Unmasking the Bright-Dark Duality of Social Media Use on Psychological Wellbeing: A Large-Scale Longitudinal Study

Author information:

Author 1:

Yanqing Lin, M.Sc.
Doctoral Candidate,
Department of Information and Service Management
Aalto University School of Business
Ekonominaukio 1, 02150 Espoo, Finland
Email: yanqing.lin@aalto.fi

Author 2 and Corresponding Author:

Dr. Shaoxiong Fu, Ph.D
Associate Professor
Head of Department of Information Management Science
College of Information Management, Nanjing Agricultural University
Email: fu_shaoxiong@163.com

Author 3:

Dr. Xun Zhou, Ph.D.
Lecturer in Environmental Economics,
Department of Environment and Geography
University of York
290 Wentworth Way, Heslington, York YO10 5NG, United Kingdom
Email: xun.zhou@york.ac.uk

Acknowledgments

Yanqing Lin gratefully acknowledges financial support from the Finnish Foundation for Economic Education (Liikesivistysrahasto) and the Marcus Wallenberg Foundation (Grant Nos. 12-3407-40; 13-3998-14; 14-4368-17). Xun Zhou gratefully acknowledges financial support from the Finnish Cultural Foundation (Grant No. 00201201).

An earlier, much shorter paper building on the same dataset was published in the *Twenty-Fourth Pacific Asia Conference on Information Systems* (PACIS 2020 Proceedings), however, with a different theoretical grounding and contributions. The full text is available at https://aisel.aisnet.org/pacis2020/66/.

Declarations of interest: none

Unmasking the Bright-Dark Duality of Social Media Use on Psychological Wellbeing: A Large-Scale Longitudinal Study

Abstract

Purpose – As the number of social media users continues to rise globally, a heated debate emerges on whether social media use improves or harms mental health, as well as the bidirectional relation between social media use and mental health. Motivated by this, our study adopts the stressor-strain-outcome model and social compensation hypothesis to disentangle the effect mechanism between social media use and psychological wellbeing.

Design/methodology/approach – To empirically validate the proposed research model, a large-scale two-year longitudinal questionnaire survey on social media use was administered to a valid sample of 6,093 respondents recruited from a university in China. Structural equation modeling was employed for data analysis.

Findings – A longitudinal analysis reveals that social media use positively (negatively) impacts psychological wellbeing through the mediator of nomophobia (perceived social support) in a short period. However, social media use triggers more psychological unease, as well as more life satisfaction from a longitudinal perspective.

Originality/value – This study addresses the bidirectional relation between social media use and psychological unease. The current study also draws both theoretical and practical implications by unmasking the bright-dark duality of social media use on psychological wellbeing.

Keywords: social media, social support, nomophobia, psychological wellbeing, social compensation, stressor-strain-outcome

Article classification: Research paper

1. Introduction

The boom of mobile Information and Communications Technologies (ICTs) has promoted a series of online communication platforms, among which social media is dubbed a distinct category of interactive ICT (Duffett and Wakeham, 2016; Mulyana *et al.*, 2020). Social media has invaded either individual communication circles or commercial communication scenarios in various forms, including but not limited to social networking sites (SNSs), chat applications, (micro)blogs, forums, and content communities (Chan-Olmsted *et al.*, 2013; Duffett and Wakeham, 2016; Ungerman and Myslivcová, 2014). The worldwide accessibility to the mobile Internet and the increasing popularity of mobile devices, particularly smartphones, significantly accelerate the pervasiveness of social media. As of 2021,

the global active social media users have amounted to 4.2 billion, with penetration surpassing half of the global population (Tankovska, 2021). Note that almost all of these users (4.15 billion) access their social media via mobile devices (Tankovska, 2021).

Albeit the widespread use of social media in daily life has set the basis for dramatic changes in personal relationships, a heated debate emerges on whether social media use enhances or undermines psychological wellbeing among academia and the public (e.g., Yue *et al.*, 2022; Zhang *et al.*, 2021). One research stream holds the ground on the *bright side* of social media use and endorses that social media use can be transformed into more frequent and better social relationships by helping users overcome such constraints as geography and schedule (Leonardi, 2014; Lin and Chang, 2018; Subramanian, 2017), thereby improving psychological wellbeing (Ainin *et al.*, 2015; Syrek *et al.*, 2018). Contrarily, more researchers subscribe to adverse outcomes of social media use, so-called the *dark side* of social media use (e.g., Baccarella *et al.*, 2018; Dhir *et al.*, 2021; Sheldon *et al.*, 2019). They contend that increasing time hunkering alone on social media can easily cause an interruption in genuine social interactions (Al-Kandari and Al-Sejari, 2021; Meshi *et al.*, 2020; Primack *et al.*, 2017), and thereby mental unease, such as social media addiction, anxiety, and depression (Amin, 2020; Hou *et al.*, 2019; Keles *et al.*, 2020).

Such disagreement among studies on the impacts of social media could be attributed to several reasons. One explanation for the duality of social media use on psychological wellbeing may be because *different mediators* exist between social media use and psychological wellbeing. Such various mediated paths enable change in the relation between social media use and psychological wellbeing. Under this circumstance, understanding how social media use impacts psychological wellbeing by consolidating the bright-dark dual view via considering different mediating variables may provide a complete picture of the effects of social media use, particularly when conflicting results have been reported in the existing literature. In addition, the current literature on the impact of social media use is predominated by the investigation of immediate outcomes of specific social media applications based on cross-sectional analyses (e.g., Gao *et al.*, 2020; Khobzi *et al.*, 2019; Reinecke *et al.*, 2017). Nevertheless, the overall impact of social media use may accumulate over time, and psychological symptoms may take time to develop and surface (Glover *et al.*, 2010; Thompson *et al.*, 2010). This could be another reason for the lack of consensus in prior studies regarding the effect of social media use on mental health. Thus, it is necessary to take the factor—*time*—into account when considering the psychological outcome of social media use. The present study strives to scrutinize the *lagged effect* of social media use on psychological wellbeing through two-year longitudinal evidence.

A bidirectional relation has been acknowledged in previous studies between social media use and psychological unease (see, e.g., Boursier *et al.*, 2020; Cauberghe *et al.*, 2021). A majority of the current literature subscribes that social media use gives rise to many psychological symptoms, such as addiction (Brooks *et al.*, 2017; Lin *et al.*, 2021b), technostress (Brooks *et al.*, 2020; Nayak and Budhwar, 2022), depression (Dhir *et al.*, 2018; Primack *et al.*, 2021), and exhaustion (Fu *et al.*, 2020b; Maier *et al.*, 2015b). Oppositely, some researchers assert that a significant element that entices increased social

media use in voluntary settings is psychological unease. For instance, individuals with a higher level of loneliness are more likely to be addicted to smartphones (Bian and Leung, 2015) and have a higher possibility of hanging over on social media longer and more frequently (Boursier *et al.*, 2020; Geirdal *et al.*, 2021). It can occur through multiple and subsequent mechanisms. First, we follow the assertion of the bulk of the current literature that social media use does contribute to cultivating addictive symptoms and psychological unease. Second, following the social compensation hypothesis (SCH), users with psychological discomfort are more likely to be lured by social media interactions because of a lack of social skills in the real world (Poley and Luo, 2012; Sivashanker, 2013). To unmask the bidirectional relation, our study argues and empirically demonstrates that psychological wellbeing can be either the outcome or driver of social media use.

This paper draws upon the stressor-strain-outcome (SSO) model and treats psychological wellbeing as a consequence of social media use through different mediators. Meanwhile, we build on the SCH and argue that the status of individual psychological wellbeing, as a triggering factor, affects subsequent social media use. This further emphasizes the importance of conducting a longitudinal study in disentangling the multiple underlying mechanisms between social media use and psychological wellbeing from a duality perspective of both bright and dark sides. Accordingly, the present study strives to answer the question: How do social media use and psychological wellbeing interact *over time*?

This study offers a comprehensive theoretical framework for understanding the multiple mechanisms underlying the relationship between social media use and psychological wellbeing from both cross-sectional and longitudinal perspectives. The contributions to social media research are three-fold. First, while prior social media research has focused on the adverse mental health aspects of social technologies, our study manifests how social media use appeals differently to social support perceivers and nomophobic users, which ultimately reflects the bright and dark sides of social media use. Such insights extend the existing literature on the duality of social media use and the sophisticated effect mechanism of social media use on psychological health. Particular attention should be paid to the process of linking social motivations to outcomes of using social media since users may experience distinct wellness outcomes based on different mediating factors. Second, this study addresses the longitudinal effect of social media use on psychological wellbeing by the lagged effect. This can help to bring consensus to the relationship through robust evidence and address the limitations in most previous studies, where cross-sectional analyses may lead to contradictory results. Third, this study is conducive to disentangling the bidirectional relation between social media use and psychological wellbeing. This enriches the current literature by showing how social media use acts as a stressor to cause wellness-related outcomes and reversely how it is affected by mental health.

The rest of the present paper is structured as follows. Section 2 presents a literature review on the dual effect of social media use, followed by the theoretical foundation built in Section 3 and the research hypotheses proposed in Section 4. Subsequently, Section 5 describes the methodology, after which the data analysis and results are reported in Section 6. In the final section, we discuss the results and conclude this study with theoretical and practical implications, as well as research limitations.

2. Literature review

2.1 Duality in psychological outcomes of social media use

Social media use not only provides numerous psychological benefits to users (Choi and Noh, 2020a; Pang, 2020; Zhang and Jung, 2022) but also causes adverse consequences on their psychological well-being (Fu *et al.*, 2020b; Salo *et al.*, 2019). Table I summarizes key empirical studies in past years regarding the positive and negative effects of social media use on psychological wellbeing.

One research stream highlights the bright side of social media use. As a hub of communities for online interactions, social media intentionally helps individuals bridge geographic and temporal gaps and explicitly meets users' needs for social communication and interpersonal connection (Gerke *et al.*, 2020; Subramanian, 2017). As such, "*increased social support would seem to be an element sine qua non of the social media experience*" (Gerke *et al.*, 2020, p. 711). Social support refers to the sustained social cohesion that assists users in maintaining psychological health through accepting comfort, protection, and information from other users (Luarn *et al.*, 2015). Notably, social support serves as one typical positive outcome of social media use (which can also be observed in the column "*Psychological outcomes*" in Table I). As proof, seeking social support through social media enables youngsters to ameliorate depressive symptoms if they have received social support (Frison and Eggermont, 2015). Besides, perceived social support is found to be a protective agent against depression in girls with active use of social media (Frison and Eggermont, 2016). Pang (2020) shows that social media use positively impacts social support and a sense of belonging by positively affecting online self-presentation. Similarly, Raza *et al.* (2020) indicate that social media use positively affects users' social benefits, which, in turn, positively affects their life satisfaction. Note that, as an essential proxy of psychological wellbeing, life satisfaction has been conceptualized as a cognitive assessment of a person's quality of life by "*a comparison of one's circumstances with what is thought to be an appropriate standard*" (Diener *et al.*, 1985, p. 71). In addition, previous studies suggest that social media use for non-work-related purposes during work sessions may constitute a micro-break and benefit employees from recovering from job-related stress (Lim and Chen, 2012; Syrek *et al.*, 2018). In a word, using social media can benefit users with positive psychological outcomes by inducing favorable perceptions, such as perceived social support (Kim, 2014; Selkie *et al.*, 2020).

Alongside the bright side that social media affords, more recent studies focus on the dark side of social media use. Social media addiction, or related nomophobic symptoms, can be one of the most significant direct outcomes of social media use (Schneider and Wang, 2016; Thadani *et al.*, 2016). A number of studies demonstrate that social media use can contribute to the cultivation of nomophobia (also known as no mobile phone phobia, referring to the fear of being unavailable to mobile phones) (Lin *et al.*, 2021b; Tams *et al.*, 2018) and addiction-related disorders (Brooks *et al.*, 2017; Thadani *et al.*, 2016; Turel *et al.*, 2011), thereby deteriorating personal mental health and individual performance. Furthermore, many researchers subscribe to the negative associations between social media use and psychological wellbeing. For instance, Boursier *et al.* (2020) find that excessive social media use can cause anxiety among users. Salo *et al.* (2019) contend that social media overdependence and overload

triggered by social media use can result in concentration and sleep problems. Likewise, Maier *et al.* (2015b) show that social media use can induce social overload and further cause social media exhaustion; social media dependency significantly increases social media stress. As a psychological stressor, compulsive SNS use positively contributes to depression and anxiety by cultivating social media fatigue (Dhir *et al.*, 2018). The detrimental consequences of social media use can be socially far-reaching by affecting individual psychology and behaviors, such as causing depression (Primack *et al.*, 2021), which has been declared the leading global cause of disability (Mathers and Loncar, 2006), or even triggering suicidal ideation (Romer *et al.*, 2006; Vidal *et al.*, 2020).

Noteworthily, a few prior studies indicate the duality of social media by covering both benefits and harms of using social media. As Turel and Serenko (2012) endorsed, being a significant motivation that drives individuals to engage in social media, perceived enjoyment also promotes user engagement as a favorable consequence of social media use. Perceived enjoyment can, in turn, lead to habitual social media use, thereby causing the undesirable outcome—pathological technology addiction. Social influence deriving from using social fitness applications can simultaneously trigger both harmonious and obsessive passion for exercise, further enhancing and undermining psychological wellbeing concerning life burnout, respectively (Whelan and Clohessy, 2021). Motivated by the intense debate between social media and wellbeing, Taylor *et al.* (2022) indicate the duality of social media use in close relationships in terms of facilitating connection (including closeness and relational satisfaction) and disconnection (including partner mistrust or jealousy) based on a review. More research has been recently called for to build theories on the duality of social media use and disentangling how the same social media behavior could engender relational processes with both positive benefits and adverse consequences (c.f., Soror *et al.*, 2022; Taylor *et al.*, 2022).

There is a lack of consensus concerning the psychological outcome of social media use documented in past studies. Different mediators may exist in the overall relationship between social media use and psychological wellbeing. This observation motivates the present study. Since past studies have been dominated by either negative or positive psychological outcomes of using social media and rarely taken a bright-dark duality view into account, an integrated analysis simultaneously involving both bright and dark sides is conducive to offering a complete understanding of the psychological impacts of social media use. Additionally, as indicated in Table I (the column "*Sampling*"), a large body of the existing literature is based on cross-sectional evidence. As such, a longitudinal perspective to understand the effect of social media use is needed to bring consensus to this topic.

