amazon, Apple, Meta, and Microsoft (Poell et al., 2019), which gives the platforms enormous power and ability to regulate social and economic interactions (Lehdonvirta, 2022). Together, these companies form a whole *platform ecosystem*—a networked digital infrastructure that organizes the flow of data and provides backend technology on which other services and platforms are developed (van Dijck et al., 2018). In the context of this research, social media is understood as a part of this large ecosystem of digital platforms, which has transcended its digital limits and is challenging governments and old institutions with its disruptions of the ways we work, consume, and interact.

Digital technologies are subject to constant change and evolution, and the popularity of various services' may rise and fall within a brief period. Consequently, researchers have struggled with providing a clear definition of the concept of social media (Fox & McEwan, 2019). By adapting a popular conceptualization by Carr and Hayes (2015), I define social media as Internet platforms that allow users to interact, share, and present themselves to broad and specific audiences. Furthermore, the *value* of social media platforms comes from the content that users produce and distribute and from the sense of community and connection made with other users. Here, value means simply why users perceive these services as valuable, useful, or relevant to them (Carr & Haeys, 2015). However, the *economic value* that social media platforms produce is also based on user interactions and user-produced content.

Digital platforms can have various sources of revenue, such as user subscriptions and sale of digital goods and services, but the collection and monetization of user data is a major source of revenue in the current platform economy (van Dijck et al., 2018). Social media platforms are typically free to use, and user-generated content and behavioral and profiling data are essential for platforms' value creation (van Dijck, 2013). The platforms use data collected from user behaviors to provide targeted advertisements, and advertisers pay platforms based on these advertisements (Vallas & Schor, 2020). For example, Meta, the owner of Facebook and Instagram, receives most of its revenue from targeted advertising (Meta Platforms Inc., 2024). Because digital platforms' business models are dependent on user data and user-created content, the platforms are incentivized to keep users engaged and get them to spend as much time on platforms as possible (Bhargava & Velasquez, 2021). This is a challenging task in a digital environment, where

information is abundant and possibilities for entertainment are limitless, but at the same time, human have only limited capabilities for prolonged attention (Davenport & Beck, 2001; Goldhaber, 1997).

2.2 Social interactions on social media

Social media companies have developed several technologies to compete for users' attention and keep users engaged with their services. For example, infinite scrolling technologies aim to keep users immersed by providing endless feeds of algorithmically curated content (Montag & Elhai, 2023; Montag et al., 2019), and smartphones and social media apps use appealing user interface designs with bright and saturated colors, which are pleasurable and stimulating and can create the urge to keep engaging with the technology (Holte & Ferraro, 2023; Holte et al., 2023). Even though it is undeniable that these designs are successful in making social media use more appealing and rewarding, from the user's point of view, one of the main motives to use social media platforms is the possibility of satisfying the basic human needs for social interaction and belonging (Bayer et al., 2020).

Social media is used to enhance already existing, strong ties and relationships with family and friends but also to form weaker ties and new connections within one's wider social network (e.g., Ellison et al., 2014). It has been well documented that people have a strong tendency to form social ties with people who are similar to them in all areas of life (McPherson et al., 2001). The same homophily principle applies to online environments, where people form groups around shared interests, lifestyles, and belief systems (e.g., Dehghani et al., 2016; Kaakinen et al., 2020; Miller et al., 2021). Strong identification with these groups can foster a sense of belonging but can also increase political polarization and moral outrage (e.g., Oldemburgo de Mello, 2024; Van Bavel et al., 2021). Research has also shown that users are likelier to engage with polarized content that evokes strong emotions, and social media platforms' content algorithms consistently expose users to information with which they are more likely to engage (e.g., Brady et al., 2017, 2020). This creates a cycle in which algorithms feed individuals with information that reinforces their group-related identities and their sense of belonging to the group. As a consequence, users are also more likely to spend more time on the platforms creating, sharing, and interacting with this stimulating content.

Social interactions on these platforms can take multiple forms. Most social media platforms provide people with the opportunity to comment on each other's updates and send messages to other users (Bayer et al., 2020). In addition, social media platforms typically offer paralinguistic digital affordances (PDAs) to make interactions easy to engage with and as rewarding as possible (Hayes et al., 2016). Notable examples of PDAs are likes (on Instagram and Facebook), favorites (on X),

and upvotes (on Reddit). These metrics provide users with valuable information about their position in a digital network of individuals and about the amount of attention they receive from their peers. Individuals can find social interactions quantified with PDAs very rewarding, which keeps them coming back and participating in the interactions (Lindström et al., 2021). Interactions with other group members who are perceived as similar enforce the feeling of belonging (Figeac & Farve, 2021), and the interactions are often reciprocal, so users may feel morally obligated to react (give a like, upvote, etc.) to their close networks' content (Xu et al., 2020). Both actions are rewarded with likes, comments, and other social rewards, which keep individuals engaged in the reciprocal communication dynamics of the platforms and the group-related activities' reciprocal communication dynamics.

Additionally, social media provides a platform for various self-presentational strategies and identity-based experiments (e.g., Bareket-Bojmel et al., 2016; Keipi et al., 2016). For example, social media platforms typically let users have their profiles, which can consist of pictures, status updates, and other content that others can view and interact with (Bayer et al., 2020). Because a group-based identity can overcome one's self-identity, individuals can feel obligated to curate their identities to conform to the group's norms and to seek validation from the group (Terry et al., 1999). Individuals' behavior on social media is also related to their need to maintain their status in the group with which they identify (e.g., Brady et al., 2020). For example, one can feel obligated to post or share content on social or political issues to strengthen ties with in-group members or to distinguish oneself from the out-group, which can lead to updating one's profile and aiming to curate as perfect an online self-presentation as possible.

2.3 Social media and well-being

Considering that social media technologies are developed to be as persuasive as possible and that social relationships are maintained and built on social media platforms, it is no surprise that people also spend a lot of time on social media. According to nationally representative data collected by Statistics Finland in 2023, 60% of Finns from the ages of 16 to 89 have used social media services daily or almost daily (Official Statistics of Finland, 2024a).

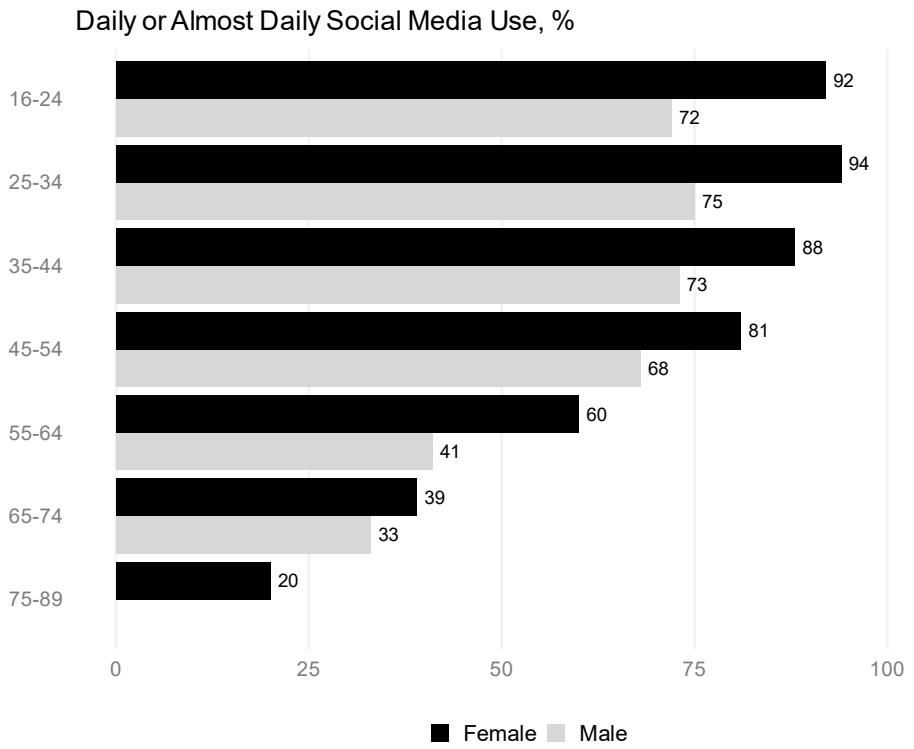

Fig. 1. Daily or almost daily use of social media services (%) among Finnish males and females by age group and gender (2023). *Note:* No data available for males aged 75–89. (Official Statistics of Finland, 2024a)

Fig. 1. represents daily or almost daily use categorized by age group and gender. As shown, there are considerable differences in social media use between different age groups and genders. For example, over 80% of females from 16 to 44 years of age use social media services almost daily, whereas only 33% of males from 65 to 74 years of age use these services daily. Consistent with the observations from other countries, Finnish females are more active on social media than males in all age groups, and young women are most active on social media, with the number of daily users exceeding 90% in those from 16 to 34.

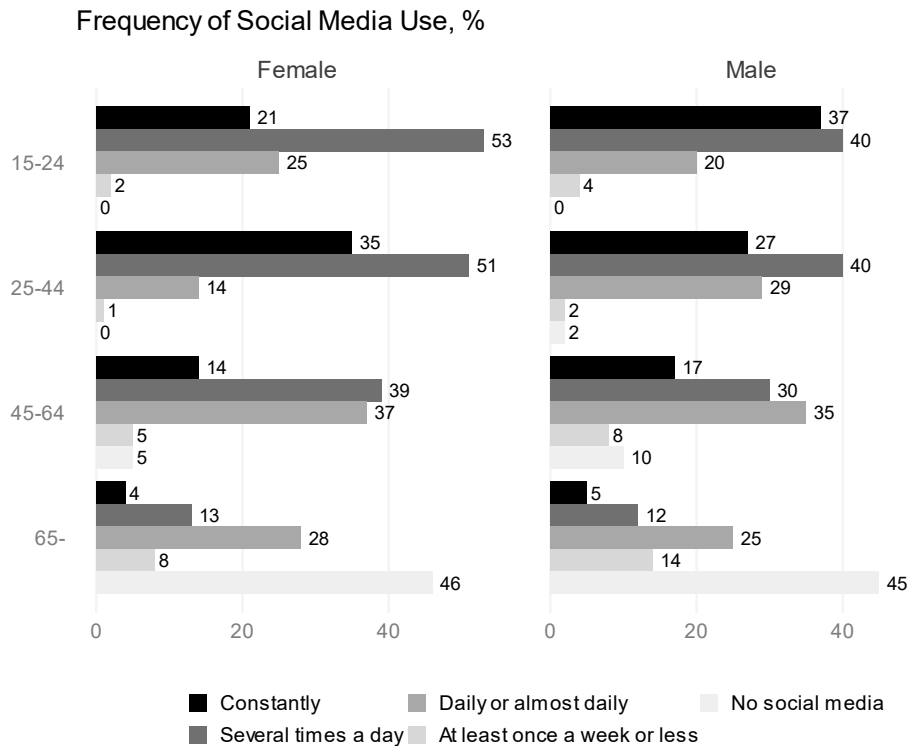

Fig. 2. Frequency of social media use (%) among Finnish males and females by age group and gender. Categories include constant use, daily or almost daily use, several times a day, use at least once a week or less, and no social media use (2021). (Official Statistics of Finland, 2024b)

Fig. 2 provides a more detailed look on how often the Finns use their social media services (Official Statistics of Finland, 2024b). Here too, the younger age cohorts and females generally use social media more actively, with the 15–24-old males being an exception, while most of under 44-year-old Finns regardless of gender are quite active social media users. For example, 35% of 25- to 44-year-old females and 27% of 25- to 44-year-old males reported using social media "constantly," and even larger proportions of under 44-year-olds used social media several times a day. On the other hand, almost half of those over 65 reported that they did not use social media at all.