Table I. Critical studies from 2015 to 2022 on the psychological outcomes of social media use

Source	Platform	Measurement of social media use	Sampling	Theoretical grounding	Antecedents	Psychological outcomes
The bright side of social media use						
Zhang and Jung (2022)	WeChat	Frequency of engaging (Like, Share, Comment) with health-related posts	Online survey (*N* = 522), voluntary participants in China aged above 18 years (50.2% females)	Social capital theory	Wechat engagement with health information (i.e., like, share, and comment)	Bonding social capital, Bridging social capital, Psychological wellbeing
Zhang *et al.* (2021)	General social media	Social media communication	Four-wave surveys from the Health and Retirement Study (2010/2012 and 2014/2016) (*N* = 7,524), Americans older than 50 years (59.53% females)	Social capital theory, Need-to-belong theory	Social media communication	Perceived social support, Social contact, Decreased loneliness
Choi and Noh (2020a)	Facebook, Twitter, Instagram, Line, Band, Kakaotalk, etc.	The frequency of using social media to communicate or make contact with family members and friends/ other users who share similar interests/ other users who have diverse views and various opinions	Nationwide online panel survey (*N* = 1,500), South Korean adults aged above 19 years (50.7% males)	Interpersonal-psychological theory	Social media use	Social capital, Self-esteem, Reduced suicidal ideation
Choi and Noh (2020b)	General social media (e.g., Facebook, Twitter, Instagram, and Kakaotalk)	The frequency of engaging in social media activities, including contacting or interacting with family and friends/ other people who have similar interests/ other people who have new and various perspectives	National online panel survey (N = 1,500), participants from South Korea (49.3% females)	–	Social media use	Psychological wellbeing, Social support, Decreased social isolation, Negative attitude toward suicide
Gerke *et al.* (2020)	General social media	Frequency of social media (e.g., Facebook, Twitter) use from 0 (never) to 9 (all the time)	Survey (N = 774), participants recruited from the participants enrolled in a site. Among which, 612 are cisgender who have sex with men, and 162 are trans women	–	Social media use frequency	Perceived social support
Pang (2020)	WeChat	Social function of WeChat use	Web-based questionnaire survey (*N* = 485), Chinese college students aged 18-20 years (50.5% females)	Self-presentation theory	Social function of WeChat use, Recreation function of WeChat use	Social support, Sense of belonging
Raza *et al.* (2020)	Facebook, Twitter, Instagram, WhatsApp, etc.	Social media intensity (including time spent using SNSs)	Online survey (*N* = 525), business college students (53% males)	Theory of social influence uses, Gratifications theory	Usage of social media	Social benefit, Life satisfaction
Selkie *et al.* (2020)	YouTube, Instagram, Facebook, Twitter, and Tumblr	Accessing the listed social media platforms for transgender-specific content	Interview (*N* = 25), participants recruited from a pediatric gender services clinic in the Midwestern U.S. aged 15-18 years (11 transfeminine, 13 transmasculine, and 1 nonbinary)	–	Social media use	Emotional support, Appraisal support, Informational support
Lee and Cho (2019)	General social media	The overall use of SNSs and online communities	Survey (*N* = 91), South Korean adults (68.1% males); Focus group interview (N =15)	–	Intensity of SNS use; Intensity of online community use	Social support (i.e., emotional, instrumental, informational, and appraisal support), Decreased depression Health psychological disposition

Source	Platform	Measurement of social media use	Sampling	Theoretical grounding	Antecedents	Psychological outcomes
Chae (2018)	Blog, Community, Facebook, Twitter, Instagram, LinkedIn, Mobilemessager	Daily frequency of using seven typical social media platforms	Nationwide online panel survey (*N*1 = 1,064, *N*2 = 782), Korean women aged 20-39 tears	Happiness-is-relative theory	Social media use	Happiness
Duan and Dholakia (2017)	General social media	Posting purchases on social media platforms (experiment-design)	Scenario-based survey (*N*1 = 176), undergraduate students (78 females); Web-based survey (*N*2 = 112) , undergraduate students (51 females)	–	Posting purchases on social media	Happiness from purchase
Oh and Syn (2015)	Facebook, Twitter, Delicious, YouTube, and Flickr	–	Online survey (*N* = 1,056), participants recruited from Amazon MTurk aged above 18 years (732 males)	The social exchange theory, The social cognitive theory	Motivations of social media use	Social support
The dark side of social media use						
Homaid (2022)	General social media	26-item Chen Internet Addiction Scale	Survey (*N* = 312), students at Shaqra University in KSA (31.4% females)	SSO model	Problematic social media use	Technostress, Exhaustion
Loh *et al.* (2022)	Social media use for mobile learning	–	Survey (*N* = 384), students from Malaysian public and private universities (55.5% females)	Stimulus–organism–response theory	Social overload, Privacy invasion, Information overload, Life invasion	Technostress, Exhaustion
Nayak and Budhwar (2022)	Enterprise social networks	Excessive social, hedonic, and cognitive uses at work (spending an unusually large amount of time using social media to create relationships at work/ take a break and relax from work/share content with colleagues)	Survey (*N* = 242), employees from research and development centers in India (33% females)	Conservation resource theory, Social support theory	Enterprise social networks use	Technostress, Employee mental health
Tandon *et al.* (2022)	General social media	–	Online survey (*N* = 243), respondents recruited s from US-based employees via *Prolific Academic* (58.8% males)	Theory of compensatory internet use, Regulatory focus theory, Limited capacity model	Fear of missing out	Phubbing at workplace, Work incivility, Workplace exhaustion
Whelan *et al.* (2022)	General social media	–	Survey (*N* = 220), students from a university in Ireland (60% females)	Theoretical perspective from technostress, The strength model of self-control,	SNS stressors	Deficient SNS self-control, Student vitality, Satisfaction with academic life
Yu *et al.* (2022)	General social media	Excessive social, hedonic, and cognitive uses at work	Online survey (*N* = 422), employees recruited via a market research company in China (213 females)	Uses and gratifications theory, Conservation of resources theory	Excessive social media use at work	Social media-related overload, Emotional exhaustion
Yue *et al.* (2022)	General social media	The extent to which Wuhan residents used social media to browse others' profiles, pictures, comments, and posts that are not relevant to COVID-19/ particularly relevant to COVID-	Online survey (*N* = 1,131), adults resided in Wuhan and self-identified as healthy (69.6% females)	Emotion regulation theory	Passive social media use, Cognitive reappraisal	Stress

Source	Platform	Measurement of social media use	Sampling	Theoretical grounding	Antecedents	Psychological outcomes
		19/ information seeking after Wuhan was locked down				
Lin *et al.* (2021a)	General social media	Bergen Social Media Addiction Scale	Survey (N = 1,073), Participants recruited from health centers and health houses in Qazvin province, Iran (57.2% females).	–	Problematic social media use	Decreased social trust, Decreased perceived social support, Decreased happiness, Anxiety, Depression, Decreased mental quality of life
Lin *et al.* (2021b)	General social media	Daily average time of using social media	Web-based survey (*N* = 9,256), Chinese college students (5,385 males)	Theories of psychological traits, Activity theory	Social media use	Nomophobia
Meshi and Ellithorpe (2021a)	General social media	6-item Bergen Social Media Addiction Scale	Survey (*N* = 403), undergraduate students from a large Midwestern U.S university (63.3% females)	–	Problematic social media use	Real-life social support, Social support on social media, Depression, anxiety, Social isolation
Primack *et al.* (2021)	General social media	Average total daily time spent on each self-reported social media	Online survey (*N* = 1,289), participants recruited by Qualtrics aged 18−30 years (55.1% females)	–	Social media use	Depression
Tandon *et al.* (2021b)	General social media	–	Survey (*N* = 324), social media users aged 18-25 years, recruited from *Prolific Academic* (55.4% females)	Theory of social comparison, Theory of compensatory internet use	Fear of missing out	Social media fatigue
Boursier *et al.* (2020)	General social media	Bergen Social Media Addiction Scale (e.g., "How often during the last year have you spent a lot of time thinking about social media or planned use of social media?)	Online survey during the period of pandemic lockdown for COVID-19 (*N* = 715), Italian adults aged 18-72 years (71.5% females)	–	Excessive social media use	Anxiety
Brooks *et al.* (2020)	General social media	–	Survey (*N* = 363), undergraduate students from the US (from a public university in the northwest, 245) and China (from a public university in the northwest, 118)	–	Social media addiction, Internet addiction	Social media related technostress
Fu *et al.* (2020b)	Facebook	–	Online survey (*N* = 412), participants recruited from Amazon MTurk aged above 18 years (209 males)	SSO model	Information overload, System feature overload, Social overload	Social media exhaustion, Discontinuous usage behavior
Shi *et al.* (2020)	General social media	–	Online survey (N = 249), undergraduate students from several comprehensive Chinese universities (140 females)	SSO model	Information overload, Communication overload, Social overload	Technostress, Exhaustion
Tarafdar *et al.* (2020)	Facebook	–	Three-wave survey panel (*N* = 444), participants from a European Union country recruited from emails (55.1% females)	Theory of technology frames; The concept of feature-rich information technology; Distraction as a coping behavior	SNS stressors	Distraction (within SNS), Distraction (outside SNS), SNS addiction
Cao and Yu (2019)	General social media	Excessive social, hedonic, and cognitive uses at work	Online survey (*N* = 305), employees recruited via a market research company in China (51.8% females)	Uses and gratifications theory	Excessive social use at work,	Technology-work conflict, Strain

Source	Platform	Measurement of social media use	Sampling	Theoretical grounding	Antecedents	Psychological outcomes
					Excessive hedonic use at work, Excessive cognitive use at work	
Salo *et al.* (2019)	General social media	–	Interview (*N* = 32), SNS users who had experienced SNS stress aged 20-80 years (16 females)	–	SNS overdependence, Overload, Life comparison discrepancy, Online discussion conflict, Privacy and security uncontrollability	Concentration problems, Sleep problems, Identity problems, Social relation problems
Cao and Sun (2018)	General social media	–	Online survey (*N* = 258), participants recruited from university BBS and email (55.0% males)	Stimuli-organism-response model	Information overload, Communication overload, Social overload	Exhaustion, Regret
Dhir *et al.* (2018)	Facebook	Compulsive Facebook use	Survey (*N1* = 1,554, *N2* = 1,144) adolescent social media users from India, aged 12–18 (54.5% and 50.6% males, respectively)	SSO model	Compulsive SNS use, Fear of missing out	Depression; Anxiety
Moqbel and Bartelt (2018)	ESM software platform	Using SNSs to post updates on work projects/ arrange meetings with colleagues about organizational objectives, policies, and procedures/ gain access to others with expertise in a particular area	Online survey (*N* = 276), employees from an information technology corporation in the Midwest region of the US (51.6% females)	Social capital theory, Emotional dissonance theory	SNS work use	Work isolation, Decreased job satisfaction, Decreased positive emotions, Work stress
Brooks *et al.* (2017)	Facebook, Youtube, etc.	–	Survey (*N* = 1,731), participants recruited from Amazon MTurk aged 18-81 years (47.5% males)	Distraction-conflict theory	Distraction from social media	Social media-induced technostress, Internet addiction
Hsiao *et al.* (2017)	Line, WeChat, etc.	Compulsive usage (withdrawal symptoms, loss of control, salience, life dysfunction, conflict, and compulsion/persistence)	Online survey (*N* = 136), university students aged 18-25 years (57.35% females)	Personality theory	compulsive social app usage	Technostress
Schneider and Wang (2016)	General social media	–	Survey (*N* = 300), social media users in the US (245 samples, 56% males) and Hong Kong (55 samples, 38% males)	–	Internet addiction, Social media addiction	Social media-related technostress
Maier *et al.* (2015a)	Facebook	Frequency of SNS usage	Online survey (*N* = 571), Facebook users (55% males)	Social support theory	Extent of SNS usage, Number of friends in SNS	SNS overload, SNS exhaustion, Lower SNS satisfaction
Maier *et al.* (2015b)	Facebook	–	Experiment (*N* = 82), participants recruited using advertisements on a university notice board aged 18-42 years (52% males)	User transformation model	SNS-stress creators, Switching-stress creators	SNS-exhaustion, Switching-exhaustion
Sasaki *et al.* (2015)	Twitter	The number of tweets received, number of friends, and density of a user's egocentric network	Web-based survey and crawling of Twitter users' data (*N* = 277), Twitter users aged 20-39 years (48.5% males)	–	Social media use	Information overload

2.2 Bidirectional relation between social media use and psychological status

Although the mainstream of past studies conveys that social media use can trigger psychological reactions from users (e.g., Boursier *et al.*, 2020; Lin *et al.*, 2021b; Selkie *et al.*, 2020; Zhang and Jung, 2022), some researchers assert that unfavorable mental status contributes to increasing social media use (e.g., Cauberghe *et al.*, 2021; Cha and Seo, 2018; Milošević-Đorđević and Žeželj, 2014). To exemplify this contention, previous studies show empirical evidence that loneliness is positively associated with the duration and frequency of social media use (Boursier *et al.*, 2020; Geirdal *et al.*, 2021; Guo, 2018); higher loneliness causes an increased likelihood of being mobile phone addiction (Bian and Leung, 2015). Low self-esteem, low self-efficacy, and high introversion are psychological predictors that significantly contribute to addictive SNS use (Milošević-Đorđević and Žeželj, 2014). Anxious users are inclined to use social media more frequently to deal with the current situation during the Covid-19 pandemic, and lonely users use social media more often to increase social connections (Cauberghe *et al.*, 2021). Personality traits, taking narcissism as an example, are also found to cause higher tendencies toward problematic social media use/social media use disorder, despite the terminology *per se* being a matter of stormy debate in academia (Brailovskaia and Margraf, 2017; Casale and Banchi, 2020; Hussain *et al.*, 2020; Wegmann *et al.*, 2020). Dependence on the Internet and mobile phones can increase social media use. Yildirim and Correia (2015) show that users with nomophobia depend on the resources offered by smartphones, which improves users' access to social media. Higher nomophobia is associated with a longer duration of mobile Internet use (Gezgin and Çakır, 2016), habitually checking smartphones (Gezgin *et al.*, 2017), and pre-sleep mobile phone use (Yogurtcu, 2018).

Whereas seeking social support is one primary motivation for users to use social media (Frison and Eggermont, 2015; Oh and Syn, 2015; Vidal *et al.*, 2020), would individuals with sufficient perceived social support decrease their social media use? Perceived social support represents personal confidence that one has access to adequate support from others when needed (Barrera, 1986). Past studies articulate that perceived social support is negatively associated with problematic smartphone use (Fu *et al.*, 2020a; Gökçearslan *et al.*, 2018). Evidence also suggests that perceived social support helps mitigate excessive smartphone use (Wu *et al.*, 2016) and plays a protective role in preventing individuals from suffering from Internet addiction (Lei *et al.*, 2018). In this vein, it is conceivable that people who perceive more social support are less likely to spend more time on social media, considering that social media dominates mobile use.

In a nutshell, the current literature conveys a bidirectional relationship between social media use and psychological status. While social media use causes psychological outcomes in users, users' psychological states can also affect their social media use. A potential inference is that the bidirectional relation could be a time-lagged manifestation: the initial social media use results in psychological outcomes, and the induced psychological outcomes further influence subsequent social media use in the next stage. In this regard, scrutinizing the relationship between social media use and psychological

wellbeing through a longitudinal analysis may derive some new insights, especially when insufficient literature has concurrently examined the duality in psychological outcome of social media use.

3. Theoretical foundation

3.1 SSO model: social media use induces psychological outcomes

The SSO model suggests that environmental stimuli can lead to specific psychological and/or behavioral responses by provoking individuals' emotional and cognitive reactions (Koeske and Koeske, 1993). This model involves three sequential factors: *stressor*, i.e., the environmental stimulus that triggers stress and influences a user's experiences (Ayyagari *et al.*, 2011); *strain*, i.e., a user's psychological reaction to stressors (Cao *et al.*, 2018); and *outcome*, i.e., the reaction to strains, including psychological and physical outcomes and behavioral responses (Cao *et al.*, 2018; Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2019). The SSO model conceptualizes the process of how stressors engender strains, and how strains result in outcomes, where strains typically act as mediators between stressors and outcomes (Koeske and Koeske, 1993; Shi *et al.*, 2020; Sun and Lee, 2021). Although strains are usually viewed as disruptive and annoying (Cao *et al.*, 2018), we treat the strains here as neutral reactions to stressors because the direct impact of social media use can be either positive or negative on individuals.

The SSO model has been widely applied in various social media contexts (see Table II), e.g., Facebook, Wechat, and WhatsApp. As proof, based on WeChat, Teng *et al.* (2022) find that information overload, social overload, and privacy concerns positively affect social network fatigue, while social overload positively affects anxiety. Further, social network fatigue and anxiety positively affect negative usage behavior. Through an empirical study on Facebook, Fu *et al.* (2020b) indicate that users' information overload, social overload, and system feature overload exert positive impacts on their discontinuous usage behavior by inducing social media fatigue. Following two waves of cross-sectional surveys, Dhir *et al.* (2018) present that compulsive social media use and fear of missing out positively influence social media fatigue, which, in turn, positively affects depression and anxiety. As such, SSO offers an explanatory framework to model the impact of social media use on psychological outcomes by creating social media-related strains.

The present study is grounded on the SSO model to explain the effect mechanism of social media use on psychological wellbeing through nomophobia and perceived social support. Due to its practicality and scientific validity in terms of research theory and techniques, the SSO model has been well-articulated in a variety of studies related to the causes and outcomes of stressors (Ayyagari *et al.*, 2011; Sun and Lee, 2021; Ye *et al.*, 2022). Past studies have shown the SSO model can account for factors related to stress and their influence on outcomes within the technology use context, as demonstrated in Table II. In this study, the primary reason that the SSO model is singled out over other theoretical lenses lies in its full compatibility with the immediate underlying mechanism argued in the present study: social media use is identified as a technology-based stimulator that leads to direct mental reactions, and direct mental reactions in turn shape psychological change outcome. From an information system (IS) perspective, social media use, being personal mobile technology using

experience, has been acknowledged as an external stimulator that induces social media-related strains, which further cause psychological or behavioral consequences (Cao *et al.*, 2018). Past studies have investigated social media use in specific scenarios (e.g., late-night use) that causes mental reactions, such as social media addiction (Zolkepli *et al.*, 2021) and social media fatigue (Masood *et al.*, 2021; Teng *et al.*, 2022; Xiao and Mou, 2019), which further lead to psychological reactions (Chuang and Liao, 2021; Dhir *et al.*, 2018; Zolkepli *et al.*, 2021) or behavioral responses (Guo *et al.*, 2020; Teng *et al.*, 2022; Zhang *et al.*, 2022). In addition, the current study has identified perceived social support as one of the primary motivations (Gerke *et al.*, 2020; Subramanian, 2017) and typically positive outcomes of social media use (Oh and Syn, 2015; Pang, 2020; Selkie *et al.*, 2020). In this vein, we employ the SSO model in social media research to pinpoint the process of how personal experience of social media use shapes psychological outcome.

Table II. A summary of key journal articles from 2016 to 2022 on the influence of social media use grounded on the SSO model

Source	Platform	Stressors	Strains	Outcomes
Homaid (2022)	General social media	Problematic social media use	Technostress, Exhaustion	Academic performance decrement
Masood *et al.* (2022)	General social media	Social overload, Information overload, System feature overload	Academic performance	Discontinuance intention
Teng *et al.* (2022)	General social media	Information overload, System feature overload, Social overload, Privacy concern	Social network fatigue, Anxiety	Negative usage behavior
Wang and Deng (2022)	General social media	Social media use, Concern level	Social media Fatigue	–
Yang and Zhang (2022)	General social media	Social media affordances (i.e., editability, visibility, persistence, association)	Privacy concern, Impression management concern	Social media fatigue
Ye *et al.* (2022)	General social media	System feature overload, Information overload, Social overload	Fear of missing out, Fatigue	Discontinuous usage intention
Zhang *et al.* (2022)	Wechat	Information overload, Compulsive use, Fear of missing out, Time cost, Privacy concerns	Social media fatigue intention	Social media fatigue behavior
Bermes (2021)	General social media	Information overload	Information strain	Probability of sharing fake news
Chuang and Liao (2021)	Facebook	Overload	Social network fatigue, Disconfirmation, Dissatisfaction	Regret, Discontinuance intention
Luqman *et al.* (2021)	(Late-night usage of) smartphone-based SNSs	Excessive social use, Excessive hedonic use, Excessive cognitive use	Poor sleep quality, Cognitive function depletion	Decreased academic performance
Malik *et al.* (2021)	WhatsApp	Social comparisons, Self-disclosure, Intensity of mobile instant messaging (MIM) use	MIM fatigue	Academic performance decrement
Masood, Feng, *et al.* (2021)	General mobile social media	Late-night excessive use of smartphone-based SNSs	Poor sleep quality, Social media self-control failure, Guilt feelings	Discontinuance intention
Pang (2021)	Wechat	Compulsive WeChat use, Information overload	Social media fatigue	Emotional stress, Social anxiety
Shahzad *et al.* (2021)	General social media	Late-night social media usage	Life invasion, Technostress	Entrepreneurial cognitive engagement

Source	Platform	Stressors	Strains	Outcomes
Sun and Lee (2021)	Instant messaging apps like WhatsApp, iMessage, Skype, WeChat, GroupMe, KakaoTalk, etc.	Communication overload, Social overload	Instant messaging fatigue, Technostress	Discontinuous usage intention
Tandon *et al.* (2021a)	General social media	Exhibitionism, Voyeurism	Fear of missing out	Compulsive social media use, Work performance decrement, Procrastination due to social media use at work
Zolkepli *et al.* (2021)	General social media	Boredom, Fear of missing out	Social media addiction, Social media fatigue	Perceived social isolation
Fu *et al.* (2020b)	Facebook	Information overload, System feature overload, Social overload	Social media fatigue	Discontinuous usage behavior
Guo *et al.* (2020)	WeChat Moment	Information irrelevance, Information overload, Social overload	Social network fatigue	Information avoidance behavior
Masood, Luqman, *et al.* (2020)	Facebook	Excessive social media use	Cognitive distraction	Decreased academic performance
Shi *et al.* (2020)	Social media in China like WeChat, QQ, and Sina Weibo	Information overload, Communication overload, Social overload	Technostress, Exhaustion	Decreased academic performance
Dhir *et al.* (2019)	Facebook and WhatsApp	Privacy concerns, Self-disclosure, Parental encouragement, Parental worry, Parental monitoring, Parental permission	Fatigue	Academic performance decrement
Xiao and Mou (2019)	WeChat	Privacy invasion, Invasion of life	Social media fatigue	–
Cao *et al.* (2018)	General social media	Excessive social media use, Cognitive-emotional preoccupation	Life invasion, Techno-exhaustion, Privacy invasion	Decline in academic performance
Dhir *et al.* (2018)	Facebook	Compulsive social media use, Fear of missing out	Social media fatigue	Depression, Anxiety
Nawaz *et al.* (2018)	General social media	Social overload, Information overload, Exhaustion	Dissatisfaction, Regret	Discontinuous usage intentions
Yu *et al.* (2018)	Social media use at work	Information overload, Communication overload, Social overload	Social media exhaustion	Decreased job performance
Lee *et al.* (2016)	General social media	Information overload, Communication overload, System feature overload	Social media fatigue	–
Zhang *et al.* (2016)	Qzone	System feature overload, Information overload, Social overload	Social network fatigue, Dissatisfaction	Discontinuous usage behavior

3.2 SCH: psychological wellbeing acts as a precursor of social media use

The SCH argues that people with high social anxiety are more likely to utilize online interactions to compensate for their deficits in offline social skills in the real world (Poley and Luo, 2012; Sivashanker, 2013). The establishment of this argument is based on the fact that those individuals, who lack social skills and struggle to build relationships with others in the offline world, tend to feel more comfortable in online communications in virtual communities (Papacharissi, 2002), thereby being more motivated to use social media (Zywica and Danowski, 2008). Socially disadvantaged individuals, such as those who are lonely or have low social competence, normally lack the ability to maintain rich and strong social ties in face-to-face circumstances and are prone to spend more time on social media platforms because they may feel better and controllable to express their true selves over the Internet

(Casale *et al.*, 2022; Chen *et al.*, 2022; McKenna *et al.*, 2002). Evidence also reveals that adolescents self-report they use social media for social compensation acquisition and social relationship formation and maintenance (Casale *et al.*, 2022; Oh and Syn, 2015; Pang, 2020). As such, social media offers a channel for them to augment their limited social networks and accumulate the resources that they need.

The recent literature endorses the role of SCH in explaining that psychological wellbeing takes for a precursor of social media use (e.g., Chen *et al.*, 2022; Lyvers *et al.*, 2020; Toma, 2022). Previous findings demonstrate that individuals with psychological unease, such as anxiety and loneliness, perceive online communications as more comfortable and are more likely to disclose themselves on social media for social compensation (Amichai-Hamburger and Ben-Artzi, 2003; Cauberghe *et al.*, 2021; McKenna *et al.*, 2002; Sheeks and Birchmeier, 2007; Zywica and Danowski, 2008). Likewise, an introvert tends to disclose personal information via social media (Ross *et al.*, 2009; Zywica and Danowski, 2008), which is driven by social compensation (Amichai-Hamburger and Vinitzky, 2010). There is replicable evidence indicating that individuals with higher mental unease are more likely to spend longer time online for social purposes (Amichai-Hamburger and Ben-Artzi, 2003; Desjarlais and Willoughby, 2010; Papacharissi, 2002; Peter *et al.*, 2005). In line with SCH, past studies associate higher social media use with lower life satisfaction (Ponnusamy *et al.*, 2020), higher social anxiety (Lyvers *et al.*, 2020), and incremental stress (Yang *et al.*, 2021a). In this regard, people with unfavorable psychological status probably perceive themselves as undesirable members of social groups and turn to virtual networks to develop online relationships and compensate for their offline lack. Given that social media platforms are the primary carriers of online communications, the social compensation process signifies that mental discomfort brings about accumulated social media use. On the contrary, individuals with an optimum psychological state, such as satisfaction with life, are less likely to turn to virtual communities for social compensation.

Whereas SSO model concentrates on that personal behavioral experience leads to psychological outcomes either directly or indirectly through strains, SCH explains that psychological status can affect individual behaviors of online interaction. As a result, the SSO model, together with SCH, articulates that personal experience impacts psychological outcomes via psychological mediators, and the formed psychological outcomes, in turn, shape subsequent individual behavior. These two theories are complementary to each other to a large degree. In this vein, the SSO model helps explain the impact process of social media use on psychological wellbeing through perceived social support and nomophobia. In contrast, SCH interprets how the shaped psychological status influences subsequent social media of the next stage.

4. Hypotheses development

4.1 Hypotheses development based on SSO model

Following the SSO model, social media use can be viewed as a technology-related stimulus, which induces psychological reactions, i.e., techno-exhaustion (Cao *et al.*, 2018) and bonding/bridging social capital (Chen and Li, 2017) in users. Social media is one of the main channels for users to

maintain online social connections and obtain social support from friends, colleagues, and family (Udwan *et al.*, 2020). For example, for transgender adolescents, social media platforms represent community hubs to seek social support in terms of emotion, appraisal, and information (Selkie *et al.*, 2020). Social media use can provide social support to users through enhancing online self-presentation (Pang, 2020). Perceived social support is particularly critical for creating the social atmosphere in social media communities, promoting users to actively engage in social media communities (McKenna *et al.*, 2002). In particular, when users are physically scattered, more time spent on social media results in increased perceived social support (Pai and Tsai, 2016). Thus, we propose that:

Hypothesis 1. Social media use is associated with *higher* perceived social support.

The cultivation of nomophobia can be viewed as a process that an experience-based stimulus of smartphone use evokes the user's psychological reactions. A global survey revealed that the average daily time on social media by Internet users worldwide was 145 minutes in 2020, taking up most of their mobile phone time (Tankovska, 2021). Since mobile phone overuse is the leading cause of nomophobia (Fu *et al.*, 2021; Kara *et al.*, 2021), it is conceivable that nomophobia develops along with the increased use of social media via mobile phones. More expressly, past studies have revealed that individual tendency to suffer from nomophobia is proportional to their social media use level (Ayar *et al.*, 2018; Lin *et al.*, 2021b). Individuals with high engagement in social media should have more fear of missing out and a higher possibility of being addicted to mobile phones (Fuster *et al.*, 2017). As a result, social media use can be a sufficient qualification for cultivating nomophobia. Social media users may worry about being out of contact with their friends or family members, thus, keep checking their social media applications on their phones. As such, social media users are more likely to feel anxiety when away from mobile phones, thereby developing nomophobia. Thus, we posit that:

Hypothesis 2. Social media use is associated with *higher* nomophobia.

In social media contexts, perceived social support emphasizes the experience and/or subjective belief that users can obtain assistance from social networks (House *et al.*, 1988). Following the main effect model of social support (Lakey and Orehek, 2011), social support offers psychological benefits for users by regulating their thoughts, sentiments, and behaviors. Social media users can receive comfort and a positive appraisal from others by interacting with other users, thus reducing psychological unease like loneliness, depression, and perceived stress (Luarn *et al.*, 2015), as well as increasing life satisfaction (Oh *et al.*, 2014; Utz and Breuer, 2017). Specifically, perceived social support provided by friends on social media helps users cope with loneliness (Cao and Lu, 2021) and improves psychological wellbeing (Chan and Li, 2020). Perceived social support acts as a protective blocking agent in the depression pathway (Kim and Suh, 2019) and helps to improve life satisfaction (Fang *et al.*, 2021). It also offers resources to users in a certain way that promotes their abilities to buffer stressors in work and life (Agbaria and Mokh, 2022). Thus, we propose that:

Hypothesis 3a. Perceived social support is associated with *lower* psychological unease.

Hypothesis 3b. Perceived social support is associated with *higher* life satisfaction.

The strain of nomophobia attributed to mobile social media use can further cause adverse psychological outcomes. For instance, users with nomophobia are more likely to be lured into spending more time on social media applications, which may further lead to negative psychological symptoms. Nomophobia is also known as a kind of addiction (Yildirim and Correia, 2015), which contributes to adverse psychological symptoms, such as loneliness (Gezgin *et al.*, 2018) and anxiety (Ayar *et al.*, 2018). Users with nomophobia will feel psychological discomfort and anxiety when they cannot interact with their friends on social media via mobile phones or connect to social networks (King *et al.*, 2013; Yildirim and Correia, 2015). Thus, we propose that:

Hypothesis 4a. Nomophobia is associated with *higher* psychological unease.

With the prevalence of technology addiction, the relationship between mobile use (including addiction) and life satisfaction/happiness has attracted great academic interest (Hull *et al.*, 2013; Kula *et al.*, 2020; Longstreet and Brooks, 2017). Previous evidence suggests a negative relation between smartphone addiction and life satisfaction (Kula *et al.*, 2020). As subscribed by Samaha and Hawi (2016), smartphone addiction can reduce individual satisfaction with life through increasing perceived stress. It is conceivable that users with nomophobic symptoms, similar to addiction to smartphones, could end up with reduced life satisfaction. Thus, we propose that:

Hypothesis 4b. Nomophobia is associated with *lower* life satisfaction.

4.2 Hypotheses development based on SCH

Perceived social support indicates individual confidence in accessing adequate support when needed (Barrera, 1986). Following SCH, individuals with sufficient perceived social support are less likely to rely on online social skills to acquire supererogatory social compensation. Past studies document this indication with supporting evidence that perceived social support is negatively associated with problematic mobile phone use (Fu *et al.*, 2020a; Gökçearslan *et al.*, 2018; Wu *et al.*, 2016). Furthermore, perceived social support is conveyed as a protective agent that prevents individuals from suffering from Internet addiction (Lei *et al.*, 2018). In this vein, it is conceivable that individuals with higher perceived social support are less likely to hunker alone on their social media platforms via mobile devices. Therefore, we postulate that:

Hypothesis 5. Perceived social support is associated with *lower* subsequent social media use.