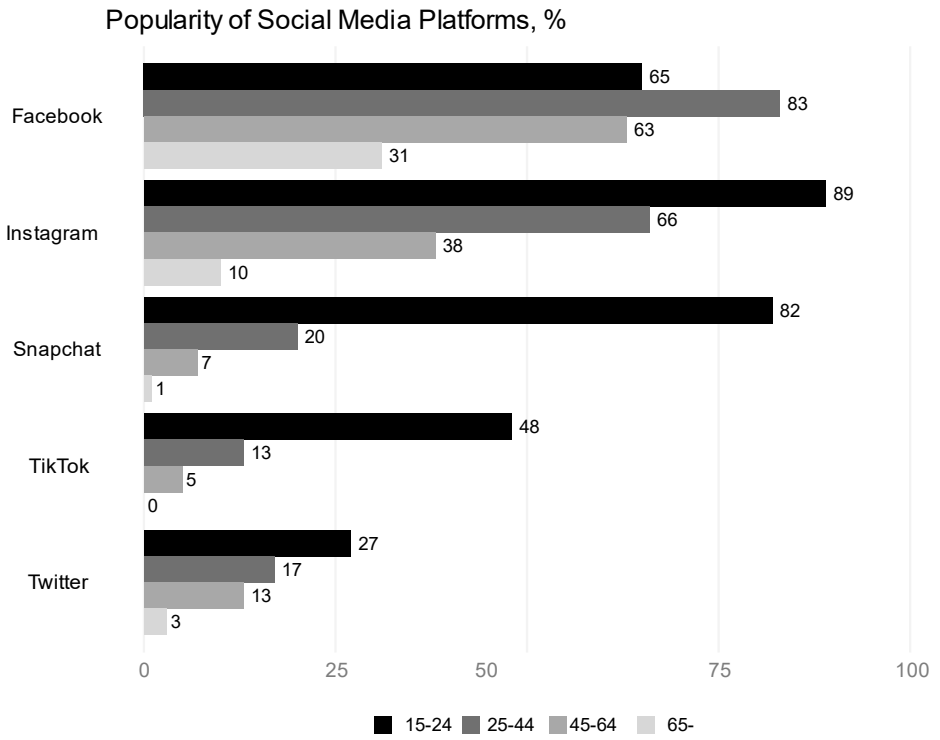

Fig. 3. Popularity of social media platforms (%) among different age groups in Finland. Platforms include Facebook, Instagram, Snapchat, TikTok, and Twitter, with usage percentages shown for four age groups: 15–24, 25–44, 45–64, and over 65 (2021). (Official Statistics of Finland, 2024b)

There are also stark differences between age groups in the popularity of different social media platforms (Official Statistics of Finland, 2024b). As visualized in Fig. 3, Facebook and Instagram were the most popular platforms across all age groups, but both Snapchat and TikTok were quite popular among adolescents and younger adults. This further illustrates the differences in social media use between different age groups. We should also note that the data is from 2021, and that the popularity of platforms can change quite a lot over short periods of time.

At a general level, these figures show us that a large proportion of Finns use social media very actively, which raises the question of how this usage affects their health and well-being. The negative effects of social media use on psychological and social well-being have been widely discussed in the public sphere, often with quite alarmist tones (e.g., Haidt, 2024; Twenge, 2017, 2020). Research on the relationship between social media use and well-being has produced mixed results, and the exact relationship between social media and well-being remains disputed. In general, the current evidence suggests a negative yet small effect of social media use on psychological well-being (e.g., Appel et al., 2020; Hancock et al., 2022; Meier &

Reinecke, 2020; Orben, 2020), but others have reported insignificant or even positive associations (Valkenburg, 2022). Research on the effects of social media has no established theoretical or methodological base, which is reflected in the variety of theoretical and methodological choices. For example, studies on social media use lump together indicators of well-being and ill-being, which can provide one explanation for earlier reviews' inconsistent results (Valkenburg, 2022). When looked at separately, however, the relationship between well-being indicators and social media use is stronger. For example, Hancock et al. (2022) found that social media use was positively associated with anxiety, depression, and social well-being.

The positive effects of social media use are typically explained by increased social capital and connections, particularly if these ties are reinforced between individuals who also know each other in an offline context (see Liu et al., 2016). This is reflected in how abstaining from social media use could decrease feelings of connectedness and bonding social capital and lead to decreased well-being (Mitev et al., 2021). However, even though social media use can foster a sense of belonging and strengthen social ties, researchers have also suggested that digital technologies in general, and social media use in particular, might create feelings of social isolation and loneliness. In recent decades, loneliness has started to be seen as a major health issue across the world (e.g., Hawkley & Cacioppo, 2010). Young adults in particular have been seen to be at risk of experiencing loneliness, and the rates have been increasing over the past 40 years (Buecker et al., 2021). Accordingly, it has been suggested that although digital technologies can increase opportunities for communication, digital connections are superficial and do not satisfy the need to belong, thereby possibly increasing feelings of loneliness (e.g., Nowland et al., 2018; O'Day & Heimber, 2021). On the other hand, it has been suggested that lonely people are prone to use social media platforms (e.g., Oldemburgo de Mello et al., 2024), and this relationship's directionality remains not well understood and might be reciprocal (Zhang et al., 2024).

Another important aspect of the discussion on the effects of social media use is that its effects are not uniform across populations or socioeconomic groups (e.g., Hancock et al., 2022). Consequently, critics have argued that the research on social media and well-being has been blind to digital inequalities inherent in digital practices (e.g., Büchi & Hargittai, 2022). For example, several studies have shown that those who overuse the Internet and social media are at a particular risk of experiencing negative outcomes of social media use (see Huang, 2022). The discussion on the excessive use of digital technologies and their effect on particular risk groups is hardly new, and the possibility for technological addictions has been discussed in various contexts. For example, the question of excessive Internet use was introduced in the 1990s, and young adults and students were considered at particular risk of developing addictive symptoms regarding the Internet (Widyanto

& Griffiths, 2005) and other mediums, such as online gaming (Kuss & Griffiths, 2012). With the development and success of social media platforms, much of this attention has turned toward the excessive use of social media platforms and services (Griffiths, 2013). In addition, the question of the addictive nature of social media platforms is often brought up in the public discourse on the possible negative effects of social media use. Some researchers have warned that discourse surrounding social media addiction may create a risk of categorization of otherwise ordinary behaviors as pathological and problematic (e.g., Hancock et al., 2022). At the same time, others have argued that there is an urgent need for a better understanding of how intensive or excessive use is affecting this population of users (e.g., Boer et al., 2022a; Valkenburg, 2022). The following chapter will provide a more detailed analysis of the concept of PSMU.

3 Understanding Problematic Social Media Use

3.1 The concept of PSMU

Public debate on the dangers of social media use often includes the term *social media addiction* to refer to the excessive use of social media that people say they experience. In the research literature, there has been theoretical and methodological debate over the nature of the overuse of social media, and there is no consensus over what social media addiction is or how it should be measured. For example, the literature includes terms such as *social media addiction*, *compulsive social media use*, and *problematic social media use* interchangeably, and there is no single, commonly accepted concept for assessing social media addiction (see Moretta et al., 2022; Sun & Zhang, 2021). Despite these contradictions, all these terms refer to individuals' tendency to use social media in a way that is out of control and therefore affects their psychological and social well-being in a negative manner (Sun & Zhang, 2021).

In addition, the question of whether social media addiction is different from general Internet addiction or smartphone addiction has been debated (Marino et al., 2021). For example, certain online behaviors, such as online gaming, are closely related to addiction to the Internet but are still considered a distinct phenomenon (Montag et al., 2021). However, general Internet addiction and social media addiction are strongly correlated with each other (Hawi & Samaha, 2021; Montag et al., 2015), which is expected because the current platform ecology binds various services into the same network. In this dissertation, I refer to theories and empirical evidence that are sometimes based on empirical studies on slightly different technologies or online activities. Because general Internet addiction and PSMU correlate highly and describe similar habitual patterns, I argue it is not meaningful to make a strong distinction between the points of evidence regardless of whether the object of the study is, for example, Internet addiction, smart phone addiction, or social media addiction.

Another debate in the research is the question of whether PSMU should be considered a disorder similar to substance-related addictions (Moretta et al., 2022). This discussion should be understood in the context of a wider, decades-long debate

on what constitutes an addiction (see Griffiths, 2005, 2017). In the literature on addictions, a distinction between substance-related addictions and behavioral addictions is often made (see Petry et al., 2018). Substance-related addiction refers to the consumption of psychoactive substances, such as alcohol, nicotine, and cocaine, whereas behavioral addiction is not defined by the consumption of any substance but rather by excessive participation in various kinds of activities, such as gambling, shopping, eating, sex, and Internet use (Grant et al., 2010). Historically, substance-related addictions have been more easily accepted in medical classifications, such as in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013). Currently, gambling disorder is the only behavioral addiction with clear diagnostic criteria and treatment in the DSM-5.

Related to these discussions, some researchers have asked whether we should approach the overuse of social media from the point of view of the addiction framework because doing so risks pathologizing normal, everyday activities and considering them diseases requiring intervention (e.g., Carbonell & Panova, 2017; Hancock et al., 2022). On the other hand, it has been suggested that addiction is better understood as a continuum (e.g., of casual users, problem users, and addicts) and that specific activities should be evaluated based on how harmful they are and how difficult it is to quit or control the activity (Ylikoski & Pöyhönen, 2015). In line with this, some researchers have critiqued the traditional disease model of addiction for being too narrow and encouraged an understanding of addictions as repetitive, rewarding behaviors that are characterized by the loss of control and a sense of conflict that leads to negative life outcomes (see Orford, 2001).

Despite these controversies, the operationalizations of PSMU typically assume that such use shares the same core symptoms as substance-related addictions. This is explained by the fact that most operationalizations of PSMU are based on the early models developed for Internet addiction (Varona et al., 2022). Here, the *components model of addiction* (Griffiths, 2005) has been the most influential. The components model of addiction defines Internet addiction as a condition in which a user's Internet-related cognitions, emotions, and behaviors include loss of control, preoccupation, withdrawal symptoms, coping, or mood modification, and inter- and intrapersonal conflict (Griffiths, 2005; Meererk, 2014). Another commonly used model is the *cognitive-behavioral model* (Caplan, 2002, 2003, 2010; Davis, 2001).

Problematic social media use is typically measured with self-report scales and questionnaires that have been developed to measure excessive use, its symptoms, and its consequences (see Varona et al., 2022). Again, there is no single, standardized diagnostic tool for assessing PSMU but rather a large variety of psychometric assessments with differing quality. For example, Laconi et al. (2014) identified 45 assessment tools for measuring Internet addiction. In a more recent review, Varona

et al. (2022) identified 20 instruments for measuring social media overuse, most of which were based on models of behavioral addiction. Consequently, the estimates of the prevalence of PSMU also vary greatly between studies, and there might be significant differences in PSMU between adolescent and adult populations. In their meta-analysis of 32 countries and a sample of adolescent and adult populations, Cheng et al. (2021) estimated that the prevalence of PSMU ranged from 5% to 25%, depending on how the problematic use was classified. In another meta-analysis, Meng et al. (2022) estimated that the mean prevalence of social media addiction was 14.22% across all countries. However, in the absence of standardized criteria for problematic use, the exact number of individuals affected by PSMU remains under debate.

3.2 Consequences of PSMU

In contrast with the mixed results of studies on the link between social media use and well-being, earlier research suggested that PSMU has a robust correlation with various dimensions of well-being and ill-being (Valkenburg et al., 2022). For example, meta-analyses by Marino et al. (2018) and Huang (2022) showed a small negative association between PSMU and well-being and a small to moderate positive association between PSMU and ill-being. Similarly, several meta-analyses (Cunningham et al., 2021; Shannon et al., 2020; Wu et al., 2024b; Yigiter et al., 2023) showed a moderate association between PSMU and various measures of ill-being.