Nomophobia can further aggravate users' subsequent mobile use. As a psychological disorder, nomophobia manifests itself as pathological symptoms of anxiety, irritability or even anguish caused by being out of reach of mobile phones (Bragazzi and Puente, 2014; Marciano *et al.*, 2021). Previous studies have empirically subscribed to elevated social anxiety resulting from the cultivation of nomophobia/smartphone addiction (e.g., Anshari *et al.*, 2019; Edwards *et al.*, 2022; Enez Darcin *et al.*, 2016). Individuals with nomophobia usually suffer from social anxiety, and end up being introverted with low self-confidence and disabling them to express themselves in face-to-face settings but turn to online communication (Anshari *et al.*, 2019). In accordance with SCH, social media can be an alternative to offline contact for these nomophobic individuals who are socially anxious (Anshari *et al.*, 2019; Tosuntaş *et al.*, 2020). This assertion is supported by evidence that people with nomophobia are

more dependent on their mobile devices and more likely to compel themselves to spend more time on their mobile devices (Lin *et al.*, 2020). Nomophobia can reduce users' self-control by incurring fatigue (Geng *et al.*, 2018; Tams *et al.*, 2018), resulting in inappropriate behavioral responses, such as habitually checking their mobile phones (Gezgin *et al.*, 2017) and devoting more time to mobile use (Gezgin and Çakır, 2016). In light of social media as an important form of mobile use, it is reasonable to assume that nomophobic users would further increase time on social media use. Thus, we postulate:

Nomophobia can further aggravate users' subsequent mobile use. As a psychological disorder, nomophobia manifests itself as pathological symptoms of anxiety, irritability, or even anguish caused by being out of reach of mobile phones (Bragazzi and Puente, 2014; Marciano *et al.*, 2021). Previous studies have empirically subscribed to elevated social anxiety resulting from the cultivation of nomophobia/smartphone addiction (e.g., Anshari *et al.*, 2019; Edwards *et al.*, 2022; Enez Darcin *et al.*, 2016). Individuals with nomophobia usually suffer from social anxiety, and end up being introverted with low self-confidence and disabling them to express themselves in face-to-face settings but turn to online communication (Anshari *et al.*, 2019). In accordance with SCH, social media can be an alternative to offline contact for these nomophobic individuals who are socially anxious (Anshari *et al.*, 2019; Tosuntaş *et al.*, 2020). This assertion is supported by evidence that people with nomophobia are more dependent on their mobile devices and more likely to compel themselves to spend more time on their mobile devices (Lin *et al.*, 2020). Nomophobia can reduce users' self-control by incurring fatigue (Geng *et al.*, 2018; Tams *et al.*, 2018), resulting in inappropriate behavioral responses, such as habitually checking their mobile phones (Gezgin *et al.*, 2017) and devoting more time to mobile use (Gezgin and Çakır, 2016). In light of social media as an important form of mobile use, it is reasonable to assume that nomophobic users would further increase time on social media use. Thus, we postulate:

Hypothesis 6. Nomophobia is associated with *higher* subsequent social media use.

Seeking social compensation is one primary motivation for mobile use for young adults (Barker, 2009, 2018). In line with SCH, people with high social anxiety and low social competence typically feel uncomfortable with face-to-face interactions and have difficulties building relationships in offline communications. They prefer online interactions to make up for their inadequate social compensation in the offline world (Poley and Luo, 2012). Past studies show that individual psychological unease (e.g., loneliness, dating anxiety, and introversion) contributes to increased mobile use (Guo, 2018; Poley and Luo, 2012) and mobile phone use disorder (Arpaci, 2022). Individuals with higher fear of missing out or/and stress are more likely to increase smartphone use frequency (Yang *et al.*, 2021b). Through a systematic literature review, O'Day and Heimberg (2021) conclude that social anxiety and loneliness make individuals more online engaged and hunt for social support on social media, potentially compensating for social competence deficits in the real world. In this line, we argue that people with psychological unease will subsequently increase their social media use. Thus, we postulate:

Hypothesis 7a. Psychological unease is associated with *higher* subsequent social media use.

On the contrary, higher satisfaction with life generally represents that an individual has higher subjective wellbeing and sufficient social support, and there is a lower possibility that they would suffer

from mental unease, such as perceived stress (Vujić and Szabo, 2022), depression (Headey *et al.*, 1993), and anxiety (Duong, 2021). Life satisfaction is closely bonded with perceived social support (Adams *et al.*, 1996; Kalaitzaki *et al.*, 2021; Oh *et al.*, 2014). Just as in the case of *Hypothesis 2*, people with higher life satisfaction often have sufficient perceived social support, so they are less likely to depend upon online interactions via social networks to seek social compensation. The previous study by Longstreet and Brooks (2017) demonstrates that life satisfaction plays a significant role in buffering generalized Internet addiction and social media addiction. A recent finding further shows that a reduction in life satisfaction ratings significantly predicts increased estimated social media use (Orben *et al.*, 2022). That is, there is a lower possibility for individuals with higher satisfaction with life to spend much time on their social media platforms. Thus, we postulate that:

Hypothesis 7b. Life satisfaction is associated with *lower* subsequent social media use.

4.3 Hypotheses development regarding the lagged effect of social media use

Chronic social media use for a relatively long time could make users progressively rely on virtual online communities, thereby reducing their offline activities (Shimoga *et al.*, 2019). This inevitably reduces the frequency and time of face-to-face interactions, and the reduction of face-to-face interaction, in turn, leads to exacerbating their mental unease (Wang *et al.*, 2015). Users relying on social networks will reduce their interaction with their friends in reality, which will cause psychological problems among them (Shimoga *et al.*, 2019). Specifically, the utilitarian and hedonic values derived from social media can easily lure users into using it excessively, gradually changing their way of thinking and feeling (Baker *et al.*, 2004). They over-rely on social media readily leads to psychological unease, especially in the case of the cessation of social media use (Wang *et al.*, 2015). Previous research has also established a positive relationship between social media use and social media addiction and emotional symptoms (Fabris *et al.*, 2020). When interacting with other users on social media, the worries of receiving negative responses or not receiving likes/comments may induce psychological unease (Fabris *et al.*, 2020). Excessive social media use has also been reported to predict decreased life satisfaction (Geraee *et al.*, 2019; Marttila *et al.*, 2021). Consequently, despite some momentary benefits (e.g., perceived social support), individuals who devote much time to using social media are more likely to develop nomophobia and, in turn, cultivate psychological disorders and decrease satisfaction with life from a longitudinal view. Thus, we propose:

Hypothesis 8a. Social media use is associated with *higher* psychological unease *over time*.

Hypothesis 8b. Social media use is associated with *lower* life satisfaction *over time*.

A research model is established based on the above hypotheses, as illustrated in Figure 1.

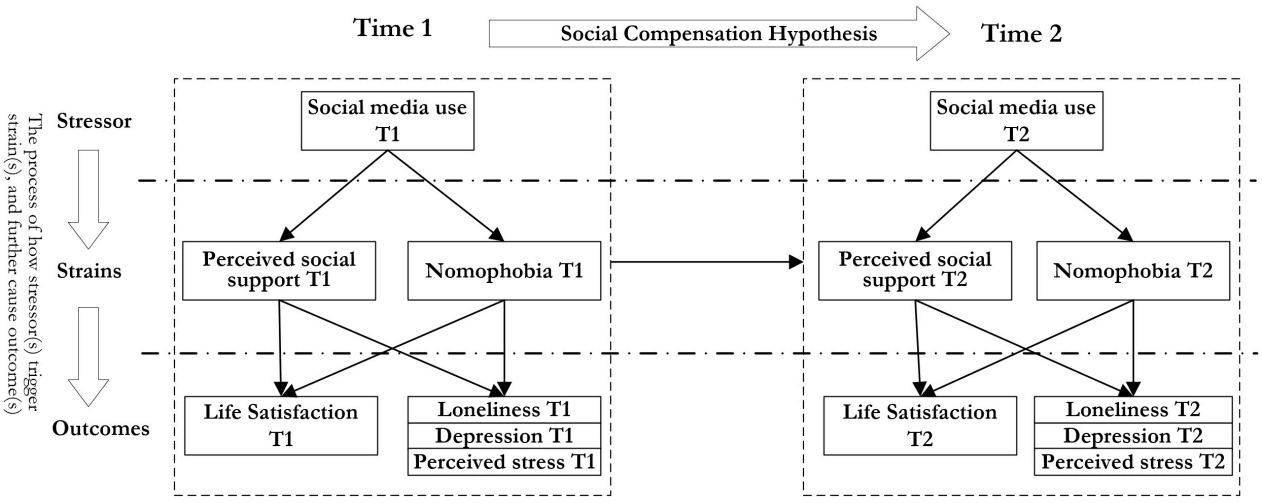


Figure 1. Research model

5. Methodology

The empirical two-year longitudinal dataset was collected from undergraduates of a highly regarded university in central China. Note that the same questionnaire survey aiming to investigate the impacts of smartphone use on college students' wellbeing was distributed twice from December 2017 to January 2018 (Time 1) and from December 2018 to January 2019 (Time 2), respectively, to obtain the longitudinal dataset. The student id was sought from the survey but only used to identify the same respondent in the two surveys.

5.1 Measures

All the used constructs in this study are adapted from previous studies. Social media use is measured through a single item, i.e., the daily average time of using social media via smartphones (Felisoni and Godoi, 2018). A related report indicates that social media is the most popular category of mobile applications among Chinese college students, and communication with others and information acquisition are the primary purposes of using social media (iiMedia, 2018). Perceived social support is measured based on Hamza *et al.* (2012), whereas nomophobia is adapted from the scale developed by Yildirim and Correia (2015). The measurement items of life satisfaction are adapted from Pavot and Diener (2008). Following Kraut *et al.* (1998), psychological unease is measured with three psychological indexes, namely loneliness (Russell *et al.*, 1980), depression (Radloff, 1977), and perceived stress (Cohen *et al.*, 1983). A seven-point Likert scale spanning from 1 to 7 is utilized to measure the latent variables except for social media use. Appendix A presents all measurement items.

Given that the surveys were conducted in Chinese, we processed the back-translation for the original English-based measurement items to guarantee translation consistency between English and Chinese versions in line with prior works (Huang *et al.*, 2008). Specifically, these measurement items were first translated from English into Chinese by a researcher in IS field. Subsequently, another researcher back-translated them into English to ensure translation consistency. A pilot test was

performed among 30 college students with experience in using social media. According to their comments and suggestions, some measurement items were modified to improve the readability and face validity of the measurements, thereby forming the final questionnaire version.

5.2 Data collection and sampling

The questionnaire was advertised on the university's official website with the support of the university administration institution, and each university student had access to the questionnaire once they logged in with a username and password. After consenting to engage in the survey, respondents would turn to fill in the questionnaire. Those who responded to the questionnaire would gain access to the data analysis report as compensation. In total, 10,352 students filled in the first questionnaire, and 9,256 valid records remained after dropping unfinished responses that included missing values, as well as unmindful responses that selected almost the same scale for each question. These 9,256 surviving respondents were notified to participate in the second survey and had 6,719 students respond. After dropping invalid responses as did for the first survey, a final sample size of 6,093 remains.

Table III presents the demography of sample cases. Among the remained respondents aged from 16 to 31 years, 57.5% (3,501) were males. Most respondents self-reported their daily time of smartphone use above 2 hours ($N_{\text{Time 1}}$ = 4,355, 71.5%; $N_{\text{Time 2}}$ = 4,517, 74.1%). A high percentage of respondents used social media applications on their smartphones ($N_{\text{Time 1}}$ = 5660, 92.9%; $N_{\text{Time 2}}$ = 5,945, 97.6%). It is worth mentioning that a considerable rate of college students spent more than one hour daily using their social media ($N_{\text{Time 1}}$ = 3317, 54.4%; $N_{\text{Time 2}}$ = 2586, 42.4%). Note that there was a relatively high percentage (21.9%) of respondents at Time 1 self-reported more than 3 hours of daily social media use, but it fell to 9.7% at Time 2. During the period of investigation, no restriction on social media use or mobile use was issued by the surveyed university. Possible explanations behind such a significant drop include the following. First, among the 1,332 respondents, almost half of them (n = 597) were freshmen enrolled in the year 2017 at Time 1. Consistent with previous studies (Chen *et al.*, 2022; Mikal and Grace, 2012; Ruppel *et al.*, 2018), there was a high likelihood for incoming university students to spend increased time on social media to maintain social needs and develop social ties during life transitions. Meanwhile, others enrolled in the years 2016 and 2015 had such pressures as postgraduate entrance, internship, and job-hunting at Time 2, thereby decreasing their time spent on social media use. Second, the significant drop in social media use from Time 1 to Time 2 might result from self-control and self-adjust. The university under investigation is renowned in China, and its undergraduates are generally with high self-control and self-adjust capabilities, which enable them to adjust, to some degree, their access to mobile devices accordingly once they feel overloaded.

Table III. Demographic information of participants

Variables	Sample composition		
	Categories	Time 1	Time 2
Age	Between 16 and 31 (based on the first survey); Mean = 20.03; Std. Dev. = 1.20		
Gender	Male	3,501 (57.5%)	
	Female	2,592 (42.5%)	
Grade	Enrolled in 2014	82 (1.3%)	

	Enrolled in 2015		1,741 (28.6%)		
	Enrolled in 2016		1,683 (27.6%)		
	Enrolled in 2017		2,587 (42.5%)		
		Frequency	Percentage (%)	Frequency	Percentage
Daily smartphone use in hours	Less than 0.5 hour	306	5.0	148	2.4
	0.5-1 hour	359	5.9	327	5.4
	1-2 hours	1,073	17.6	1,101	18.1
	2-4 hours	1,832	30.1	2,045	33.6
	4-6 hours	1,513	24.8	1,604	26.3
	7-8 hours	410	6.7	452	7.4
	More than 8 hours	600	9.8	416	6.8
Daily social media use in hours	Never	433	7.1	148	2.4
	Less than 15 minutes	286	4.7	334	5.5
	15-30 minutes	772	12.7	1,183	19.4
	0.5-1 hour	1,282	21.0	1,842	30.2
	1-2 hours	1,214	19.9	1,374	22.6
	2-3 hours	774	12.7	620	10.2
	More than 3 hours	1,332	21.9	592	9.7
Overall health status	1 (Very unhealthy)	297	4.9	160	2.6
	2	155	2.5	151	2.5
	3	333	5.5	299	4.9
	4	774	12.7	787	12.9
	5	1,373	22.5	1,331	21.8
	6	1,570	25.8	1,510	24.8
	7 (Very healthy)	1,591	26.1	1,855	30.4

6. Data Analysis and Results

The proposed hypotheses are verified by the structural equation modeling (SEM) technique through SmartPLS (Hansmann and Ringle, 2004). Under the recommended procedure (Hulland, 2015), the measurement model was first assessed with regard to the reliability and validity of each construct, and then the structural model was examined with model pathways between constructs, together with their significance levels.

6.1 Measurement model

The assessment of the reliability usually involves comparing three indicators, including Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) (Fornell and Larcker, 1981). As shown in Table IV, Cronbach's alpha, CR, and AVEs for all constructs are above the suggested thresholds of 0.70, 0.70, and 0.5, respectively (Chin, 1998). Further, both convergent validity and discriminant validity are examined. To this end, for sufficient convergent validity to be present, the items of the same construct should load highly amongst themselves. Following Comrey (1995), factor loadings above 0.70 indicate excellent validity. Given that the minimal factor loadings of each construct are above the threshold (see Table IV), it can be concluded that convergent validity has been achieved. Discriminant validity is assessed by checking whether items load more strongly on their own constructs than other items (Cook and Campbell, 1979). By comparing the square root of AVEs for a construct with the concerning correlation coefficients of that construct, the results show that

items load much more highly on their own latent constructs than on any other constructs (cross-loadings) (Bock *et al.*, 2005; Fornell and Larcker, 1981). Additionally, the AVE square roots are larger than correlations among constructs. Thus, adequate discriminant validity is confirmed.

Table IV. Construct reliability, validity, and intercorrelation matrix

Construct	Mean	Minimal factor loading	Cronbach's alpha	CR	AVE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. DT1	2.998	0.911	0.912	0.945	0.850	**0.922**													
2. DT2	2.991	0.926	0.932	0.956	0.879	0.276	**0.938**												
3. LST1	4.085	0.911	0.930	0.956	0.878	0.113	−0.121	**0.937**											
4. LST2	4.317	0.908	0.930	0.955	0.877	−0.134	−0.051	0.256	**0.936**										
5. LT1	3.167	0.895	0.910	0.941	0.847	0.777	0.234	0.169	−0.120	**0.920**									
6. LT2	3.275	0.886	0.906	0.941	0.842	0.251	0.745	−0.126	−0.027	0.278	**0.918**								
7. NOMT1	3.898	0.911	0.905	0.940	0.840	0.443	0.086	0.351	0.017	0.453	0.087	**0.916**							
8. NOMT2	3.959	0.904	0.895	0.934	0.826	0.132	0.356	0.004	0.171	0.138	0.369	0.353	**0.909**						
9. PSST1	4.539	0.931	0.933	0.957	0.882	0.083	−0.154	0.710	0.199	0.096	−0.161	0.375	0.041	**0.939**					
10. PSST2	4.707	0.928	0.936	0.959	0.886	−0.138	−0.088	0.206	0.664	−0.142	−0.100	0.060	0.227	0.308	**0.942**				
11. PST1	3.212	0.937	0.936	0.959	0.887	0.853	0.245	0.086	−0.152	0.811	0.252	0.452	0.142	0.093	−0.133	**0.942**			
12. PST2	3.462	0.938	0.933	0.957	0.882	0.244	0.794	−0.124	−0.072	0.225	0.738	0.106	0.396	−0.114	−0.019	0.249	**0.939**		
13. SMUT1	4.675	1.000	1.000	1.000	1.000	0.003	0.015	−0.006	0.066	−0.001	0.026	0.152	0.290	0.094	0.189	0.031	0.117	**1.000**	
14. SMUT2	4.344	1.000	1.000	1.000	1.000	0.090	−0.105	0.252	0.019	0.109	−0.090	0.375	0.101	0.378	0.100	0.133	−0.042	0.309	**1.000**

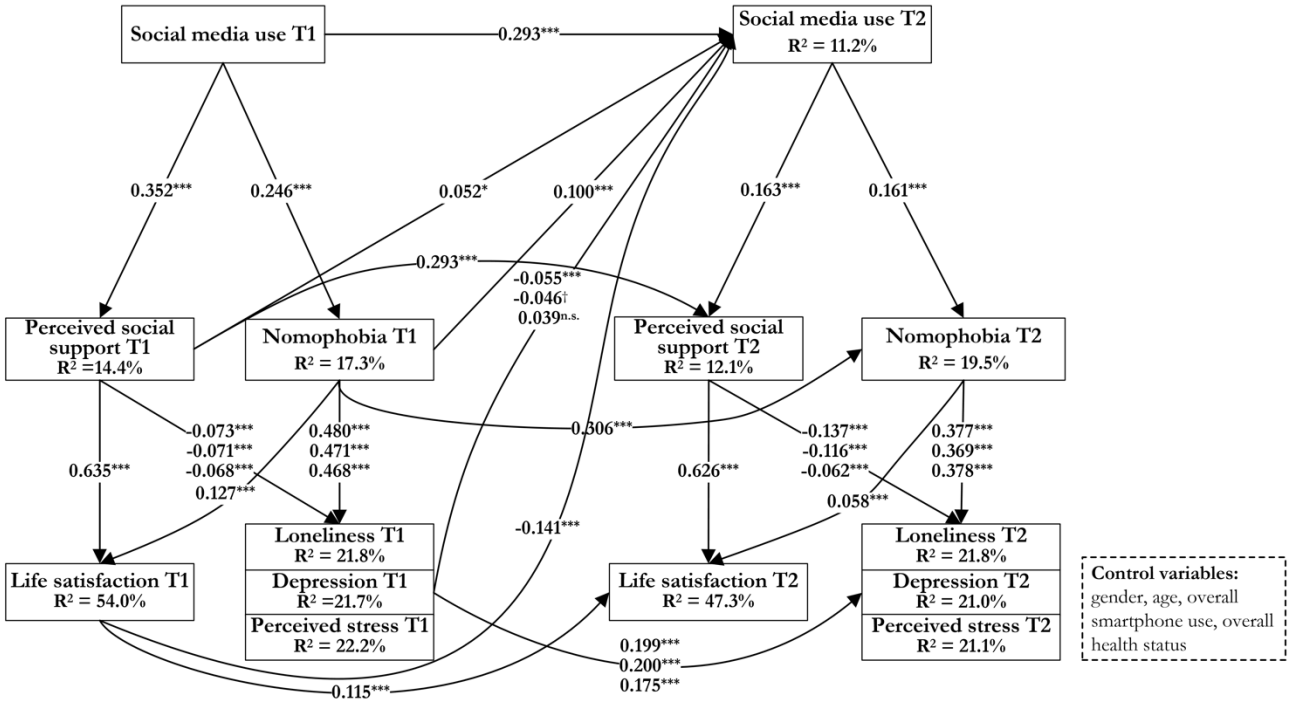
Notes: i) T1 = Time 1, T2 = Time 2, D = Depression, LS = Life satisfaction, L = Loneliness, NOM = Nomophobia, PSS = Perceived social support, PS = Perceived stress, SMU = Social media use. ii) The boldfaced numbers in the diagonal row are the square roots of AVEs. SMU is a single-item variable; therefore, their AVE values are 1.000.

6.2 Structural model

The verification of the structural model involves estimates of the path coefficients and coefficients of determination, labeled as R^2 values. The former (including correlations and statistical significance level) represents relationship strengths between the independent and dependent variables, whereas R^2 indicates the proportion of variance on its dependent variable explained by corresponding independent variables. Together with R^2, the path coefficients specify how well the data is in support of the hypothesized model. The analysis results of the structural model are illustrated in Figure 2. The explanatory power (R^2) of the model on all affected constructs is higher than the suggested acceptable threshold of 10% (Falk and Miller, 1992), offering that the research model is adequate.

Most of the hypotheses are confirmed by empirical evidence. First, the path coefficients between social media use and perceived social support is significant (β_{T1}= 0.352, $p < 0.001$; β_{T2} = 0.163, $p < 0.001$), suggesting that increased social media use positively contributes to increased perceived social support. Thus *Hypothesis 1* is supported. Perceived social supported can further negatively affect psychological unease, including loneliness (β_{T1}= −0.073, $p < 0.001$; T2: β_{T2} = −0.137, $p < 0.001$), depression (β_{T1} = −0.071, $p < 0.001$; β_{T2} = −0.116, $p < 0.001$), and perceived stress(β_{T1} = −0.068, $p < 0.001$; β_{T2} = −0.062, $p < 0.001$), confirming *Hypothesis 3a*. Increased perceived social support contributes to higher life satisfaction (β_{T1} = 0.635, $p < 0.001$; β_{T2} = 0.626, $p < 0.001$), supporting *Hypothesis 3b*. In addition, social media use is positively associated with the cultivation of nomophobia (β_{T1} = 0.246, $p < 0.001$; β_{T2} = 0.161, $p < 0.001$), verifying *Hypothesis 2*. Nomophobia further contributes to the development of loneliness (β_{T1} = 0.480, $p < 0.001$; β_{T2} = 0.377, $p < 0.001$), depression (β_{T1} =

0.471, $p < 0.001$; $\beta_{T2} = 0.369$, $p < 0.001$), perceived stress ($\beta_{T1} = 0.468$, $p < 0.001$; $\beta_{T2} = 0.378$, $p < 0.001$), and life satisfaction ($\beta_{T1} = 0.127$, $p < 0.001$; $\beta_{T2} = 0.058$, $p < 0.001$). Thus, *Hypothesis 4a* is confirmed, but *Hypothesis 4b* is rejected.



(Note: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$, $^{\dagger}p < 0.1$; $^{n.s.}p > 0.1$)

Figure 2. Verified research model

Across different time periods, our results show that social media use T1 is positively associated with social media use T2 ($\beta = 0.293$, $p < 0.001$). The stories are the same way as in perceived social support ($\beta = 0.293$, $p < 0.001$), nomophobia ($\beta = 0.306$, $p < 0.001$), life satisfaction ($\beta = 0.115$, $p < 0.001$), and psychological unease ($\beta_{loneliness} = 0.199$, $p < 0.001$; $\beta_{depression} = 0.200$, $p < 0.001$; $\beta_{perceived\ stress} = 0.175$, $p < 0.001$). Noteworthily, there is a weak association between perceived social support T1 and social media use T2 ($\beta = 0.052$, $p < 0.05$), rejecting *Hypothesis 5*, whereas a positive association between nomophobia T1 and social media use T2 is verified ($\beta = 0.100$, $p < 0.001$), supporting *Hypothesis 6*. Surprisingly, different types of psychological unease show differentiated impacts on subsequent social media use. Loneliness T1 ($\beta = -0.055$, $p < 0.001$) and depression T1 ($\beta = -0.046$, $p < 0.1$) exert negative effects on social media use T2, while the effect of perceived stress T1 on social media use T2 is insignificant ($\beta = 0.039$, $p > 0.1$), thus *Hypothesis 7a* is rejected. Higher life satisfaction in the earlier stage significantly reduces social media use in the next stage ($\beta = -0.141$, $p < 0.001$), supporting *Hypothesis 7b*. The findings partially run counter to the argument of SCH.

This study also examines the total effects of social media use on psychological unease (see Table V). From a longitudinal perspective, social media use T1 positively affects psychological unease T2, reflecting on the development of loneliness ($\beta = 0.044$, $p < 0.001$), depression ($\beta = 0.046$, $p < 0.001$), and perceived stress ($\beta = 0.053$, $p < 0.001$). Social media use T1 is associated with higher life satisfaction T2 over time ($\beta = 0.131$, $p < 0.001$). Thus, *Hypothesis 8a* is verified but not *Hypothesis 8b*.

Table V. Lagged effects of social media use

Total effects	Coefficients	*t*-statistics	*p*-value
Social media use T1 → Loneliness T2	0.044	9.220	$p < 0.001$
Social media use T1 → Depression T2	0.046	9.783	$p < 0.001$
Social media use T1 → Perceived stress T2	0.053	11.577	$p < 0.001$
Social media use T1 → Life satisfaction T2	0.131	18.904	$p < 0.001$

Considering that this study models multiple mechanisms simultaneously in an integrated framework, the mediation-analysis approach prescribed by Hayes (2017)—Hayes Process Regression Analysis—has been utilized via SPSS. Following Hayes (2017), we assess the indirect path between the independent and dependent variables, as well as its significance (Hayes, 2009; Rucker *et al.*, 2011). As part of the SPSS Hayes mediation testing macro, the default bootstrapping method is applied in the mediation analysis operations (Hayes, 2012). The results of Hayes process mediation models are reported in Table VI. Taking Loneliness T1 as an example of psychological outcome, for the bright pathways, social media use T1 significantly increases perceived social support T1 (standardized β = 0.340, SE = 0.011, $p < 0.001$), which in turn decreases loneliness T1 (standardized $\beta = -0.071$, SE = 0.013, $p < 0.001$). For the dark pathways, social media use T1 significantly contributes to the development of nomophobia T1 (standardized $\beta = 0.365$, SE = 0.012, $p < 0.001$), which further leads to the increased loneliness T1 (standardized $\beta = 0.463$, SE = 0.012, $p < 0.001$). In this case, social media use T1 indirectly influences loneliness T1. Both perceived social support and nomophobia mediate the relationship between social media use and loneliness. As shown in Table VI, the mediating effects of perceived social support and nomophobia can also be concluded between social media use and the other psychological outcomes, i.e., depression, perceived stress, and life satisfaction.

Table VI. Mediation analysis for the established parallel multiple-mediator model

	M1 (perceived social support)			*M2* (Nomophobia)			Outcome variables		
Antecedent	**Coeff.**	**SE**	***p***	**Coeff.**	**SE**	***p***	**Coeff.**	**SE**	***p***
									Loneliness T1
Social media use	0.340	0.011	0.000	0.365	0.012	0.000	−0.045	0.012	0.000
M1	—	—	—	—	—	—	−0.071	0.013	0.000
M2	—	—	—	—	—	—	0.463	0.012	0.000
Constant	2.948	0.054	0.000	2.191	0.058	0.000	1.897	0.065	0.000
	$R^2 = 14.2\%$			$R^2 = 14.1\%$			$R^2 = 21.3\%$		
	$F(1, 6091) = 1011.532$, $p = 0.000$			$F(1, 6091) = 998.866$, $p = 0.000$			$F(3, 6089) = 549.4481$, $p = 0.000$		
									Depression T1
Social media use	0.340	0.011	0.000	0.365	0.012	0.000	−0.062	0.012	0.000
M1	—	—	—	—	—	—	−0.080	0.013	0.000
M2	—	—	—	—	—	—	0.468	0.012	0.000
Constant	2.948	0.054	0.000	2.191	0.058	0.000	1.823	0.066	0.000
	$R^2 = 14.2\%$			$R^2 = 14.1\%$			$R^2 = 20.7\%$		
	$F(1, 6091) = 1011.532$, $p = 0.000$			$F(1, 6091) = 998.866$, $p = 0.000$			$F(3, 6089) = 530.986$, $p = 0.000$		
									Perceived stress T1
Social media use	0.340	0.011	0.000	0.365	0.012	0.000	−0.018	0.012	0.000
M1	—	—	—	—	—	—	−0.086	0.013	0.000
M2	—	—	—	—	—	—	0.468	0.012	0.000
Constant	2.948	0.054	0.000	2.191	0.058	0.000	1.861	0.067	0.000
	$R^2 = 14.2\%$			$R^2 = 14.1\%$			$R^2 = 21.1\%$		
	$F(1, 6091) = 1011.532$, $p = 0.000$			$F(1, 6091) = 998.886$, $p = 0.000$			$F(3, 6089) = 543.102$, $p = 0.000$		
									Life satisfaction T1
Social media use	0.340	0.011	0.000	0.365	0.012	0.000	−0.043	0.009	0.000
M1	—	—	—	—	—	—	0.647	0.010	0.000
M2	—	—	—	—	—	—	0.100	0.009	0.000

Constant	2.948	0.054	0.000	2.191	0.058	0.000	0.959	0.048	0.000
	R^2 = 14.2%			R^2 = 14.1%			R^2 = 51.2%		
	F (1, 6091) = 1011.532, p = 0.000			F (1, 6091) = 998.886, p = 0.000			F (3, 6089) = 2129.599, p = 0.000		
									Loneliness T2
Social media use	0.175	0.012	0.000	0.311	0.014	0.000	−0.028	0.013	0.031
M1	—	—	—	—	—	—	−0.113	0.013	0.000
M2	—	—	—	—	—	—	0.380	0.012	0.000
Constant	3.311	0.076	0.000	2.052	0.086	0.000	2.937	0.078	0.018
	R^2 = 15.3%			R^2 = 19.9%			R^2 =24.9%		
	F (5, 6087) = 219.281, p = 0.000			F (5, 6087) = 303.065, p = 0.000			F (7, 6085) = 288.783, p = 0.000		
									Depression T2
Social media use	0.177	0.012	0.000	0.311	0.014	0.000	−0.041	0.014	0.003
M1	—	—	—	—	—	—	−0.101	0.014	0.000
M2	—	—	—	—	—	—	0.378	0.012	0.000
Constant	3.275	0.075	0.000	2.065	0.085	0.000	2.450	0.092	0.000
	R^2 = 15.0%			R^2 = 20.0%			R^2 = 23.7%		
	F (5, 6087) = 215.540, p = 0.000			F (5, 6087) = 303.632, p = 0.000			F (7, 6085) = 269.596, p = 0.000		
									Perceived stress T2
Social media use	0.180	0.012	0.000	0.312	0.014	0.000	0.046	0.014	0.001
M1	—	—	—	—	—	—	−0.055	0.014	0.000
M2	—	—	—	—	—	—	0.386	0.012	0.000
Constant	3.270	0.075	0.000	2.055	0.085	0.000	2.202	0.092	0.000
	R^2 = 15.1%			R^2 = 19.9%			R^2 = 22.8%		
	F (5, 6087) = 216.101, p = 0.000			F (5, 6087) = 303.290, p = 0.000			F (7, 6085) = 256.147, p = 0.000		
									Life satisfaction T2
Social media use	0.187	0.013	0.000	0.305	0.014	0.000	−0.045	0.010	0.000
M1	—	—	—	—	—	—	0.642	0.010	0.000
M2	—	—	—	—	—	—	0.055	0.009	0.000
Constant	2.976	0.075	0.000	2.117	0.084	0.000	1.198	0.065	0.000
	R^2 = 13.0%			R^2 = 20.2%			R^2 = 47.7%		
	F (5, 6087) = 181.295, p = 0.000			F (5, 6087) = 308.408, p = 0.000			F (7, 6085) = 792.395, p = 0.000		

Note: Coeff. Means coefficient; SE means standard error.