It is common for meta-analyses related to social media use to combine various measures of well-being (e.g., life satisfaction, happiness) and ill-being (e.g., depression, loneliness) into aggregated outcomes for each (Valkenburg, 2022). The most common measure used for well-being in earlier studies was life satisfaction (e.g., Huang, 2022). Research has shown a consistent negative link between PSMU and life satisfaction. For example, several small sample cross-sectional studies have indicated that PSMU decreases life satisfaction (e.g., Błachnio et al., 2016; Brailovskaia et al., 2021; Çiftci & Yıldız, 2023; Koç & Turan, 2021; Satici, 2019; Satici & Uysal, 2015). Studies with either larger samples or longitudinal designs have mostly focused on children and adolescent populations. For example, a large cross-country comparison of European adolescent populations showed comparable results, with problematic users experiencing lower satisfaction with life combined with higher levels of mental distress and lower perceived social support (Boer et al., 2020, 2021, 2022). Another large study on Chinese adolescents also indicated a negative association between PSMU and life satisfaction (Chao et al., 2023). Longitudinal evidence on the relationship is scarce, but in a sample of Dutch adolescents, PSMU predicted decreased life satisfaction over time (van den Eijnden,

2018). In an experimental study with Danish participants, it was found that taking a break from social media use increased life satisfaction, and this effect was particularly strong for heavy users (Tromholt, 2016).

In the earlier literature, loneliness was often mentioned as one dimension of decreased well-being. However, recent meta-analyses have revealed a moderate positive relationship between loneliness and PSMU in adolescent and adult populations (Cai et al., 2023; Huang, 2022). Additionally, several studies have shown that PSMU is associated with loneliness across populations (e.g., Aalbers et al., 2019; Atroszko et al., 2018; Meshi et al., 2020) and platforms (Williams et al., 2024). Longitudinal evidence has provided similar results. Two longitudinal studies with young adults in China showed that increased PSMU was associated with increased loneliness in individuals over time (Shi et al., 2023; Zhang et al., 2018). Additionally, another study on Chinese adolescents provided comparable results: increased PSMU predicted increased loneliness in individuals over time (Hu & Xiang, 2024).

Researchers have proposed that an additional outcome of PSMU is an increased risk of cybercrime victimization. Cybercrime victimization, which refers to victimization from various crimes committed in an online environment, affects well-being negatively (e.g., Kaakinen et al., 2018) and is therefore a key component in understanding the consequences of PSMU. Studies that have focused specifically on the relationship between PSMU and cybercrime victimization are scarce. However, research on Internet use has shown that across studies and various measures of cybercrime victimization, more frequent and addictive use is associated with an increased risk of cybercrime victimization (Baldry et al., 2015; Leukfeldt & Yar, 2016). In turn, cybercrime victimization experiences are associated with poorer subjective well-being (e.g., Kaakinen et al., 2018; Lahti et al., 2023). Most of the evidence on the association between active usage and victimization is cross-sectional but often with samples that are representative of the general population. For example, in a large survey of Swiss respondents (Milani et al., 2022), more frequent Internet and social media use was associated with an increased risk of cybercrime victimization regardless of the type of victimization. Comparable results were obtained from a survey conducted in Hong Kong (Cheng et al., 2020). Also, a large, nationally representative survey of Finnish residents confirmed that those who are active online, particularly those who are highly active, are at higher risk of becoming victims of various cybercrimes (Näsi et al., 2023). Longitudinal evidence of this relationship is scarcer. For example, Herrero et al. (2022) found, using a nationally representative Spanish sample, that PSMU is also positively associated with victimization over time. Similar results were obtained in a sample of Spanish adolescents (Gámez-Guadix et al., 2013) and in a sample of Dutch adolescents (Boer et al., 2021).

Researchers on PSMU have proposed various explanations for why PSMU decreases well-being and increases ill-being (e.g., Andreassen, 2015; Lee et al., 2017). In the literature, the negative effects of PSMU are often explained by the fact that excessive use replaces other activities in life that are beneficial to well-being. According to the *displacement hypothesis*, social media use is displacing more important activities, such as time spent on physical exercise, and replacing strong offline social ties with weaker online ones, which can eventually lead to decreased quality of life and well-being (e.g., Kraut et al., 1998; Nie, 2001). One feature of excessive use is that the time spent on social media use increases substantially. This can, in turn, create conflicts in social relationships and lead to decreased well-being, such as decreased life satisfaction. Because PSMU can take a toll on close relationships, addiction can lead to increased feelings of loneliness and social isolation (e.g., Nowland et al., 2018). Also, offline social networks provide a buffer that reduces pathological online communities' possible negative effects (e.g., Minkkinen et al., 2016), including cybercrime victimization (e.g., Mikkola et al., 2022). Therefore, PSMU's negative effect on well-being indicators can be indirect by disassembling close social networks.

Another hypothesis that researchers frequently employ is the so-called *stimulation hypothesis*. According to this hypothesis, digital technologies and online services can be used to enhance existing social relationships and forge new ones, which can then increase well-being and reduce loneliness (e.g., Gross, 2004). Likewise, a sense of shared identity with a group provides benefits to an individual's health and well-being (Haslam et al., 2009). This appears to be particularly true when an individual's identification with the social group is high (Häusser et al., 2020), and the effect is amplified through the perceived feeling of receiving social support from the group (e.g., Frisch et al., 2014). Research has demonstrated that problematic users are often more active on social media than non-problematic users (see Valkenburg, 2022). Even though social media use can increase the well-being of those who can use it to expand their existing social networks, those who lack social resources might not find them online (Cheng et al., 2019). Additionally, some researchers have suggested that the illusory nature of online ties might not satisfy an individual's need to belong, thereby further increasing their feelings of social isolation (Nowland et al., 2018).

In the criminological literature, daily actions or lifestyle patterns are proposed as possible mechanisms that can explain the differences in the risk of becoming victimized (e.g., Leukfeldt & Yar, 2016). According to routine activity theory (RAT), daily routines expose individuals to risks by placing them near dangerous people, places, and situations, with crime being likelier when a motivated offender, a suitable target, and a lack of capable guardians converge (Cohen & Felson, 1979). Similarly, lifestyle exposure theory (LET) examines how lifestyle patterns in social

contexts contribute to various forms of victimization (Hindelang et al., 1978). For example, contacting strangers online or participating in online discussions are routinized patterns that can increase the risk of victimization. Related to this, belonging to online networks or online communities can negatively affect one's well-being, and individuals on social media are exposed to various kinds of harmful and hateful content (e.g., Hawdon et al., 2017; Räsänen et al., 2016). For example, research has shown that pro-anorexia and pro-suicide communities (Keipi et al., 2015; Minkkinen et al., 2016, 2017), online communities for school shootings (Oksanen et al., 2014a), and communities that produce hate-advocating content related to religion, race, ethnicity, sexuality, or political ideology (Oksanen et al., 2014b) are all prevalent on social media. Because problematic users spend more time on online platforms than others, they are also more likely to be exposed to harmful content and experience its negative consequences, such as decreased subjective well-being (Keipi et al., 2015). Also, as previously mentioned, individuals often strongly identify with like-minded individuals in online groups. Strong identification with the social group also comes with a risk because individuals might, for example, conform to norms that initiate risky behavior (e.g., Savolainen et al., 2019) and become too reliant on feedback received from online networks (Schreurs et al., 2024).

3.3 Predictors of PSMU

3.3.1 Social needs and rewards

In earlier research, several explanations for why some individuals become problem users while others do not were proposed (e.g., Moretta et al., 2022; Sun & Zhang, 2021). One starting point is individuals' motives for using social media in the first place. Often, individuals use media technologies to satisfy their basic needs (e.g., Valkenburg et al., 2016), such as the essential need for social connection, interaction, and belonging (e.g., boyd & Ellison, 2007; Kircaburun et al., 2020; Throuvala et al., 2019). However, not all users share similar social needs, and a distinction between individuals who have sufficient social resources and use social media to gain more social resources and those who are socially disadvantaged and use social media to compensate for their lack of real-life social connections has often been made in the research (see Cheng et al., 2019). Consequently, two distinct hypotheses have been formulated: the *rich-get-richer/social enhancement hypothesis* and the *poor-get-richer/social compensation hypothesis* (e.g., Pouwels et al., 2021). In their review of the literature, Cheng et al. (2019) also proposed an additional *poor-get-poorer hypothesis*, for those with a lack of social skills and connections who are not necessarily able to create new social ties in the online environment. Therefore,

individuals differ not only in their motives for social media use, but also experience different consequences of social media use based on their starting point.

A similar distinction between socially affluent and socially deficient users has also been made in the research literature that has aimed to explain psychosocial mechanisms that predispose individuals to develop PSMU. In their review of the literature, Wegmann and Brand (2019) suggested two hypotheses that provide explanations for distinct pathways to PSMU: *the fear-driven/compensation-seeking hypothesis* and *the reward-driven hypothesis*. According to the fear-driven/compensation-seeking hypothesis, individuals with psychosocial problems, such as social anxiety and loneliness, prefer to use social media platforms when they try to make new social connections and alleviate their feelings of loneliness. In contrast, the reward-driven hypothesis proposes that PSMU is the result of rewards obtained from increased social connectedness, social belonging, and possibilities for impression management (Wegmann & Brand, 2019).

The fear-driven/compensation seeking hypothesis shares the assumption of early theoretical models of generalized problematic Internet use (Caplan, 2003, 2010; Davis, 2001), which proposed that individuals with psychosocial problems and poor social skills might find online interactions preferable because they perceive them as a safer and more comfortable mode of communicating with other people (Caplan, 2010). From this perspective, social media is a tool that individuals who experience negative affective states, such as loneliness, anxiety, or stress, can use to alleviate their symptoms and even feel socially competent. These expected rewards can lead to frequent use and eventually to PSMU over time (Cheng et al., 2019; Wegmann & Brand, 2019).

The perspective provided by the theory on *social belonging* (Baumeister & Leary, 1995) can offer additional insight into the fear-driven/compensation seeking hypothesis and on how the efforts to initiate social connections can lead to PSMU. The need to belong is typically described as a basic need to form meaningful and stable connections with other human beings (Baumeister & Leary, 1995). To satisfy their need to belong, individuals are eager to form social connections, join groups, and establish social bonds in various contexts and environments (Allen et al., 2021). Successfully satisfying the need to belong is positively associated with several well-being measures (e.g., Lambert et al., 2013; Michalski et al., 2020). However, the inability to meet one's social needs and the feeling that one's social connections do not satisfy needs for connection can lead to feelings of loneliness, and lonely individuals are prone to experience PSMU (e.g., Mellor et al., 2008; Tóth-Király et al., 2021).

The process that begins with feelings of loneliness and progresses to attempts to satisfy the need to belong may lead to PSMU through a number of routes. Because loneliness is such a pervasive feeling, lonely people may use social media more

frequently or intensively to satisfy their need to belong (e.g., Valkenburg & Peter, 2007a, 2007b), to modify their moods, and to escape their negative feelings (Caplan, 2010), and as the use intensifies, it can eventually lead to PSMU (Boer et al., 2021). Lonely individuals can also feel that they are missing experiences that others with social connections are having. In the literature, the feeling of being left out is conceptualized as the fear of missing out (FOMO; Przybylski et al., 2013). In previous studies, FOMO has been found to be associated with loneliness (Barry & Wong, 2020) and psychosocial problems in general (Wegmann et al., 2017).

The hypothesis that reward-driven use leads to PSMU can be further understood through the application of *social identity theory* (SIT; Tajfel & Turner, 2004). According to the SIT, individuals have a basic tendency to form groups ("us" vs. "them") and shape their identity to conform to the group to which they feel they belong. This self-categorization is accompanied by individuals evaluating which groups they belong to (in-groups) and which groups they are not part of (out-groups) and comparing the value of belonging to these distinct groups. Together, social categorization, comparison of groups, and the value of a group's membership form the basis of one's social identity. In the current digitally mediated environment, identity building often occurs on digital platforms, where individuals meet others with shared interests, ideologies, and lifestyles (e.g., Dehghani et al., 2016; Keipi et al., 2016; Miller et al., 2021).

Group-related identification processes can increase rewards for social media use, lead to increased intensity and frequency of use, and eventually develop into PSMU. For example, the sense of belonging acquired from belonging to online communities is associated with increased pleasurable and rewarding experiences, which can increase use and lead to addiction (Hsu, 2020; Miranda et al., 2023). It has been suggested that the sense of belonging to an online group is associated with PSMU indirectly through rewarding feelings that users experience (Gao et al., 2017) and that belonging to online social networks might increase the risk of PSMU (Meshi & Ellithorpe, 2021). Group processes are typically based on the principle of reciprocity between individuals (Buunk & Schaufeli, 1999), and on social media, one is expected to take part in two-way interactions (commenting, liking, upvoting) between users (e.g., Xu et al., 2020). These quantitative measures are psychologically rewarding and can tie individuals more strongly together (e.g., Figeac & Farve, 2021; Lindström et al., 2021; Zell & Moeller, 2018). The more individuals identify with their online groups, the more important the social rewards from other group members become, which can then lead to more frequent use of social media platforms.

Even though belonging to a group of like-minded individuals might provide an important space for understanding and sharing emotions, the identification process can also increase hostility toward those who are seen as different and not part of the

group (e.g., Brewer, 1999). This can lead to more frequent social media use by various mechanisms. First, studies have proven that polarizing and emotionally engaging content is more likely to be shared and consumed in online environments (e.g., Brady et al., 2020) and that individuals are particularly likely to share posts about their political opponents on various social media platforms (Rathje et al., 2021). Additionally, social groups often have their own norms and expectations of behavior, and individuals eagerly modify their attitudes and behaviors to fit the social norms of the perceived similar others (see Van Bavel et al., 2024). Social media makes it possible to curate one's online self-presentation to signal which groups one belongs to and to distinguish oneself from the rival groups. As this kind of content is compensated with more engagement and more social rewards, identity-driven social media use may contribute to the increased and even PSMU of social media.

3.3.2 Reciprocal dynamics

Earlier studies have provided support for the hypotheses that those with sufficient social resources and those with a lack of social resources can become problem users. For example, there appear to be two distinct subgroups of problematic users: those who have poor social skills and those who have poor self-control (Boer et al., 2022b). Of course, we can assume that these types of use are not separate or distinct from each other; rather, both can exist simultaneously and even feed each other (Wegmann & Brand, 2019).

One challenge in social science research is the question of the temporal order of cause and effect (see Leszczensky & Wolbring, 2022). Whereas the directionality of the causal arrow is straightforward for certain social processes (e.g., one's socioeconomic background may affect their partner choice, but their partner choice does not affect their socioeconomic background), many media-related social processes are interdependent, and distinguishing the primary cause from the effect is often challenging (Thomas et al., 2021). The question of cause and effect is also relevant concerning the development of addiction—is Jack depressed because Jack drinks, or does Jack drink because Jack is depressed? Separating causes from effects is equally difficult when researching the predictors and consequences of PSMU. For example, research has shown that although loneliness has long been associated with a higher risk for PSMU, it is unclear whether loneliness leads individuals to become problem users or the other way around (e.g., Moretta & Buedo, 2020; Nowland et al., 2018). Consequently, it has been proposed that the relationship may be reciprocal, so increases in loneliness can predict increases in PSMU, but PSMU can also increase feelings of loneliness (see Nowland et al., 2018; Zhang et al., 2024).

Various mechanisms explaining the reciprocal relationship between loneliness and PSMU can be hypothesized. First, PSMU, as an all-consuming activity, may

displace the already limited offline social resources of those who feel lonely, thus causing lonely individuals to become even more reliant on online networks (e.g., Nie et al., 2002). Social media may not satisfy the need to belong or reduce feelings of loneliness because online social relationships are not satisfying or because lonely individuals are not able to form new social ties in online environments (Cheng et al., 2019). Additionally, spending a lot of time on social media and observing portrayals of other people's life events and social activities can further increase FOMO and social comparisons, thus leading to increased feelings of loneliness (e.g., Roberts & David, 2019). Consequently, users might experience a vigilant negative feedback loop, in which loneliness leads to increased use, and eventually PSMU and PSMU further increase loneliness, leading to more PSMU.

Similar self-reinforcing mechanisms are also possibly related to reward-driven use. Again, in line with the displacement hypothesis, the all-consuming nature of PSMU may also sever real-world social ties (Lin et al., 2021) and thus cause individuals to rely even more strongly on their identity-based online networks for social support (e.g., Meshi & Ellithorpe, 2021; Tang et al., 2016). Furthermore, one of the primary features of social media platforms is their tendency to bring together those who have similar backgrounds or interests (see Kaakinen et al., 2020). As individuals develop stronger relationships with their online groups, they may develop more extreme opinions, which can conflict with the norms of other social groups to which they belong. This decrease in the quality of other social relationships can threaten problematic users' self-identity, further increasing the salience of online communities and networks as sources of social support and social identity. Thus, identity-driven use can lead to PSMU, which can further increase identity-driven use and lead to more severe PSMU.

Based on all of the above, I propose that both fear-driven/compensation seeking use and reward-driven use can be understood through reciprocal dynamics, where loneliness and identity-driven use contribute to the development of PSMU, and in turn, PSMU exacerbates feelings of loneliness and reinforces identity-driven use. Social needs and motivations are the underlying mechanisms that can explain why this cycle keeps reinforcing itself. The reciprocal process is illustrated in Fig. 4.

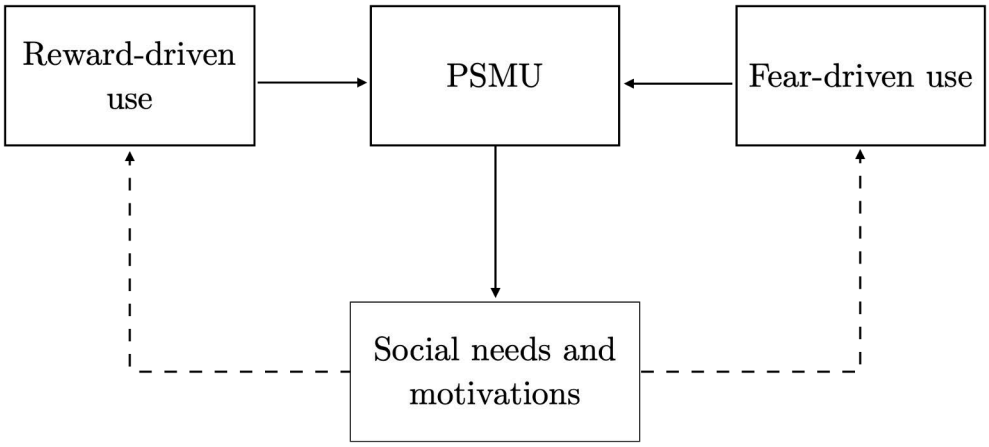

Fig. 4. Reciprocal relationships between PSMU, reward-driven use, fear-driven use, and social needs and motivations.

4 This Study

4.1 Research aims and questions

This dissertation's general aim was to explore both the development and consequences of problematic social media use (PSMU). The dissertation is based on a wide range of social scientific literature, including theories on social belonging (Baumeister & Leary, 1995), social identity theory (SIT; Tajfel & Turner, 2004), theories on loneliness and digital technologies (Nowland et al., 2018; O'Day & Heimberg, 2021), and crime opportunity theories (Leukfeldt & Yar, 2016). The research's central aim was to focus on how social needs and the aim to satisfy them are related to PSMU. To clarify the development and consequences of PSMU and to understand the role of social needs and motivations related to PSMU, the dissertation presents three general research questions.

First, the dissertation examines the effects of PSMU on subjective well-being and cybercrime victimization. Additionally, it explores whether these effects are indirect through loneliness and social interactions on social media platforms. These objectives are reflected in the first research question:

1. How is PSMU associated with life satisfaction and cybervictimization?

Second, the dissertation aims to improve our understanding of how the drive to search for social connection and to satisfy social needs contribute to the development of PSMU. Additionally, the possibility of reciprocal relationships is considered, so that the same processes that lead to PSMU may also be reinforced by it. These aims are reflected in the second and third research questions:

2. How does identity-driven social media use contribute to the development of PSMU?
3. How is loneliness associated with PSMU?

To answer these questions, the dissertation provides four empirical research articles that each provide a unique but complementary perspective on the development and consequences of PSMU. All articles are based on two longitudinal survey datasets collected in Finland from 2017–2020 and 2021–2023. The data are analyzed with various statistical methods suitable for cross-sectional and panel data analysis.

Although research on PSMU has been conducted for nearly two decades, the field is often limited by access to only relatively small, cross-sectional datasets (Moretta et al., 2022). In addition, despite advances in the field, longitudinal evidence on the development and consequences of PSMU is still rather scarce (Parry et al., 2022). This research adds to the field by using longitudinal datasets that are collected over several years. It also provides new information on how the social needs and motivations contribute to PSMU and on the possibility of reciprocal relationships between PSMU and these social and psychological processes.

In Article I, we focused on the effect of PSMU on life satisfaction and examined whether this effect is indirect through loneliness. Cross-sectional and panel data on Finnish social media users were used. Multiple linear regression for the cross-sectional data and random effects within-between (REWB) models for the panel data were applied. In Article II, we investigated the relationship between PSMU and cybercrime victimization and considered how social interactions on social media platforms mediate this relationship. Here, cross-sectional and panel data of Finnish social media users were employed using logistic regression and mediation analysis for the cross-sectional data and REWB models for the panel data. In Article III, we focused on how identity-driven social media use contributes to PSMU and explored how an individual's online actions moderate this relationship. We utilized panel data and REWB models with cross-level interactions. In Article IV, the dynamic and reciprocal relationship between PSMU and loneliness was considered. We used panel data and dynamic panel models (DPMs) with fixed effects to understand the dynamic and reciprocal nature of this relationship. The research questions, article level hypotheses, data, concepts, main variables, and analysis methods are presented in Table 1.

Table 1. Summary of research articles.