Considering the findings in past studies (Creed and Watson, 2003; Durak, 2019; Lin *et al.*, 2020; Pavithra *et al.*, 2015), the research model includes age, gender, overall smartphone use, and overall health status as control variables. To this end, the significant results of interest obtained in this study are guaranteed to be undisturbed by these control variables (see Appendix B for details).

7. Discussion and Conclusion

7.1 Interpretation of major findings

Whereas the pervasiveness of social media use undoubtedly accounts for a piece of evidence for its value (Ainin *et al.*, 2015; Subramanian, 2017; Syrek *et al.*, 2018), a more recent research stream contradicts it and endorses its dark side (e.g., Amin, 2020; Hou *et al.*, 2019; Keles *et al.*, 2020), prompting an ongoing heated debate on psychological outcomes of social media use. More interestingly, a bidirectional relation between social media use and psychological status has been acknowledged in prior studies. To address these issues, the present study employs the SSO model and SCH to disentangle how social media use and psychological wellbeing interplay through longitudinal analysis. There are several interesting findings.

This study resolves the dispute on the effect of social media use on psychological wellbeing and disentangles the underlying mechanism between them. On the one hand, a bright-dark duality perspective in explaining the impact of social media use on psychological wellbeing is supported.

Whether social media use enhances or undermines psychological wellbeing depends on the effect pathways through different mediators. This finding resonates with the existing literature highlighting the advantages of social media in improving individual mental health through enhanced social relationships and social support (Bekalu *et al.*, 2019; Chun and Lee, 2017; Kim, 2014). This study indicates that the question of how social media use affects mental health deserves a sophisticated rather than a straightforward answer. As manifested by this study, social media use either benefits or harms users' psychological wellbeing via distinct pathways and differentiated mechanisms. With the increasing use of social media, its adverse outcomes can get internalized and progressively invade personal psychological wellbeing without effective intervention. The negative consequences of social media use can be intervened with different tactics, such as avoiding the cultivation of nomophobia (or being addictive). On the other hand, one will arrive at various assessments when considering the purposes and degree of social media use. As proof, excessive social media use is negatively predictive of individual mental health by inducing social overload (Maier *et al.*, 2015b), whereas social media use is oriented toward seeking support from others or self-presentation is not (Pang, 2020).

More importantly, the present study answers the question of how social media use affects psychological wellbeing *over time* through longitudinal evidence. Although the immediate effects of social media use on psychological unease can be inconclusive, the lagged effect of social media use on psychological unease is found to be significantly positive, and so does the lagged effect of social media use on life satisfaction. In other words, social media use is a double-edged sword. The immediate benefits of using social media regarding communication-oriented advantages emerge by increased perceived social support and life satisfaction. But rather, daily long-duration using social media on smartphones can anyhow engender personal psychological unease by developing nomophobia in the long run. This finding also echoes the previous indication that smartphone addiction reduces social support over time (Herrero *et al.*, 2019).

Our analysis results empirically demonstrate the bidirectional relation between social media use and psychological wellbeing. To this end, the present study established a longitudinally comprehensive model by combining SSO and SCH. In line with previous studies (Haand and Shuwang, 2020; Hou *et al.*, 2019; Lin *et al.*, 2021b), our results show that social media use contributes to cultivating addictive symptoms, thereby accumulating loneliness, depression, and perceived stress. In turn, nomophobia accumulates over time and triggers users to spend more time on social media use further in the subsequent period, supporting past studies that nomophobia induces more mobile use (Lin *et al.*, 2020). Our findings settle down the controversy on the bidirectional effect between social media use and addiction/nomophobia (Gezgin and Çakır, 2016; Lin *et al.*, 2021b), indicating a cause-and-effect relationship between social media use and nomophobia.

A higher level of life satisfaction at the initial stage triggers decreased use of social media in the subsequent period, echoing the previous study by Orben *et al.* (2022) and the argument of the SCH (Poley and Luo, 2012; Weidman *et al.*, 2012). Remarkably, initial perceived social support contributes to increased subsequent social media use, although the effect strength is weak. An acceptable reason

that leads to this result could be a lack of subdivision of real-life social support and online social support. In other words, sufficient perceived social support in real life could mitigate social media use, but social support on social media could even drive users to stay on social media (Meshi and Ellithorpe, 2021b). Surprisingly, psychological symptoms of loneliness and depression do not necessarily increase subsequent social media use. A potential explanation is that loneliness and depression are powerfully enduring psychological traits that are often shaped through prior life experiences such as childhood experiences (Botella and Feixas, 1992; Neve, 2015). Such mental symptoms are challenging to curb by merely hunkering alone over their social media channels or interacting with an acquaintance or even stranger. Alternatively, there may exist an inverted-U relation between loneliness (depression) and subsequent social media use. That is, if loneliness (depression) was moderate, loneliness (depression) would lead to increased social media use. Once one's loneliness (depression) level surpasses a specific threshold, her/his psychological unease might develop into mental illnesses with more severity, manifesting by turning off online communication channels or even complete social isolation. Consequently, the overall effect coefficient might appear to be inconclusive. In comparison, perceived stress is normally affected by more recent life experiences (Eswi *et al.*, 2013). Although it can be alleviated and released by external intervention, such as social connectedness (Chen *et al.*, 2021; Nitschke *et al.*, 2021) and online communications with others (Zhao and Zhou, 2021), entertainment-oriented mobile use (e.g., mobile gaming) could be more favorable and attractive for adolescents with high perceived stress because of its significance in stress relaxation (Chen, 2021). The recent study by Griffioen *et al.* (2021, p. 1) confirms a similar conclusion that "*social stress does not affect adolescents' subsequent social media use.*"

7.2 Implications for research and practice

This study provides several implications for the social media literature. First, the current study extends the literature concerning the outcomes of social media use by considering multiple effect mechanisms from a bright-dark duality view. Research concerning the adverse consequences of social media use dominates existing studies (e.g., Rodríguez-García *et al.*, 2020; Savci and Aysan, 2017; Yu *et al.*, 2018), indicating that social media addiction, as the most direct consequence of social media use, would further lead to psychological symptoms. Nevertheless, considering only the dark side of individual behavior may be insufficient to tell the whole story. Social media may also benefit users if used appropriately (Craig *et al.*, 2021; Subramanian, 2017). In this vein, the findings of our study contribute to the growing body of the IS literature on social media research by comprehensively explaining the interrelationship between social media use and psychological wellbeing and consolidating both bright and dark sides within one integrated model.

Second, our study is a pioneering attempt to offer an integrated understanding of the immediate and lagged effects of social media use on psychological wellbeing from a longitudinal perspective utilizing the combination of the SSO model and SCH. Whereas previous studies have typically concentrated on the immediate impact of social media use on personal mental health through a heap of theoretical perspectives, the study highlights its lagged effect via a longitudinal analysis. From a

cross-sectional perspective, this study unravels the immediate effect mechanism of social media use on psychological wellbeing, particularly highlighting the possible mediators of perceived social support and nomophobia. From a longitudinal perspective, this study offers empirical evidence that although social media use may mitigate psychological unease by ameliorating perceived social support for the short term, social media use can progressively exacerbate psychological unease in the long run through developing nomophobia. These findings help address the inconclusive results regarding the mental outcomes of social media use (cf. Keles *et al.*, 2020; Simsek *et al.*, 2019; Syrek *et al.*, 2018). Our study suggests that exhaustive explanations for the link between social media use and psychological wellbeing should not be limited to disentangling how social media use affects psychological wellbeing but call for more research into the interaction between the two constructs from a longitudinal perspective.

Third, this study enriches the existing literature by disentangling the dispute concerning the bidirectional relationship between social media use and psychological wellbeing. To this end, the present study conducts a two-year longitudinal analysis and controls its endogenous effects. This offers a plausible explanation regarding the bilateral association between social media use and psychological wellbeing. On the one side, it is convincing that individuals who spend more time on social media are more likely to develop nomophobic symptoms, leading to adverse psychological outcomes. This also corroborates past studies that underline the effects of mobile applications on phone addiction (Lin *et al.*, 2021b) and mental attachments (Zhang and Jung, 2022), such as anxiety and stress (Brailovskaia *et al.*, 2021; Moqbel and Kock, 2018; Vannucci *et al.*, 2017). On the flip side, individuals with lower life satisfaction are more likely to seek social connectedness via social media.

Some implications for practice can also be drawn from the current study. First, users need to pay close attention to the intended purpose of social media use. Although using social media allows users to mitigate psychological unease via gaining perceived social support momentarily, its adverse outcome regarding psychological wellbeing through cultivating nomophobia should not be ignored. These findings suggest that practitioners who work to deal with psychological disorders should recognize social media use as a potentially crucial emerging risk factor for cultivating and possibly worsening psychological conditions. Second, considering the mediators of perceived social support and nomophobia between social media use and psychological unease may offer insights into averting the adverse impacts of using social media. It is undoubtedly a worthy pursuit for individuals to adopt social media applications to seek social support and improve their social relationships. Thus, taking feasible measures to seek and improve individual perceived social support could effectively alleviate the negative psychological consequences of social media use. However, spending a long time on social media can easily cause the development of nomophobia, although the initial motivation for using social media might be to seek social support. As a result, an unintended outcome of continuous social media use shows up: an enthusiasm for social support drives users to traverse into social media addiction with negative psychological outcomes. In this vein, tackling nomophobic behaviors regarding social media has the potential to partially cut off or narrow the influence channel of social media use on personal mental health.

7.3 Limitations and future research

A few limitations still exist in this study, which implies future research venues. First, all the survey respondents in the current study are college students in China. Future studies that take diversified samples and cultural backgrounds into account are promising to supplement the present study. Second, given that this study considers overall social media use in terms of daily average time spent on social media applications, it is recommended to investigate if the impacts of social media use vary across different purposes (e.g., social media for communication, entertainment, and mobile learning), settings, or scenarios. Alternatively, measuring social media use by tracing social media activities with mobile sensors other than self-reported data is encouraged in future studies. Third, this study is established based on a two-year longitudinal analysis. A longitudinal study spanning more periods is prospective to allow more possibilities of causal inference, such as difference-in-differences and propensity score matching, and further the generalization of our findings.

References

Adams, G.A., King, L.A. and King, D.W. (1996), "Relationships of job and family involvement, family social support, and work-family conflict with job and life satisfaction", *Journal of Applied Psychology*, Vol. 81 No. 4, pp. 411–420.

Agbaria, Q. and Mokh, A.A. (2022), "Coping with Stress During the Coronavirus Outbreak: the Contribution of Big Five Personality Traits and Social Support", *International Journal of Mental Health and Addiction*, Vol. 20, pp. 1854–1872.

Ainin, S., Naqshbandi, M.M., Moghavvemi, S. and Jaafar, N.I. (2015), "Facebook usage, socialization and academic performance", *Computers & Education*, Vol. 83, pp. 64–73.

Al-Kandari, Y.Y. and Al-Sejari, M.M. (2021), "Social isolation, social support and their relationship with smartphone addiction", *Information Communication and Society*, Vol. 24 No. 13, pp. 1925–1943.

Amichai-Hamburger, Y. and Ben-Artzi, E. (2003), "Loneliness and Internet use", *Computers in Human Behavior*, Vol. 19 No. 1, pp. 71–80.

Amichai-Hamburger, Y. and Vinitzky, G. (2010), "Social network use and personality", *Computers in Human Behavior*, Vol. 26 No. 6, pp. 1289–1295.

Amin, S. (2020), "Why ignore the dark side of social media? A role of social media in spreading corona-phobia and psychological well-being", *International Journal of Mental Health Promotion*, Vol. 22 No. 1, pp. 29–37.

Anshari, M., Alas, Y. and Sulaiman, E. (2019), "Smartphone addictions and nomophobia among youth", *Vulnerable Children and Youth Studies*, Vol. 14 No. 3, pp. 242–247.

Arpaci, I. (2022), "Gender differences in the relationship between problematic internet use and nomophobia", *Current Psychology*, Vol. 41, pp. 6558–6567.

Ayar, D., Özalp Gerçeker, G., Özdemir, E.Z. and Bektaş, M. (2018), "The Effect of Problematic Internet Use, Social Appearance Anxiety, and Social Media Use on Nursing Students' Nomophobia Levels", *Computers Informatics Nursing*, Vol. 36 No. 12, pp. 589–595.

Ayyagari, R., Grover, V. and Purvis, R.L. (2011), "Technostress: Technological Antecedents and Implications", *MIS Quarterly*, Vol. 35 No. 4, pp. 831–858.

Baccarella, C. V, Wagner, T.F., Kietzmann, J.H. and Mccarthy, I.P. (2018), "Social media? It's serious! Understanding the dark side of social media", *European Management Journal*, Vol. 36 No. 4, pp. 431–438.

Baker, T.B., Piper, M.E., McCarthy, D.E., Majeskie, M.R. and Fiore, M.C. (2004), "Addiction Motivation Reformulated: An Affective Processing Model of Negative Reinforcement", *Psychological Review*, Vol. 111 No. 1, pp. 33–51.

Barker, V. (2009), "Older adolescents' motivations for social network site use: The influence of gender, group identity, and collective self-esteem", *Cyberpsychology and Behavior*, Vol. 12 No. 2, pp. 209–213.

Barker, V. (2018), "Text you pictures: The role of group belonging, race identity, race, and gender in older adolescents' mobile phone use", *Social Sciences*, Vol. 7 No. 7, p. 115.