	Article I	Article II	Article III	Article IV
RQs	RQ1, RQ3	RQ1	RQ2	RQ3
Hypotheses	**H1.** Problematic use of social media has a negative association with life satisfaction. **H2.** Loneliness has a negative association with life satisfaction. **H3.** Problematic use of social media is associated with life satisfaction indirectly through loneliness.	**H1.** Increased PSMU associates with increased cybercrime victimization. **H2..** The association between PSMU and cybercrime victimization is confounded by factors assessing exposure to risk, proximity to offenders, target attractiveness, and lack of guardianship.	**H1a.** On average, individuals with higher identification with online social networks experience higher levels of problematic social media use. **H1b.** At the individual level, an increase in identification with online social networks predicts higher levels of problematic social media use over time. **H2a.** On average, individuals who are concerned about their self-presentation on social media experience higher levels of problematic social media use. **H2b.** At the individual level, the relationship of increased identification with online social networks and problematic use is moderated by individuals' average tendency for concern about their self-presentation in the social media.	**H1a.** Problematic use has a positive contemporaneous effect on loneliness. **H1b.** Problematic use has a positive lagged effect on loneliness. **H1c.** Past problematic use positively predicts future problematic use. **H2a.** Loneliness has a positive contemporaneous effect on problematic use. **H2b.** Loneliness has a positive lagged effect on problematic use. **H2c.** Past loneliness positively predicts future loneliness.
Data	Finland in the Digital Age	Finland in the Digital Age	Finland in the Digital Age	Gambling in the Digital Age
Concepts	Well-being, loneliness	Cybercrime victimization experiences, routine activities, and lifestyle patterns	Identity-driven social media use, self-presentation	Loneliness
Main Variables	PSMU, loneliness, life satisfaction	PSMU, contacting strangers on social media, being politically active on social media, cybercrime victimization	PSMU, identity-bubble reinforcement scale (IBRS), aim for perfect self-presentation	Compulsive internet use (CIUS), loneliness
Methods	Linear regression, random effects within-between modeling	Logistic regression, decomposition analysis, random effects within-between modeling	Random effects within-between modeling	Dynamic panel models with fixed effects in structural equation modeling framework

4.2 Data

Finland in the Digital Age Survey

For the research in **Articles I–III,** we used the longitudinal Finland in the Digital Age (FDA) survey, which was conducted in approximately 15-month intervals from 2017 to 2020 (Koivula et al., 2020; Sivonen et al., 2018, 2019). The original FDA survey was conducted from December 2017 to January 2018, and it sampled 3,724 respondents at first wave (T1; 50.0% female, M_{age} = 51.51, SD_{age} = 15.91, range 18–74 years), of whom 66.3% were recruited via mail and probability sampling and 33.7% via an online panel by Taloustutkimus using nonprobability sampling (Sivonen et al., 2018). To gather the longitudinal dataset, the second wave of the FDA was conducted in February–April 2019 (T2; N = 1141; 50.0% female, M_{age} = 49.89, SD_{age} = 16.16, range 19–75 years). It sampled individuals from T1 who were willing to join the longitudinal survey and answered the follow-up survey T2, with a response rate of 66.8% (Sivonen et al., 2019). The third wave was conducted in May–June 2020 (T3; N = 735; 50.0% female, M_{age} = 50.96, SD_{age} = 15.87, range 21–77 years), and the response rate at T3 was 75.7% (Koivula et al., 2020).

In **Articles I** and **II**, the first stage of the analysis included cross-sectional data from the first wave of the FDA survey, and the sample for analysis included only those individuals who reported using social media platforms (T1; N = 2991; 52.4% female, M_{age} = 48.95, SD_{age} = 15.94). The second stage of the analysis used longitudinal data with T1 and T2 (N = 2282; 1,141 individuals) of which only social media users were included in the analysis (N = 2021; female, M_{age} = 48.06, SD_{age} = 16.09). In **Article III**, we used longitudinal data from T1, T2, and T3 of the FDA survey. Again, only those who reported using at least some social media platforms at some time point were included in the analysis (N = 2,184; 728 individuals; 47.52% female, M_{age} = 53.30, SD_{age} = 15.83).

Even though the FDA data were only partially obtained by probability sampling methods, online panels based on nonprobability samples are well suited for exploring non-demographic subpopulations (see Lehdonvirta et al., 2021), such as those who experience problematic social media use. This research's target population was Finnish social media users. In general, FDA data represent Finnish social media users relatively well, even though older age cohorts are somewhat overrepresented (see Koivula et al., 2020; Sivonen et al., 2018, 2019).

Gambling in the Digital Age Survey

For **Article IV**, we utilized the longitudinal Gambling in the Digital Age survey. Data from the original sample, which consisted of Finnish speakers in mainland Finland, were collected in April 2021 (T1; N = 1530; 49.41% female, M_{age} = 46.67, SD_{age} = 16.42, range 18–75 years). After the initial data collection, data from subsequent waves were collected at 6-month intervals in October 2021 (T2; N = 1,530), April–May 2022 (T3; N = 1,095), October–November 2022 (T4; N = 1,004), April–May 2023 (T5; N = 934), and October–November 2023 (T6; N = 752). The final sample (T1–T6) included only individuals who participated at all time points, with a response rate of 49.15%. For the analysis of **Article IV**, we used all six time points of the survey (N = 4,512; 752 individuals, 48.20% female, M_{age} = 52.83, SD_{age} = 14.65). Compared to the original sample (T1), we can see that the respondents in the full panel were, on average, a bit older (46.67 at T1 vs. 52.83 in the full panel).

4.3 Measures

Problematic social media use was measured with the Compulsive Internet Use Scale (CIUS) (Meerkerk et al., 2009) and a modified 5-item adoption of the original scale. We used the shortened version of the scale in **Articles I**–**III** and the original scale in **Article IV**.

Research has shown that the CIUS is a psychometrically sound and validated scale and is widely recognized for its effectiveness in evaluating the psychometric characteristics related to Internet addiction across countries (Sarmiento et al., 2021) and diverse groups (Vondráčková & Gabrhelík, 2016). The original CIUS scale comprises 14 items rated on a 5-point Likert scale and measures typical symptoms of PSMU in five dimensions (Meererk et al., 2009). With our short adaptation of the original scale, we aimed to identify the presence of loss of control, conflicts within oneself and with others, mood disturbances, and obsessive thoughts about social media. The adaptation consisted of 5 items scored on a 4-point scale asking the respondents how often they experience certain symptoms related to the PSMU (1 = *Never*, 2 = *Less than weekly*, 3 = *Weekly*, 4 = *Daily*).

In **Articles I** and **II**, we recoded the original 5-item scale into a categorical composite variable to assess the severity of PSMU in respondents (1 = *None*, 2 = *Low*, 3 = *Medium*, 4 = *High*). In **Article III**, we defined a cutoff point to assess whether an individual was a problematic social media user. We first created a continuous composite variable, but because the variable violated the normality assumption, we decided to create a binary variable indicating PSMU (0 = *No*, 1 = *Yes*). There is no standard or well-established cutoff point for the original scale, and various cutoff points, such as 18 and 21, have been suggested to differentiate between pathological and non-pathological use (Guertler et al., 2014). On our full

scale (5–20), these cutoff points ranged from 10.00 to 10.83 points, and to err on the side of caution, we decided to use 10/11 points as the cutoff point so that scores of 11 or higher indicate PSMU. According to this criterion, 7.2% of the users were considered problematic across rounds. In **Article IV**, we created a composite variable and treated it as a continuous variable, with values ranging from 0 to 52.[1]

Loneliness was also measured using two instruments. In **Article I**, we asked respondents whether they felt lonely (*Are you lonely?*) on a 5-point Likert scale (1 = *Never,* 5 = *Always*). Even though direct, single-item measures of loneliness have certain limitations, they have been widely utilized in the research and shown to provide similar results to longer, indirect measures of loneliness (Nicolaisen & Thorsen, 2014). In **Article IV**, we used a shortened 3-item scale based on the UCLA Loneliness Scale (Hughes et al., 2004). The scores from three items were grouped into a continuous composite variable ranging from 0 to 6.

Subjective well-being was measured in **Article I** with respondents' subjective evaluations of their satisfaction with life in general. More specifically, respondents were asked to rate their subjective feelings about their life (*How satisfied are you with your life?*) with a single-item measure on a 10-point Likert scale (0 = *Extremely dissatisfied,* 10 = *Extremely satisfied*). In previous studies, this single-item measure was shown to produce similar results to those of longer scales (Cheung & Lucas, 2014).

Cybercrime victimization was measured in **Article II** using a set of five dichotomous questions (e.g., *Have you been the target of threats or attacks on social media*?), which were designed to determine whether respondents had experienced specific forms of cybercrime. Based on the answers, we constructed a single binary variable to indicate whether the participant had been a victim of cybercrime (0 = *No,* 1 = *Yes*).

Social media political activity and *contacting strangers on social media* were measured in **Article II**. Based on previous studies (Koiranen et al., 2020; Koivula et al., 2019), political activity was measured with four items: following, participating in, sharing, and creating political content on social media. Participants rated the frequency of each activity on a 5-point scale (1 = *Never*, 5 = *Many times per day*). For the analysis, users were categorized into four groups: *politically inactive* (never used social media for political activities), *followers* (only followed political content, not participated), *occasional participants* (at least sometimes engaged in political activities), and *active participants* (engaged at least weekly). Contacting strangers on social media was measured with a single item assessing how often the respondent contacted strangers on a 5-point scale (1 = *Not at all,* 5 = *Very much*). For analysis,

[1] In The Gambling in the Digital Age survey, respondents were given instructions to consider smart phone or other mobile device use as a form of Internet use.

responses were simplified into a three-level scale: responses 1 and 2 were combined into *Low*, 3 remained *Medium*, and 4 and 5 were combined into *High* intensity of contacting strangers.

Identity-driven social media use was measured in **Article III**. We used the Identity Bubble Reinforcement Scale (IBRS) (Kaakinen et al., 2020), which is a validated instrument for assessing an individual's inclination to engage with identity-driven social groups on social media. The scale consists of six items measured on a scale from 1 to 7 (e.g., *On social media, I belong to communities that I take pride in*.). The scale was combined into a continuous composite variable ranging from 6 to 42.

Online self-presentation in **Article II** was measured with a two-item instrument on a 5-point Likert scale (1 = *Completely agree*, 5 = *Completely disagree*). The respondents were asked to evaluate their awareness of their self-presentation on social media platforms with two questions: *I very often "like" other users' posts to show support and empathy* and *I try to give others on social media an improved image of who I am.* Scores from the variables were combined into a continuous composite variable with a range of 2 to 10.

We also controlled for several confounding variables. In **Articles I**–**III**, we controlled for social media use intensity (i.e., how frequently one uses social media). In **Article II**, we controlled for employment status. In **Articles I – IV**, we controlled for basic sociodemographic variables: age, gender, and education.

4.4 Statistical techniques

To analyze the data, several statistical techniques were utilized. In the first two articles (**Article I** and **II)**, we used data in a cross-sectional format and used statistical techniques for the cross-sectional data analysis. In all articles (**Articles I–IV**), we used panel data with observations of the same individuals across several time points. To analyze the data in a long format, we used statistical techniques that are suitable for longitudinal data analysis. In this section, the statistical techniques are described in more detail.

Cross-sectional analysis

In the first stage of **Article I**, we used *linear regression* with the cross-sectional data of subjects measured at a single time point. In **Article II**, we used *logistic regres*sion at the first stage of the analysis and *decomposition analysis with the KHB metho*d at the second stage of the analysis with cross-sectional data.

Linear regression is a common statistical technique that uses linear equations to model how the variation in a dependent variable is explained by one or more

independent variables (e.g., Allison, 1999; Vehkalahti & Everitt, 2019). Because linear regression assumes that the relationship between the independent variables and the dependent variable is linear, it is most effective when the dependent variable is continuous (Allison, 1999). For binary dependent variables, where the outcome is either 0 or 1, logistic regression offers a suitable alternative. As part of the *generalized linear models* framework, logistic regression estimates the probability that the dependent variable equals 1 based on the independent variables. This method adapts the linear model to handle noncontinuous data using a logistic link function (Vehkalahti & Everitt, 2019). The Karlson–Holm–Breen (KHB) method is a statistical technique that makes it possible to "decompose" an independent variable's total direct effect on a dependent variable into direct and indirect components in cases in which the dependent variable is binary or categorical (Breen et al., 2021). In practice, the method makes it possible to effectively determine what proportion of an independent variable's total effect on a dependent variable is indirect through a third variable.