Barrera, M.J. (1986), "Distinctions Between Social Support Concepts, Measures, and Models", *American Journal of Community Psychology*, Vol. 14 No. 4, pp. 413–445.
Bekalu, M.A., McCloud, R.F. and Viswanath, K. (2019), "Association of Social Media Use With Social Well-Being, Positive Mental Health, and Self-Rated Health: Disentangling Routine Use From Emotional Connection to Use", *Health Education and Behavior*, Vol. 46 No. 2S, pp. 69–80.
Bermes, A. (2021), "Information overload and fake news sharing: A transactional stress perspective exploring the mitigating role of consumers' resilience during COVID-19", *Journal of Retailing and Consumer Services*, Vol. 61, p. 102555.
Bian, M. and Leung, L. (2015), "Linking Loneliness, Shyness, Smartphone Addiction Symptoms, and Patterns of Smartphone Use to Social Capital", *Social Science Computer Review*, Vol. 33 No. 1, pp. 61–79.
Bock, G.-W., Zmud, R.W., Kim, Y.-G. and Lee, J. (2005), "Behavioral Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces, and Organizational Climate", *MIS Quarterly*, Vol. 29 No. 1, pp. 87–111.
Botella, L. and Feixas, G. (1992), "The autobiographical group: A tool for the reconstruction of past life experience with the aged", *International Journal of Aging and Human Development*, Vol. 36 No. 4, pp. 303–319.
Boursier, V., Gioia, F., Musetti, A. and Schimmenti, A. (2020), "Facing Loneliness and Anxiety During the COVID-19 Isolation: The Role of Excessive Social Media Use in a Sample of Italian Adults", *Frontiers in Psychiatry*, Vol. 11, p. 586222.
Bragazzi, N.L. and Puente, G. Del. (2014), "A proposal for including nomophobia in the new DSM-V", *Psychology Research and Behavior Management*, Vol. 7, pp. 155–160.
Brailovskaia, J., Cosci, F., Mansueto, G. and Margraf, J. (2021), "The relationship between social media use, stress symptoms and burden caused by coronavirus (Covid-19) in Germany and Italy: A cross-sectional and longitudinal investigation", *Journal of Affective Disorders Reports*, Vol. 3, p. 100067.
Brailovskaia, J. and Margraf, J. (2017), "Facebook Addiction Disorder (FAD) among German students—A longitudinal approach", *PLoS ONE*, Vol. 12 No. 12, p. e0189719.
Brooks, S., Longstreet, P. and B.Califf, C. (2017), "Social Media Induced Technostress and its Impact on Internet Addiction: A Distraction-conflict Theory Perspective", *Transactions on Human-Computer Interaction*, Vol. 9 No. 2, pp. 99–122.
Brooks, S., Wang, X. and Schneider, C. (2020), "Technology addictions and technostress: An examination of the U.S. And China", *Journal of Organizational and End User Computing*, Vol. 32 No. 2, pp. 1–19.
Cao, Q. and Lu, B. (2021), "Mediating and moderating effects of loneliness between social support and life satisfaction among empty nesters in China", *Current Psychology*, Vol. 40 No. 2, pp. 973–982.
Cao, X., Masood, A., Luqman, A. and Ali, A. (2018), "Excessive use of mobile social networking sites and poor academic performance: Antecedents and consequences from stressor-strain-outcome perspective", *Computers in Human Behavior*, Vol. 85, pp. 163–174.
Cao, X. and Sun, J. (2018), "Exploring the effect of overload on the discontinuous intention of social media users: An S-O-R perspective", *Computers in Human Behavior*, Vol. 81, pp. 10–18.
Cao, X. and Yu, L. (2019), "Exploring the influence of excessive social media use at work: A three-dimension usage perspective", *International Journal of Information Management*, Vol. 46, pp. 83–92.
Casale, S. and Banchi, V. (2020), "Narcissism and problematic social media use: A systematic literature review", *Addictive Behaviors Reports*, Vol. 11, p. 100252.
Casale, S., Fioravanti, G., Bocci Benucci, S., Falone, A., Ricca, V. and Rotella, F. (2022), "A meta-analysis on the association between self-esteem and problematic smartphone use", *Computers in Human Behavior*, Vol. 134, p. 107302.
Cauberghe, V., Van Wesenbeeck, I., De Jans, S., Hudders, L. and Ponnet, K. (2021), "How Adolescents Use Social Media to Cope with Feelings of Loneliness and Anxiety during COVID-19 Lockdown", *Cyberpsychology, Behavior, and Social Networking*, Vol. 24 No. 4, pp. 250–257.
Cha, S.S. and Seo, B.K. (2018), "Smartphone use and smartphone addiction in middle school students in Korea: Prevalence, social networking service, and game use", *Health Psychology Open*, Vol. 5 No. 1, pp. 1–15.
Chae, J. (2018), "Reexamining the relationship between social media and happiness: The effects of various social media platforms on reconceptualized happiness", *Telematics and Informatics*, Vol. 35 No. 6, pp. 1656–1664.
Chan-Olmsted, S.M., Cho, M. and Lee, S. (2013), "User Perceptions of Social Media: A Comparative Study of Perceived Characteristics and User Profiles by Social Media", *Online Journal of Communication*, Vol. 3 No. 4, pp. 149–178.

Chan, M. and Li, X. (2020), "Smartphones and psychological well-being in China: Examining direct and indirect relationships through social support and relationship satisfaction", *Telematics and Informatics*, Vol. 54, p. 101469.
Chen, A.T., Ge, S., Cho, S., Teng, A.K., Chu, F., Demiris, G. and Zaslavsky, O. (2021), "Reactions to COVID-19, information and technology use, and social connectedness among older adults with pre-frailty and frailty", *Geriatric Nursing*, Vol. 42 No. 1, pp. 188–195.
Chen, C. (2021), "Playing mobile games for stress recovery purposes: A survey of Chinese adolescents", *Telematics and Informatics*, Vol. 56, p. 101481.
Chen, H.T. and Li, X. (2017), "The contribution of mobile social media to social capital and psychological well-being: Examining the role of communicative use, friending and self-disclosure", *Computers in Human Behavior*, Vol. 75, pp. 958–965.
Chen, Y.A., Fan, T., Toma, C.L. and Scherr, S. (2022), "International students' psychosocial well-being and social media use at the onset of the COVID-19 pandemic: A latent profile analysis", *Computers in Human Behavior*, Vol. 137, p. 107409.
Chin, W.W. (1998), "The partial least squares approach to structural equation modeling", *Modern Methods for Business Research*, Vol. 295 No. 2, pp. 295–336.
Choi, D.H. and Noh, G.Y. (2020a), "Associations Between Social Media Use and Suicidal Ideation in South Korea: Mediating Roles of Social Capital and Self-esteem", *Health Communication*, Vol. 35 No. 14, pp. 1754–1761.
Choi, D.H. and Noh, G.Y. (2020b), "The influence of social media use on attitude toward suicide through psychological well-being, social isolation, and social support", *Information Communication and Society*, Vol. 23 No. 10, pp. 1427–1443.
Chuang, H.-M. and Liao, Y.-D. (2021), "Sustainability of the Benefits of Social Media on Socializing and Learning: An Empirical Case of Facebook", *Sustainability*, Vol. 13 No. 12, p. 6731.
Chun, J.W. and Lee, M.J. (2017), "When does individuals' willingness to speak out increase on social media? Perceived social support and perceived power/control", *Computers in Human Behavior*, Vol. 74, pp. 120–129.
Cohen, S., Kamarck, T. and Mermelstein, R. (1983), "A Global Measure of Perceived Stress", *Journal of Health and Social Behavior*, Vol. 24 No. 4, pp. 385–396.
Comrey, A.L. (1995), "Career assessment and the Comrey Personality Scales", *Journal of Career Assessment*, Vol. 3 No. 2, pp. 140–156.
Cook, M. and Campbell, D.T. (1979), *Quasi-Experimentation: Design and Analysis Issues for Field Settings*, Houghton Mifflin, Boston.
Craig, S.L., Eaton, A.D., McInroy, L.B., Leung, V.W.Y. and Krishnan, S. (2021), "Can Social Media Participation Enhance LGBTQ+ Youth Well-Being? Development of the Social Media Benefits Scale", *Social Media and Society*, available at: https://doi.org/10.1177/2056305121988931 (accessed 13 May 2021).
Creed, P.A. and Watson, T. (2003), "Age, Gender, Psychological Wellbeing and the Impact of Losing the Latent and Manifest Benefits of Employment in Unemployed People", *Australian Journal of Psychology*, Vol. 55 No. 2, pp. 95–103.
Desjarlais, M. and Willoughby, T. (2010), "A longitudinal study of the relation between adolescent boys and girls' computer use with friends and friendship quality: Support for the social compensation or the rich-get-richer hypothesis?", *Computers in Human Behavior*, Vol. 26 No. 5, pp. 896–905.
Dhir, A., Kaur, P., Chen, S. and Pallesen, S. (2019), "Antecedents and consequences of social media fatigue", *International Journal of Information Management*, Vol. 48, pp. 193–202.
Dhir, A., Talwar, S., Kaur, P., Budhiraja, S. and Islam, N. (2021), "The dark side of social media: Stalking, online self-disclosure and problematic sleep", *International Journal of Consumer Studies*, Vol. 45, pp. 1373–1391.
Dhir, A., Yossatorn, Y., Kaur, P. and Chen, S. (2018), "Online social media fatigue and psychological wellbeing—A study of compulsive use, fear of missing out, fatigue, anxiety and depression", *International Journal of Information Management*, Vol. 40, pp. 141–152.
Diener, E., Emmons, R.A., Larsen, R.J. and Griffin, S. (1985), "The satisfaction with life scale", *Journal of Personality and Assessment*, Vol. 49 No. 1, pp. 71–75.
Duan, J. and Dholakia, R.R. (2017), "Posting purchases on social media increases happiness: the mediating roles of purchases' impact on self and interpersonal relationships", *Journal of Consumer Marketing*, Vol. 34 No. 5, pp. 404–413.

Duffett, R.G. and Wakeham, M. (2016), "Social Media Marketing Communications Effect on Attitudes among Millennials in South Africa", *The African Journal of Information Systems*, Vol. 8 No. 3, pp. 20–44.
Duong, C.D. (2021), "The impact of fear and anxiety of Covid-19 on life satisfaction: Psychological distress and sleep disturbance as mediators", *Personality and Individual Differences*, Vol. 178, p. 110869.
Durak, H.Y. (2019), "Investigation of nomophobia and smartphone addiction predictors among adolescents in Turkey: Demographic variables and academic performance", *Social Science Journal*, Vol. 56 No. 4, pp. 492–517.
Edwards, E.J., Taylor, C.S. and Vaughan, R.S. (2022), "Individual differences in self-esteem and social anxiety predict problem smartphone use in adolescents", *School Psychology International*, Vol. 43 No. 5, pp. 460–476.
Enez Darcin, A., Kose, S., Noyan, C.O., Nurmedov, S., Yılmaz, O. and Dilbaz, N. (2016), "Smartphone addiction and its relationship with social anxiety and loneliness", *Behaviour and Information Technology*, Vol. 35 No. 7, pp. 520–525.
Eswi, A.S., Radi, S. and Youssri, H. (2013), "Stress/ stressors as perceived by baccalaureate Saudi nursing students", *Middle East Journal of Scientific Research*, Vol. 14 No. 2, pp. 193–202.
Fabris, M.A., Marengo, D., Longobardi, C. and Settanni, M. (2020), "Investigating the links between fear of missing out, social media addiction, and emotional symptoms in adolescence: The role of stress associated with neglect and negative reactions on social media", *Addictive Behaviors*, Vol. 106, p. 106364.
Falk, R.F. and Miller, N.B. (1992), *A Primer for Soft Modeling*, University of Akron Press.
Fang, Y., Niu, Y. and Dong, Y. (2021), "Exploring the relationship between narcissism and depression: The mediating roles of perceived social support and life satisfaction", *Personality and Individual Differences*, Vol. 173, p. 110604.
Felisoni, D.D. and Godoi, A.S. (2018), "Cell phone usage and academic performance: an experiment", *Computers & Education*, Vol. 117, pp. 175–187.
Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39–50.
Frison, E. and Eggermont, S. (2015), "The impact of daily stress on adolescents' depressed mood: The role of social support seeking through Facebook", *Computers in Human Behavior*, Vol. 44, pp. 315–325.
Frison, E. and Eggermont, S. (2016), "Exploring the Relationships Between Different Types of Facebook Use, Perceived Online Social Support, and Adolescents' Depressed Mood", *Social Science Computer Review*, Vol. 34 No. 2, pp. 153–171.
Fu, L., Wang, P., Zhao, M., Xie, X., Chen, Y., Nie, J. and Lei, L. (2020a), "Can emotion regulation difficulty lead to adolescent problematic smartphone use? A moderated mediation model of depression and perceived social support", *Children and Youth Services Review*, Vol. 108, p. 104660.
Fu, S., Chen, X. and Zheng, H. (2021), "Exploring an adverse impact of smartphone overuse on academic performance via health issues: a stimulus-organism-response perspective", *Behaviour and Information Technology*, Vol. 40 No. 7, pp. 663–675.
Fu, S., Li, H., Liu, Y., Pirkkalainen, H. and Salo, M. (2020b), "Social media overload, exhaustion, and use discontinuance: Examining the effects of information overload, system feature overload, and social overload", *Information Processing and Management*, Vol. 57 No. 6, p. 102307.
Fuster, H., Chamarro, A. and Oberst, U. (2017), "Fear of Missing Out, online social networking and mobile phone addiction: A latent profile approach", *Aloma: Revista de Psicologia, Ciències de l'Educació i de l'Esport*, Vol. 35 No. 1, pp. 22–30.
Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y., Fu, H. and Dai, J. (2020), "Mental health problems and social media exposure during COVID-19 outbreak", *PLoS ONE*, Vol. 15 No. 4, p. e0231924.
Geirdal, A.Ø., Ruffolo, M., Leung, J., Thygesen, H., Price, D., Bonsaksen, T. and Schoultz, M. (2021), "Mental health, quality of life, wellbeing, loneliness and use of social media in a time of social distancing during the COVID-19 outbreak. A cross-country comparative study", *Journal of Mental Health*, Vol. 30 No. 2, pp. 148–155.
Geng, J., Han, L., Gao, F., Jou, M. and Huang, C.C. (2018), "Internet addiction and procrastination among Chinese young adults: A moderated mediation model", *Computers in Human Behavior*, Vol. 84, pp. 320–333.
Geraee, N., Eslami, A.A. and Soltani, R. (2019), "The relationship between family social capital, social media use and life satisfaction in adolescents", *Health Promotion Perspectives*, Tabriz University of Medical Sciences, Vol. 9 No. 4, pp. 307–313.
Gerke, D.R., Step, M.M., Rünger, D., Fletcher, J.B., Brooks, R.A., Davis, N., Kisler, K.A. and Reback, C.J.