According to Allison (1999), regression can be used for two important functions in statistical analysis: prediction and causal analysis. For example, one can use regression to predict how changes in an independent variable are reflected in a dependent variable (i.e., how the frequency of social media use is reflected in the risk of PSMU). Moreover, regression models may be used to understand the causal relationship between independent and dependent variables. Here, causal analysis is used to identify whether there is a causal relationship between variables and to estimate the magnitude of this relationship (Allison, 1999). Using the earlier example, we were able to hypothesize that the frequency of social media use (*cause*) affects the risk of PSMU (*effect of cause*), test whether this relationship is plausible, and detect how strong it is by using regression modeling.

In practice, though, the primary focus of research is prediction and causality, even though publishers and scientific authors are often cautious about using explicitly causal language (see Hernan, 2018). In other words, researchers are often interested in causal inference (*under which conditions x affects y*) but resort to stating purely associational inference (*under x the risk of y is lower*) because true causality is notoriously difficult to state in observational studies. One of the biggest threats to causal inference with cross-sectional data is endogeneity, meaning that the relationship between independent and dependent variables can be affected by a third variable that the model does not observe (Allison, 2009). Although cross-sectional regression can be helpful for causal inference in certain contexts (see Best & Wolf, 2015), researchers often use panel data to overcome endogeneity issues and other problems with cross-sectional data.

Panel data analysis

In Articles **I**–**III**, we used REWB modeling (Bell et al., 2019) to account for unobserved heterogeneity and dynamics of PSMU within- and between-individuals. In **Article IV**, we use *dynamic panel models with fixed effects in a structural equation modeling framework* to assess reverse causality and to model reciprocal associations of the variables over time (Allison et al., 2017; Moral-Benito et al., 2019; Williams et al., 2018).

Panel data refers to a type of data in which the same subjects (i.e., individuals, firms, or countries) are observed on multiple occasions over time (Allison, 2009). *Fixed effects* (FE) regression models are commonly used in panel data analysis for causal inference because they can control for all the time-invariant unobserved variables of individuals, whether they are observed in the model or not (Allison, 2009; Brüderl & Ludwig, 2015). In other words, FE models control for all individuals' stable characteristics, such as gender, ethnicity, intelligence, and genetics, even if the model does not directly measure them. The ability to control for all unobserved heterogeneity is obviously a huge advantage compared to observational studies with cross-sectional data, in which we can only control for variables that are actually measured by the model (Brüderl & Ludwig, 2015). Of course, this does not eliminate the possible bias from time-varying unmeasured variables in FE models (Rohrer & Murayama, 2023).

FE models also have some other limitations. Because FE models only account for the changes within individuals over time, they do not work if there is no variation in the independent variables within individuals over time (Allison, 2009). In other words, several variables that are of interest in social science, such as gender or family background, have only little or no variation over time, and their effects cannot be measured in the fixed-effects framework (Vaisey & Miles, 2017). Related to this, according to the earlier literature, it is often practical to distinguish within-person effects from between-person effects because they can illustrate vastly different processes, and the relationships between the independent and dependent variables can differ within and between individuals (Bell et al., 2019; Curran & Bauer, 2011).

For example, social media use and well-being might be positively correlated at the between-individual level because individuals who have more social capital and beneficial social networks are using social media more and are more satisfied with their lives. However, within individuals, an increase in social media use might have a negative relationship with well-being over time because increased social media use displaces other activities in life that are beneficial for well-being. In the statistical literature, various solutions for modeling within and between effects have been presented. One solution is REWB modeling, which combines the strengths of fixed-effect and random-effect models (Bell et al., 2019). With REWB models, one can control for the unobserved time-invariant confounding, yet also explore the variation

between individuals. REWB models are versatile and can be used with binary and count variables in the framework of generalized linear models (Bell et al., 2019).

As Leszczensky and Wolbring (2022) stated, another disadvantage that FE and REWB models suffer from is the inability to account for the possible reverse causality between the variables in the models. In the FE and random effects (RE) models, the past values of the dependent variable are not allowed to correlate with future values of the dependent or independent variables. In practice, this assumption is violated in several scenarios. We can take the relationship between social media use and well-being as an example and assume that y = well-being and x = social media use. First, past states of well-being are indicative of future states of well-being, which makes the assumption that past values of y do not affect future values of y not reasonable. In addition, we can see that we cannot reasonably rule out the possibility that past values of y affect future values of x because those with poorer well-being, in general, may use social media in certain ways to alleviate the negative emotional experience they are feeling.

In previous economic and statistical literature, DPMs have been proposed as a solution to this problem (Allison et al., 2017; Williams et al., 2018). The benefit of DPMs is the ability to let the dependent variable's past values correlate with the future values of the dependent and independent variables while controlling for the unobserved time-invariant variables (Allison et al., 2017). In addition, unlike standard fixed-effects models, DPMs can include time-invariant, between-person variables (Williams et al., 2018) and are robust against the incorrect time-specification of lagged variables (Leszczensky & Wolbring, 2022). Therefore, dynamic panel models are a good option for modeling relationships in which the possibility of reverse causality is present.

4.5 Ethical considerations

In this study, we followed the Finnish National Board on Research Integrity TENK's guidelines (2019) for the ethical principles of research with human participants. These standards should cover the entire research progress from the initial planning of the research until the end. The aim of these ethical standards is to ensure research participants' dignity and autonomy. When we designed the surveys and planned the data collection, TENK's guidelines were followed, and the possibility of an ethical review was considered. According to the guidelines, no ethical review was necessary before the collection of survey data in **Articles I–III**. For the data in **Article IV,** the academic ethics committee of the Tampere Region (decision number 115/2022) reviewed the study protocol and confirmed that all ethical considerations were thoroughly addressed.

During the data collection for **Articles I–IV**, all participants were informed that their participation in the study was voluntary and that they could withdraw their consent to participate and discontinue their participation in the study at any time without any negative consequences. The participants also received information about how the data would be used and stored. When processing personal data, the researchers carefully retained the participant's right to anonymity and privacy. The data were only stored in password-protected environments, and all personal identifiers, such as name, email, and address, were removed from the data.

5 Overview of the Articles

Article I. PSMU decreases subjective well-being indirectly through loneliness

In **Article I**, we were interested in the relationship between PSMU and subjective well-being and whether this relationship is indirect through feelings of loneliness. Our analysis was conducted in two phases. In the first phase, we used cross-sectional data to understand the relationships among PSMU, well-being, and loneliness. In the second phase, we used longitudinal data to understand the relationships among PSMU, loneliness, and well-being over time within and between individuals.

The results of the first phase of the analysis showed that PSMU was negatively associated with subjective well-being. Stepwise regression results indicated that this relationship was not confounded by typical sociodemographic characteristics, such as age, gender, and education. However, after we controlled for loneliness, the effect of PSMU remained statistically significant, but was much smaller. This suggests that although PSMU is negatively associated with subjective well-being, this effect is indirect through loneliness.

The second phase deepened the analysis with longitudinal modeling. The within-individual analysis revealed that, at the individual level, increased PSMU did not predict a significant decrease in subjective well-being. However, we found that increased PSMU predicted increased loneliness and that increased loneliness predicted decreased well-being. Within-individual changes in loneliness were not significantly associated with changes in PSMU. The between-individuals analysis indicated that the lonelier the individual, on average, the poorer their well-being. In addition, those with higher average levels of PSMU were lonelier on average, and those with a higher levels of loneliness had higher average levels of PSMU.

Our findings suggest that loneliness is a key component in understanding the relationship between PSMU and well-being. Furthermore, the findings supported the assumption that there could be a path from increased PSMU to increased loneliness and from increased loneliness to decreased well-being. However, the fact that the data consisted of only two time points with 15-month intervals and the possibility of reverse causality between PSMU and loneliness limits these findings' generalizability.

Article II. PSMU, routine activities, and cybervictimization

In **Article II**, we focused on the relationship between PSMU and cybercrime victimization. Using RAT and LET frameworks, we had two goals. First, we sought to understand the direct relationship between PSMU and cybercrime victimization experiences. Second, we wanted to determine whether lifestyle-related individual dispositions and social media activities explain PSMU's effect on victimization experiences. Our analyses were conducted in two phases. In the first phase, we used cross-sectional data to understand the average relationships among PSMU, cybervictimization, and lifestyle variables across individuals. In the second phase, we used longitudinal data to model how changes in PSMU and social media activities predict the risk of cybercrime victimization within and between individuals over time.

The results of the first stage of the analysis showed that PSMU is associated with increased risk of cybercrime victimization. Stepwise logistic regression models indicated that PSMU's effect on victimization is partly explained by certain social media activities, namely, contacting strangers and taking part in political discussions. Age also affected the association between PSMU and victimization. The results of the decomposition analysis confirmed that background factors mediated almost 60% of PSMU's effect on victimization, and that age, participating in political discussions, and contacting strangers all significantly mediated this relationship.

The results of the second stage of the analysis showed that at the within-individual level, only increased PSMU predicted increased victimization over time. The between-individual analysis confirmed the earlier results and showed that those who participated in online political activities more often were more likely to become victimized, and those with low average levels of contacting strangers were less likely to become victimized.

Our findings present important insights into the relationship between PSMU and cybercrime victimization. First, the results support the notion that habitual use of social media platforms leads to routinized activities that place problematic users at risk of becoming victims of cybercrime. Furthermore, our findings show that specific, routinized online activities are particularly risky and increase the likelihood of associating with potential offenders of cybercrime. However, the study's results are limited by the fact that the data were only collected at two time points, which reduced our ability to make inferences about the longitudinal development of PSMU and victimization. In addition, we only looked at two types of activities on social media. Researchers should take a closer look at how activities on social media and becoming part of online communities can explain PSMU's effects on the increased risk of victimization.

Article III. Identity-driven social media use, self-presentation, and PSMU

In **Article III**, we hypothesized that belonging to and identifying with online identity networks (IBRS) increases PSMU. Additionally, we wanted to know whether the tendency toward perfectionistic self-presentation could explain why identity-driven use could lead to PSMU. We used the frameworks of social identity theory and theories on self-presentation to understand how IBRS and maintaining perfectionistic self-presentation online increase PSMU over time. We utilized a three-wave longitudinal and a set of stepwise REWB models with interaction effects to understand these relationships.

The results showed that increased IBRS predicted increased PSMU over time within individuals. This effect was not confounded by the overall intensity of social media use. Between individuals, stronger identification was also associated with higher probability of PSMU. The results also show that between individuals, those more concerned with online self-presentation were more likely to be problem users, but within individuals, changes in self-presentation were not significantly linked to levels of PSMU. We conducted a cross-level interaction analysis, which revealed that increased within-level identification with online communities was associated with PSMU only for those with high average levels of perfectionistic self-presentational aims.

These findings provide important information on how belonging to identity-driven online communities can lead to PSMU over time. First, our results indicate that as the salience of online communities to one's identity becomes more important, individuals might become excessive users of online communities. Our results also show that this is not dependent on the more frequent activity on social media but on identification processes. Also, the results provide evidence of the mechanisms that contribute to the increase in PSMU. Specifically, the cross-level interaction analysis shows that the impact of identification with online networks is moderated by an individual's concern over idealized online self-presentation. These concerns can be thought of as a combination of differences between individuals' personalities and their identification with diverse online groups that have varying levels of communal norms regarding self-presentation. In other words, social media use might become uncontrolled, especially when there are online communities that place a high emphasis on managing one's self-presentation.

One limitation of our study is that it did not consider the differences between online communities and their norms, only individuals' perceptions of their behavior. Therefore, it is unclear whether community norms or differences in personality account for the mechanism between identity-driven social media use and excessive social media use. Researchers should focus more on the interaction between community norms and individual dispositions toward idealized online self-presentation.

Article IV. The dynamic and reciprocal relationship between problematic use and loneliness

In **Article IV**, we focused our attention on the dynamic and reciprocal relationship of problematic Internet use and loneliness. Based on earlier theoretical and empirical literature, we created an integrative problematic use–loneliness model and tested its assumptions with a 6-wave longitudinal dataset and dynamic panel models with fixed effects. We applied a series of stepwise models with different time lags for independent variables, and we first used problematic use as the dependent variable and then loneliness as the dependent variable.

The results confirmed our initial hypothesis that problematic use and loneliness have immediate positive and reciprocal effects on each other. We also evaluated whether the effects are lagged over time with 6-month and 12-month time lags. For the delayed effects, we only found evidence that changes in problematic use were reflected in increased loneliness over the 12-month period. Additionally, we found, as the earlier research suggested, that previous levels of loneliness and problematic use strongly predicted their future levels.

These findings provide support for the problematic use–loneliness model, which assumes a dynamic and reciprocal relationship between the two variables. This effect was mostly immediate, but increases in problematic use may also be realized with higher loneliness over a longer period. Our findings provide evidence for the assumption that lonely individuals might turn to excessive use to satisfy their social needs, only to find that they feel themselves even lonelier as a result.

Our results are quite robust because the models controlled for all time-invariant unobserved heterogeneity and account for reverse causality between the variables. However, the results have limitations because all our variables refer to general social processes without considering specific social media use-related practices. Therefore, researchers should more closely focus on what sort of individual- and community-level mechanisms affect these processes.

6 Discussion

6.1 Key findings

PSMU is negatively associated with well-being and positively associated with cybercrime victimization

Although the amount of literature on PSMU, its antecedents, and its consequences has been increasing steadily over the past decade, earlier studies have often come with certain limitations. For example, most studies on the relationship between PSMU and well-being have relied on cross-sectional data and have not considered the differences in within- and between-person processes over time (e.g., Parry et al., 2022). Separating the within- from between-individual effects can be particularly useful when addressing the causal relations with longitudinal data (Rohrer & Murayama, 2023).

We found that at the between-person level, PSMU is negatively associated with life satisfaction. This result was confirmed with cross-sectional and longitudinal data. Multiple earlier studies (e.g., Boer et al., 2020; Brailovskaia et al., 2021) have found that problematic users are less satisfied with their lives, and our findings support this conclusion. Also, meta-analyses have shown a small yet negative average association between PSMU and life satisfaction (see Huang, 2022). Our results at the within-person level contradict these results because an increase in PSMU did not directly decrease satisfaction with life over time, but did it only indirectly through loneliness. Also, longitudinal studies have often produced mixed findings on how PSMU contributes to subjective well-being over time. For example, a one-week experimental study showed that taking a break from social media use increased well-being, particularly for heavy users (Tromholt, 2016). On the other hand, some longitudinal studies have not shown a significant within-level effect of PSMU on life satisfaction over time (e.g., Boer et al., 2021), whereas others have shown a significant negative effect of PSMU on life satisfaction (e.g., Xiong et al., 2023; Yu & Shek, 2018).

The contradictory results of the within-individual level analyses across studies may have various explanations. First, PSMU may be more akin to a trait-like factor that varies from individual to individual than a state-like thing that varies within

individuals across time (see Rohrer & Murayama, 2023). Some studies have supported the notion of PSMU as a trait-like tendency (e.g., Di Blasi et al., 2022), but the effects of PSMU may also fluctuate greatly, and the results may vary depending on how frequently the data are collected. Similarly, levels of well-being tend to stay quite stable over time within individuals (e.g., Lucas & Donnellan, 2005), at least in data with relatively short observation periods and few time points, such as ours. Yet, another possible explanation for the nonsignificant within-individual-level relationship but positive and significant between-person relationship is that the within-individual analysis controls for all time-invariant heterogeneity (such as stable personality traits, gender, or age), whereas between-person models do not (Allison, 2009). This implies that these stable traits may confound the between-person relationship, potentially explaining why a significant association is observed between PSMU and well-being in the between-person analysis, but not in the within-person analysis.

Our results also confirmed that PSMU is positively associated with cybercrime victimization experiences. Here, we found positive and significant relationships at the within- and between-person levels. Most earlier studies on victimization experiences used cross-sectional datasets and did not make a distinction between distinct levels of analysis. This is a research area in which earlier research is scarce, but our results align with studies that found a negative link between problematic Internet or smartphone use and increased risk of cybercrime victimization (e.g., Boer et al., 2021; Herrero et al., 2021). Our positive within-person relationship findings also align with earlier studies that have shown a positive association between problematic smartphone use and victimization over time (Herrero et al., 2022). Consistent with earlier remarks on the differences between within- and between-person processes, we can state that problematic users on average are at more risk of becoming cybercrime victims, but also that those individuals whose PSMU has increased are more likely to experience negative effects of the cyberworld, that is, cybercrime victimization.

Additionally, our analysis confirmed that PSMU's effect on victimization experiences is indirect through the initiation of social media interactions with strangers and the use of social media to discuss political topics. The effect of political social media activity was particularly meaningful; it explained ~31% of the variation in PSMU's effect on victimization experiences. Here, our results align with earlier research that has shown that politically motivated social media use is very engaging and that polarized content very frequently interacts with social media (e.g., Brady et al., 2021; Rathje et al., 2021). Therefore, politically motivated use and PSMU may reinforce each other, leading to more opportunities for victimization. Also, research has emphasized that online participation does not always lead to positive outcomes because one can be exposed to various kinds of harmful and hateful content in online

groups (e.g., Hawdon et al., 2017; Räsänen et al., 2016), and online political behaviors have been shown to be particularly risky (e.g., Lutz & Hoffmann, 2017).

Identity-driven social media use may predict PSMU, but the effects vary between individuals

Our results also clarified the role of identity-driven social media use and belonging to online groups in PSMU. The results show that identity-driven social media use is associated with PSMU within and between persons. At the between-persons level, those who, on average, identify more strongly with online groups also have a higher risk of PSMU. At the within-person level, increased identification with online groups was positively associated with the risk of PSMU over time.

These results align with research that has shown that participating in online groups can be highly rewarding (e.g., Hsu, 2020; Miranda et al., 2023) and that identity-driven use contributes to the excessive use of social media platforms (e.g., Kaakinen et al., 2020). Here, our results align with and contribute to the earlier discussions on how group-related identification processes are associated with the spread of emotionally and morally valenced content(e.g., Brady et al., 2017, 2020; Van Bavel, 2021). According to our results, becoming more intertwined in these networks and being more engaged with them may lead, in some cases, to PSMU.

Furthermore, our results shed light on the mechanisms that can moderate the relationship between identity-driven and PSMU. According to our results, identity-driven use increased the risk of PSMU only among those individuals who, on average, felt a need to participate in reciprocal actions on social media and were trying to manage a perfect image of self on social media platforms. Our results agree with earlier studies that have shown the role of social rewards obtained from online networks as an important predictor of social media use (e.g., Lindström et al., 2021) and that have recognized that various trait-like, between-person differences, such as FOMO and social comparison (Groenestein, 2024; Lewin et al., 2022; Meier & Johnson, 2022; Servidio et al., 2021), can explain differences in social media's effects. This means that some individuals might be particularly sensitive to the norms of reciprocity (e.g., "a like for like") and try to maintain as positive an image of oneself as possible to gain social rewards from the interactions with the group they identify with.

The dynamic relationship between loneliness and PSMU

Our results suggest that loneliness is an important component of PSMU and its outcomes. Again, we explored the associations of PSMU and loneliness between and within individuals. At the between-individual level, lonely individuals were more

likely to be problem users, but problem users were also more likely to be lonely. Additionally, the results of the between-person analysis showed that PSMU's effect on life satisfaction was indirect through loneliness. At the within-person level, increased PSMU was not associated with decreased life satisfaction, but PSMU was associated with increased loneliness and loneliness with decreased life satisfaction over time.

Our results align with a large amount of research that has indicated that loneliness is significantly associated with PSMU (O'Day & Heimberg, 2021). Most of the literature on the relationship between loneliness and PSMU is cross-sectional, longitudinal studies are scarce, and recent studies with longitudinal designs have provided mixed results. First, there is evidence that loneliness increases PSMU (Tóth-Király, 2021) but also that PSMU increases loneliness (Shi et al., 2023). Which question comes first has been debated extensively in the earlier literature (see Moretta & Buodo, 2020; Nowland et al., 2018), and it has been suggested that the relationship between PSMU and loneliness is reciprocal.

Our results also contribute to these discussions. We tested directionality with various data and modeling approaches and had somewhat mixed results. First, we employed REWB models, which revealed that, at the within-person level, PSMU predicted loneliness, but loneliness's effect on PSMU was not significant. We further explored the relationship with dynamic panel data models, with which we were able to consider the dynamic relationships between the variables. Our results showed that the relationship appears to be reciprocal; thus, increased PSMU increases feelings of loneliness within individuals, but increased loneliness also predicts increased PSMU within individuals over time. Here, our results suggest that there may indeed be a vicious cycle of PSMU and loneliness, which can then negatively affect other aspects of subjective well-being. These results align with recent longitudinal studies (Wu et al., 2024a) and a recent meta-analysis on longitudinal evidence (Zhang et al., 2024) that indicated a dynamic, reciprocal relationship between loneliness and PSMU.

6.2 Causes and effects of PSMU

Earlier studies on social media effects in general and on the effects of PSMU specifically have often proposed that individuals have various motives for using social media. For example, social media use might be a tool to enhance existing social relationships or a way to compensate for a lack of resources (e.g., Cheng et al., 2019). In a similar vein, two mechanisms related to PSMU have been proposed. The fear-driven/compensation seeking hypothesis states that those with poor social skills and lack of social networks may use social media excessively to satisfy their need to belong, and the contrasting reward-driven hypothesis supposes that social rewards and excitement of group-related social media activities may also lead to

PSMU (Wegmann & Brand, 2019). This dissertation contributes to this discussion by providing more information on how the need to belong and identity-driven social media use may explain why some individuals experience problems with their social media usage, whereas others do not.

To feel fulfilled, it is essential that human beings satisfy their need to belong by creating social connections and participating in group-related interactions (e.g., Baumeister & Leary, 1995). Today, individuals often use social media to connect with other individuals and satisfy their need to belong. This dissertation provides more evidence supporting the often-stated hypothesis that loneliness can lead to PSMU because lonely individuals may be inclined to use social media in an excessive manner, either to alleviate their feelings of loneliness or to reach out for new social connections (e.g., Caplan, 2003, 2010; Davis, 2001; Moretta & Buedo, 2020). On the other hand, this dissertation also supports the hypothesis that PSMU can increase feelings of loneliness and that increased loneliness can be reflected in decreased life satisfaction. Here, our results indicate that the relationship between PSMU and loneliness is dynamic and reciprocal (e.g., Wegmann & Brand, 2019; Wu et al., 2024a; Zhang et al., 2024), so loneliness and PSMU reinforce each other over time.

When they are successful in their attempts to form bonds with other individuals, people often strongly identify with the group and its members (see Tajfel & Turner, 2004). Research has shown that these identity-related group-forming processes are also prevalent in online environments (e.g., Kaakinen et al., 2020). According to this dissertation, the stronger the identification with social media groups with similar-minded individuals, the higher the risk of PSMU. Even though belonging to these groups can provide social support and offer other benefits to social media users (e.g., Meshi & Ellithorpe, 2021; Tang et al., 2016), our results provide information on the darker side of identifying with social media communities. Because users often feel they must conform to group norms on reciprocal interactions and aim to present an idealized version of the self on social media platforms to maintain their status in the group, these mechanisms can eventually lead to PSMU. Our results therefore confirm the hypothesis of self-reinforcing rewards as one pathway to PSMU (Wegman & Brand, 2019).

This dissertation also contributes to the discussions on the consequences of PSMU. Even though PSMU has been associated with decreased well-being and increased ill-being in earlier studies, the exact mechanism remains controversial. Our results show that PSMU is associated with decreased life satisfaction, but this effect is partly indirect through loneliness. Additionally, this dissertation has examined theories on routinized activities and risky lifestyles and confirms that PSMU can lead to increased victimization through different activities on social media. More precisely, we found that online actions, such as interacting with strangers or

participating in political discussions, can help explain why certain individuals are at a higher risk of victimization. Here, we add to the research on how different online interaction styles may lead to different consequences of social media use (Boer et al., 2022) and shed light on possible negative consequences of participating in political discussions in online environments (Lutz & Hoffmann, 2017).

The dissertation also adds to earlier research by using longitudinal data and statistical methods that can be helpful in estimating how PSMU is developed and how it affects individuals. For example, it is hard for cross-sectional designs to control for all unobserved confounding variables, which can lead to biased results (e.g., Allison, 2009). By controlling for all observed and unobserved time-invariant confounders in models with within-individual effects, we were able to provide more robust estimates of causality among PSMU, life satisfaction, loneliness, and cybervictimization. Furthermore, the longitudinal data made it possible to distinguish between trait-like, between-persons processes and state-like, within-person processes (Curran & Bauer, 2011; Rohrer & Murayama, 2023). These can be considered distinct processes and can sometimes even have effects in opposing directions (Wang & Maxwell, 2015). For example, we did not find a significant within-person effect of PSMU on life satisfaction, but those individuals who scored higher on PSMU were less satisfied with their lives. This could imply that occasional increases or decreases in PSMU do not affect individuals' well-being directly, but increased PSMU can increase loneliness, which then decreases well-being.

Another problem when studying the causes and effects of media use is the fact that there can be a reciprocal relationship between media use and its outcomes (see Thoma et al., 2021). For example, PSMU may increase mental health problems, but it is also quite possible that mental health problems increase PSMU. Additionally, earlier values of PSMU may affect future values of PSMU (e.g., Boer et al., 2022a; Bu et al., 2021; Tóth-Király et al., 2021) because the best predictor of future addiction is often the earlier tendency for addiction. This phenomenon is described as reverse causality between the variables (see Leszczensky & Wolbring, 2022). Therefore, it can be difficult to determine, for example, whether one first feels depressed and then becomes addicted to alleviating the negative feelings or the other way around. The relationship is also dynamic in that previous levels of loneliness predict both future loneliness and future PSMU, but also, previous levels of PSMU predict both future PSMU and future loneliness. With DPMs, we were able to address these issues and provide more support for earlier theories that PSMU and loneliness may be reciprocally associated with each other (Zhang et al., 2024).

This dynamic and reciprocal process is shown in Fig. 5, where t_n is the current time, t_{n-1} is all time that has passed, and t_{n+1} is time in the future. Let us assume that x = PSMU and y = loneliness. With panel data, we can make multiple observations of how the values of PSMU and loneliness change over time within the same

individuals. The figure illustrates how past values of loneliness can affect the current values of PSMU and how current values of PSMU can further affect future values of loneliness. On the other hand, the past, current, and future values of both loneliness and PSMU are not independent of each other. For example, the current value of loneliness is affected by the past value of loneliness, and the current value is reflected in future values of loneliness.

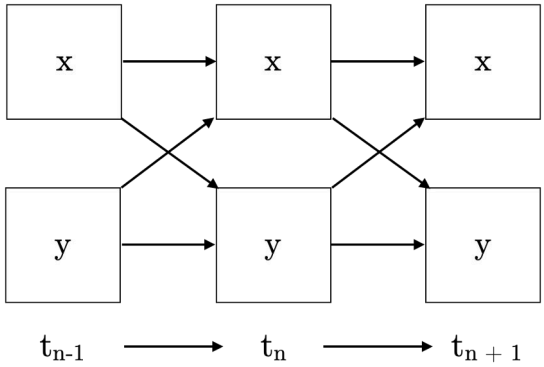

Fig. 5. An example of dynamic and reciprocal relationship between the variables.

6.3 Conclusion

As social media use has become increasingly popular, the possibility of its negative effects has acquired plenty of attention in public discussions. The negative sentiment toward social media among the public is reflected in popularized scientific literature on the subject, and young children and adolescents in particular are believed to be at an elevated risk of experiencing negative consequences of social media use (Haidt, 2024; Twenge, 2017). Another recurring theme in the popular discourse is the addictive potential of social media use. Whereas earlier research on social media's effects has returned mixed and contradictory findings, PSMU has been consistently associated with negative consequences on well-being and social relationships. Although excessive use is a widely recognized issue, the development and consequences of PSMU are not well understood in many areas.

The results of the studies discussed in this dissertation have shown that PSMU undermines subjective well-being, heightens the risk of cybercrime victimization, and increases loneliness. Various digital inequalities have been the focus of research since the late 1990s, when the concept of digital divides was developed to assess the unequal access to and imbalanced outcomes of the use of information and communication technologies (ICTs) (van Dijk & Hacker, 2003). According to van Dijk's (2020) definition, digital divide research has evolved in phases in accordance with technological, social, and economic developments within the past decade. First,

the digital divide discussions originally centered on the issue of whether one has access to ICTs, but as these technologies became faster, cheaper, and more accessible, the focus turned to unequal skills and uses of ICTs. In the latest phase, the focus has been on the positive and negative outcomes of the use of ICTs and their unequal distribution among the population. As van Dijk (2020) stated, the question now is: Who benefits from most of the use of ICTs? And conversely, who suffers most from the negative outcomes?

The inequality perspective underscores the need to identify those at risk of becoming problem users and to develop policies and practices that would be helpful in mitigating PSMU's harms. This dissertation provides support for the hypothesis that PSMU is associated with both the goal of satisfying social needs and the social rewards of belonging to and interacting with groups of like-minded individuals on social media platforms. Therefore, individuals with psychosocial problems such as loneliness and anxiety may be at particular risk for developing tendencies toward PSMU, but those with high social capital and strong online networks may also begin to compulsively use social media in order to obtain social rewards and conform to group needs. Policies and guidelines that can identify those at risk would be helpful in assessing risky behavior. One group that may be particularly appropriate for this type of intervention is adolescents, who are thought to be particularly vulnerable to the negative consequences of social media use.

This dissertation has numerous strengths that contribute to discussions on PSMU, its causes, and its consequences. First, all of the dissertation's articles include longitudinal data, which, despite its rising popularity in recent years, is still not very widely utilized in the field (Parry et al., 2022). Also, we were able to provide more evidence on causal relations related to PSMU, even though we should be cautious in our claims about causality because unobserved variables that vary over time can bias fixed-effect models as well (e.g., Rohrer & Murayama, 2023). The dissertation is also intended to reduce the bias caused by reverse causality by using dynamic panel models, which can assess the feedback effects between the variables. Our results provide more robust information on the potential dynamic influence between them.

Related to the data, another strength is that all articles are based on samples of Finnish adults. Typically, studies on social media use have included samples of children, adolescents, or young adults (Cheng et al., 2021). Even though no samples in our articles are generalizable to the whole Finnish adult population, they typically represent it well, and they offer important insights into the adult population that uses social media. Also, our data and analyses show that the negative effects of social media use, including PSMU, are not limited to children and adolescents, but that social media use can affect the adult population as well.

This dissertation, of course, has limitations. First, **Articles I** and **II** include longitudinal data from only two time points, which makes the inference of within-

person variations more uncertain. Another limitation lies in the scales used to measure PSMU. This is a typical problem that affects studies on PSMU because the scales used by different researchers attempt to define problematic use with several conceptualizations, measurements, and cutoff points (Moretta & Buedo, 2020). The instrument we used in **Articles I**–**III**, based on the FDA, included a short, 4-question scale adapted from the validated CIUS scale (Meererk, 2014). To keep the scale short, the instrument did not assess withdrawal symptoms, which is one dimension of the original CIUS scale. However, the shortened scale assesses the dimensions that imply that social media use is negatively affecting social relations, out of control, and used as a way to manage one's mood, indicating that social media use is impairing the quality of life. Moreover, the main results of **Article I** were confirmed with the original, fully validated CIUS scale and more robust statistical methods in **Article IV**.

Another limitation is related to measuring PSMU with self-reported media use, which introduces a serious threat of cognitive, social, and communicative biases, which increase the measurement error. These biases are particularly typical of survey research that deals with sensitive questions (Yan, 2021) such as PSMU. Even the framing of social media uses as potentially addictive in scales that assess PSMU can lead to more negative evaluations of one's social media use (see Hancock et al., 2022) and lead to biased estimates. These problems affect surveys on social media use specifically because it is very difficult to realistically estimate the time spent using social media (Parry et al., 2022). Consequently, a recent meta-analysis of earlier research showed only a moderate correlation between self-reported usage and actual logged usage of social media platforms, and for the relationship between PSMU and actual use, the association was even weaker (Parry et al., 2021). This discrepancy between actual and reported use is a major flaw that the whole field of social media is suffering from, and it should be addressed with actual usage logging software to obtain more realistic estimates of use.

One question about and a possible limitation of this dissertation is the nature of PSMU as a potential addictive behavior. Although addiction to social media is widely debated in public, the question remains whether excessive social media use can be approached from the same framework as substance addictions (see Griffiths, 2017). Some researchers have even challenged the whole notion of addiction to social media, arguing that it could risk pathologizing completely normal everyday behaviors of a large group of individuals (Hancock et al., 2022). Of course, this is an issue that looms over the entire field of addiction studies, and the existence of non-substance-related addictions remains a subject of controversy (e.g., Griffiths, 2005, 2017). At the same time, it is apparent that there is a widespread common understanding that social media platforms are designed to be as persuasive as possible and that individuals often use social media more than they plan or would

like to. This leaves fertile ground for further studies to gain a better understanding of the phenomenon of compulsive use of social media platforms and other digital technologies.

Based on this dissertation's strengths and limitations, a few major themes should be addressed. First, there is a need for theoretical and methodological development that would systematize the current inconsistent use of terminology, diagnostic criteria, and measurement problems across studies. Second, because the question of reliability and validity of self-reported measurement tools on PSMU has been raised frequently, researchers should aim to produce a commonly accepted, theoretically sound instrument to measure PSMU. Of course, the discrepancy between self-reported and actual use of social media platforms should also be addressed. Third, researchers should aim for causal inference and understand how PSMU and its effects evolve over time. Here, it is necessary to encourage more studies that utilize either longitudinal datasets or designs.

To conclude, this dissertation provides new information on how the aim of fundamental social needs can develop into overuse of social media platforms and to make individuals feel more lonely, less satisfied with their lives, and more likely to become victims of cybercrime. In some individuals, the compulsion for social connection evolves into compulsive social media use, which can, in turn, intensify feelings of loneliness and further heighten the need for connection. Despite the generally cautious tone of this dissertation, its objective is not to suggest that we are doomed or that social media technologies are inherently harmful. Rather, the aim is to encourage critical awareness of how new technologies integrate into our daily lives and the potential impacts they may have. All technologies carry inherent risks alongside their benefits. Therefore, it is essential to remain alert and strive to better understand the effects of these technologies on our well-being and social lives.

Abbreviations

CIUS	Compulsive Internet Use Scale
DPM	Dynamic panel model
FDA	Finland in the Digital Age
FE	Fixed effects
FOMO	Fear of missing out
IBRS	Identity Bubble Reinforcement Scale
ICT	Information and communication technology
LET	Lifestyle-exposure theory
PDA	Paralinguistic digital affordance
PSMU	Problematic social media use
RAT	Routine activity theory
RE	Random effects
REWB	Random effects within-between
SIT	Social identity theory

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