(2020), "Associations Between Social Support and Social Media Use Among Young Adult Cisgender MSM and Transgender Women Living With HIV", *Health Promotion Practice*, Vol. 21 No. 5, pp. 705–715.
Gezgin, D.M. and Çakır, O. (2016), "Analysis of nomofobic behaviors of adolescents regarding various factors", *Journal of Human Sciences*, Vol. 13 No. 2, pp. 2504–2519.
Gezgin, D.M., Hamutoglu, N.B., Sezen-Gultekin, G. and Ayas, T. (2018), "The Relationship between Nomophobia and Loneliness among Turkish Adolescents", *International Journal of Research in Education and Science*, Vol. 4 No. 2, pp. 358–374.
Gezgin, D.M., Şumuer, E., Arslan, O. and Yildirim, S. (2017), "Nomophobia Prevalence among Pre-service Teachers: A case of Trakya University", *Trakya Üniversitesi Eğitim Fakültesi Dergisi*, Vol. 7 No. 1, pp. 86–95.
Glover, D.A., Loeb, T.B., Carmona, J.V., Sciolla, A., Zhang, M., Myers, H.F. and Wyatt, G.E. (2010), "Childhood sexual abuse severity and disclosure predict posttraumatic stress symptoms and biomarkers in ethnic minority women", *Journal of Trauma and Dissociation*, Vol. 11 No. 2, pp. 152–173.
Gökçearslan, Ş., Uluyol, Ç. and Şahin, S. (2018), "Smartphone addiction, cyberloafing, stress and social support among university students: A path analysis", *Children and Youth Services Review*, Vol. 91, pp. 47–54.
Griffioen, N., Lichtwarck-Aschoff, A., van Rooij, M. and Granic, I. (2021), "From Wellbeing to Social Media and Back: A Multi-Method Approach to Assessing the Bi-Directional Relationship Between Wellbeing and Social Media Use", *Frontiers in Psychology*, Vol. 12, p. Article 789302.
Guo, H. (2018), *Linking Loneliness and Use of Social Media*, University of Helsinki.
Guo, Y., Lu, Z., Kuang, H. and Wang, C. (2020), "Information avoidance behavior on social network sites: Information irrelevance, overload, and the moderating role of time pressure", *International Journal of Information Management*, Vol. 52, p. 102067.
Haand, R. and Shuwang, Z. (2020), "The relationship between social media addiction and depression: a quantitative study among university students in Khost, Afghanistan", *International Journal of Adolescence and Youth*, Vol. 25 No. 1, pp. 780–786.
Hamza, A., Mohsein, N.A.A. and siew Yim, L. (2012), "Measuring perceived social support in stroke survivors: Linguistic validation of the Multidimensional Scale of Perceived Social Support (MSPSS) in Hausa (Nigerian) language", *South African Journal of Occupational Therapy*, Vol. 42 No. 830, pp. 26–29.
Hansmann, K.-W. and Ringle, C.M. (2004), *SmartPLS Manual*, Institute for Operations Management and Organizations at the University of Hamburg, Germany.
Hayes, A.F. (2009), "Beyond Baron and Kenny: Statistical mediation analysis in the new millennium", *Communication Monographs*, Vol. 76 No. 4, pp. 408–420.
Hayes, A.F. (2012), *PROCESS: A Versatile Computational Tool for Observed Variable Moderation, Mediation, and Conditional Process Modeling*, available at: http://www.afhayes.com/public/process2012.pdf (accessed 24 August 2022).
Hayes, A.F. (2017), *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, Guilford publications, New York.
Headey, B., Kelley, J. and Wearing, A. (1993), "Dimensions of mental health: Life satisfaction, positive affect, anxiety and depression", *Social Indicators Research*, Vol. 29 No. 1, pp. 63–82.
Herrero, J., Urueña, A., Torres, A. and Hidalgo, A. (2019), "Socially Connected but Still Isolated: Smartphone Addiction Decreases Social Support Over Time", *Social Science Computer Review*, Vol. 37 No. 1, pp. 73–88.
Homaid, A.A. (2022), "Problematic social media use and associated consequences on academic performance decrement during Covid-19", *Addictive Behaviors*, Vol. 132, p. 107370.
Hou, Y., Xiong, D., Jiang, T., Song, L. and Wang, Q. (2019), "Social media addiction: Its impact, mediation, and intervention", *Cyberpsychology*, Vol. 13 No. 1, p. article 4.
House, J.S., Landis, K.R. and Umberson, D. (1988), "Social relationships and health", *Science*, Vol. 241 No. 4865, pp. 540–545.
Hsiao, K.L., Shu, Y. and Huang, T.C. (2017), "Exploring the effect of compulsive social app usage on technostress and academic performance: Perspectives from personality traits", *Telematics and Informatics*, Vol. 34 No. 2, pp. 679–690.
Huang, L., Zhang, S.W., Wu, S.L., Ma, L. and Deng, X.H. (2008), "The Chinese version of ICIQ: A useful tool in clinical practice and research on urinary incontinence", *Neurourology and Urodynamics*, Vol. 27 No. 6, pp. 522–524.
Hull, D.C., Williams, G.A. and Griffiths, M.D. (2013), "Video game characteristics, happiness and flow as predictors of addiction among video game players: A pilot study", *Journal of Behavioral Addictions*, Vol. 2 No.

3, pp. 145–152.
Hulland, J. (2015), "Use of partial least squares (pls) in strategic management research: a review of four recent studies", *Strategic Management Journal*, Vol. 20 No. 2, pp. 195–204.
Hussain, Z., Wegmann, E., Yang, H. and Montag, C. (2020), "Social Networks Use Disorder and Associations With Depression and Anxiety Symptoms: A Systematic Review of Recent Research in China", *Frontiers in Psychology*, Vol. 11, p. Article 211.
iiMedia. (2018), "2018 Chinese College Students Online Leisure Entertainment Behavior Monitoring Analysis Report", available at: https://report.iimedia.cn/repo13-0/34426.html (accessed 31 December 2022).
Kalaitzaki, A., Tsouvelas, G. and Koukouli, S. (2021), "Social capital, social support and perceived stress in college students: The role of resilience and life satisfaction", *Stress and Health*, Vol. 37 No. 3, pp. 454–465.
Kara, M., Baytemir, K. and Inceman-Kara, F. (2021), "Duration of daily smartphone usage as an antecedent of nomophobia: exploring multiple mediation of loneliness and anxiety", *Behaviour and Information Technology*, Vol. 40 No. 1, pp. 85–98.
Keles, B., McCrae, N. and Grealish, A. (2020), "A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents", *International Journal of Adolescence and Youth*, Vol. 25 No. 1, pp. 79–93.
Khobzi, H., Lau, R.Y.K. and Cheung, T.C.H. (2019), "The outcome of online social interactions on Facebook pages: A study of user engagement behavior", *Internet Research*, Vol. 29 No. 1, pp. 2–23.
Kim, H. (2014), "Enacted social support on social media and subjective well-being", *International Journal of Communication*, Vol. 8 No. 1, pp. 2201–2221.
Kim, S. and Suh, S. (2019), "Social Support as a Mediator Between Insomnia and Depression in Female Undergraduate Students", *Behavioral Sleep Medicine*, Vol. 17 No. 4, pp. 379–387.
King, A.L.S., Valença, A.M., Silva, A.C.O., Baczynski, T., Carvalho, M.R. and Nardi, A.E. (2013), "Nomophobia: dependency on virtual environments or social phobia?", *Computers in Human Behavior*, Vol. 29, pp. 140–144.
Koeske, G.F. and Koeske, R.D. (1993), "A preliminary test of a stress-strain-outcome model for reconceptualizing the burnout phenomenon", *Journal of Social Service Research*, Vol. 17 No. 3–4, pp. 107–135.
Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T. and Scherlis, W. (1998), "Internet Paradox: A Social Technology That Reduces Social Involvement and Psychological Well-Being?", *American Psychologist*, Vol. 53 No. 9, pp. 1017–1031.
Kula, H., Ayhan, C. and Soyer, F. (2020), "The Relationship Between Smartphone Addiction and Life Satisfaction: Faculty of Sport Sciences Students", *International Journal of Psychology and Educational Studies*, Vol. 7 No. 1, pp. 86–95.
Lakey, B. and Orehek, E. (2011), "Relational Regulation Theory: A New Approach to Explain the Link Between Perceived Social Support and Mental Health", *Psychological Review*, Vol. 118 No. 3, pp. 482–495.
Lee, A.R., Son, S.M. and Kim, K.K. (2016), "Information and communication technology overload and social networking service fatigue: A stress perspective", *Computers in Human Behavior*, Vol. 55, pp. 51–61.
Lee, H.E. and Cho, J. (2019), "Social Media Use and Well-Being in People with Physical Disabilities: Influence of SNS and Online Community Uses on Social Support, Depression, and Psychological Disposition", *Health Communication*, Vol. 34 No. 9, pp. 1043–1052.
Lei, H., Li, S., Chiu, M.M. and Lu, M.H. (2018), "Social support and Internet addiction among mainland Chinese teenagers and young adults: A meta-analysis", *Computers in Human Behavior*, Vol. 85, pp. 200–209.
Leonardi, P.M. (2014), "Social media, knowledge sharing, and innovation: Toward a theory of communication visibility", *Information Systems Research*, Vol. 25 No. 4, pp. 796–816.
Lim, V.K.G. and Chen, D.J.Q. (2012), "Cyberloafing at the workplace: Gain or drain on work?", *Behaviour and Information Technology*, Vol. 31 No. 4, pp. 343–353.
Lin, C.Y., Namdar, P., Griffiths, M.D. and Pakpour, A.H. (2021a), "Mediated roles of generalized trust and perceived social support in the effects of problematic social media use on mental health: A cross-sectional study", *Health Expectations*, Vol. 24 No. 1, pp. 165–173.
Lin, H.C. and Chang, C.M. (2018), "What motivates health information exchange in social media? The roles of the social cognitive theory and perceived interactivity", *Information and Management*, Vol. 55 No. 6, pp. 771–780.
Lin, Y., Liu, Y. and Fan, W. (2020), "How does Mobile ICT Affect Psychological Unease? A Longitudinal

Study", *Twenty-Fourth Pacific Asia Conference on Information Systems, Dubai, UAE*, pp. 1–14.
Lin, Y., Liu, Y., Fan, W., Tuunainen, V.K. and Deng, S. (2021b), "Revisiting the Relationship Between Smartphone Use and Academic Performance: A Large-Scale Study", *Computers in Human Behavior*, Vol. 122, p. 106835.
Loh, X.K., Lee, V.H., Loh, X.M., Tan, G.W.H., Ooi, K.B. and Dwivedi, Y.K. (2022), "The Dark Side of Mobile Learning via Social Media: How Bad Can It Get?", *Information Systems Frontiers*, Vol. 24, pp. 1887–1904.
Longstreet, P. and Brooks, S. (2017), "Life satisfaction: A key to managing internet & social media addiction", *Technology in Society*, Vol. 50, pp. 73–77.
Luarn, P., Yang, J.C. and Chiu, Y.P. (2015), "Why people check in to social network sites", *International Journal of Electronic Commerce*, Vol. 19 No. 4, pp. 21–46.
Luqman, A., Masood, A., Shahzad, F., Shahbaz, M. and Feng, Y. (2021), "Untangling the adverse effects of late-night usage of smartphone-based SNS among University students", *Behaviour and Information Technology*, Vol. 40 No. 15, pp. 1671–1687.
Lyvers, M., Cutinho, D. and Thorberg, F.A. (2020), "Alexithymia, impulsivity, disordered social media use, mood and alcohol use in relation to facebook self-disclosure", *Computers in Human Behavior*, Vol. 103, pp. 174–180.
Maier, C., Laumer, S., Eckhardt, A. and Weitzel, T. (2015a), "Giving too much social support: social overload on social networking sites", *European Journal of Information Systems,* Vol. 24 No. 5, pp. 447–464.
Maier, C., Laumer, S., Weinert, C. and Weitzel, T. (2015b), "The effects of technostress and switching stress on discontinued use of social networking services: A study of Facebook use", *Information Systems Journal*, Vol. 25 No. 3, pp. 275–308.
Malik, A., Dhir, A., Kaur, P. and Johri, A. (2021), "Correlates of social media fatigue and academic performance decrement: A large cross-sectional study", *Information Technology and People*, Vol. 34 No. 2, pp. 557–580.
Marciano, L., Schulz, P.J. and Camerini, A.L. (2021), "How smartphone use becomes problematic: Application of the ALT-SR model to study the predicting role of personality traits", *Computers in Human Behavior*, Vol. 119, p. 106731.
Marttila, E., Koivula, A. and 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*, Vol. 59, p. 101556.
Masood, A., Feng, Y., Rasheed, M.E., Ali, A. and Gong, M. (2021), "Smartphone-based social networking sites and intention to quit: self-regulatory perspective", *Behaviour and Information Technology*, Vol. 40 No. 11, pp. 1055–1071.
Masood, A., Luqman, A., Feng, Y. and Ali, A. (2020), "Adverse consequences of excessive social networking site use on academic performance: Explaining underlying mechanism from stress perspective", *Computers in Human Behavior*, Vol. 113, p. 106476.
Masood, A., Luqman, A., Feng, Y. and Shahzad, F. (2022), "Untangling the Adverse Effect of SNS Stressors on Academic Performance and Its Impact on Students' Social Media Discontinuation Intention: The Moderating Role of Guilt", *SAGE Open*, available at: https://doi.org/10.1177/21582440221079905 (accessed 29 November 2022).
Mathers, C.D. and Loncar, D. (2006), "Projections of global mortality and burden of disease from 2002 to 2030", *PLoS Medicine*, Vol. 3 No. 11, p. e422.
McKenna, K.Y.A., Green, A.S. and Gleason, M.E.J. (2002), "Relationship formation on the internet: What's the big attraction?", *Journal of Social Issues*, Vol. 58 No. 1, pp. 9–31.
Meshi, D., Cotten, S.R. and Bender, A.R. (2020), "Problematic Social Media Use and Perceived Social Isolation in Older Adults: A Cross-Sectional Study", *Gerontology*, Vol. 66 No. 2, pp. 160–168.
Meshi, D. and Ellithorpe, M.E. (2021a), "Problematic social media use and social support received in real-life versus on social media: Associations with depression, anxiety and social isolation", *Addictive Behaviors*, Vol. 119, p. 106949.
Meshi, D. and Ellithorpe, M.E. (2021b), "Problematic social media use and social support received in real-life versus on social media: Associations with depression, anxiety and social isolation", *Addictive Behaviors*, Vol. 119, p. 106949.
Mikal, J.P. and Grace, K. (2012), "Against Abstinence-Only Education Abroad: Viewing Internet Use During Study Abroad as a Possible Experience Enhancement", *Journal of Studies in International Education*, Vol. 16 No. 3, pp. 287–306.

Milošević-Đorđević, J.S. and Žeželj, I.L. (2014), "Psychological predictors of addictive social networking sites use : The case of Serbia", *Computers in Human Behavior,* Vol. 32 No. 3, pp. 229–234.
Moqbel, M. and Bartelt, V. (2018), "Social Network Sites in Businesses: Combating Technostress", *Proceedings of the 51st Hawaii International Conference on System Sciences*, pp. 1846–1853.
Moqbel, M. and Kock, N. (2018), "Unveiling the dark side of social networking sites: Personal and work-related consequences of social networking site addiction", *Information and Management*, Vol. 55 No. 1, pp. 109–119.
Mulyana, A., Briandana, R. and Rekarti, E. (2020), "ICT and social media as a marketing communication platform in facilitating social engagement in the digital era", *International Journal of Innovation, Creativity and Change*, Vol. 13 No. 5, pp. 1–16.
Nawaz, M.A., Shah, Z., Nawaz, A., Asmi, F., Hassan, Z. and Raza, J. (2018), "Overload and exhaustion: Classifying SNS discontinuance intentions", *Cogent Psychology*, Vol. 5 No. 1, p. e1515584.
Nayak, S. and Budhwar, P. (2022), "Negative effects of enterprise social networks (ESNs) and technostress: empirical evidence from R&D centres operating in India", *Aslib Journal of Information Management*, Vol. 74 No. 5, pp. 966–988.
Neve, J.E. De. (2015), "Personality, childhood experience, and political ideology", *Political Psychology*, Vol. 36 No. 1, pp. 55–73.
Nitschke, J.P., Forbes, P.A.G., Ali, N., Cutler, J., Apps, M.A.J., Lockwood, P.L. and Lamm, C. (2021), "Resilience during uncertainty? Greater social connectedness during COVID-19 lockdown is associated with reduced distress and fatigue", *British Journal of Health Psychology*, Vol. 26, pp. 553–569.
O'Day, E.B. and Heimberg, R.G. (2021), "Social media use, social anxiety, and loneliness: A systematic review", *Computers in Human Behavior*, Vol. 3, p. 100070.
Oh, H.J., Ozkaya, E. and Larose, R. (2014), "How does online social networking enhance life satisfaction? the relationships among online supportive interaction, affect, perceived social support, sense of community, and life satisfaction", *Computers in Human Behavior*, Vol. 30, pp. 69–78.
Oh, S. and Syn, S.Y. (2015), "Motivations for sharing information and social support in social media: A comparative analysis of Facebook, Twitter, Delicious, YouTube, and Flickr", *Journal of the Association for Information Science and Technology*, Vol. 66 No. 10, pp. 2045–2060.
Orben, A., Przybylski, A.K., Blakemore, S.J. and Kievit, R.A. (2022), "Windows of developmental sensitivity to social media", *Nature Communications*, Vol. 13, p. 1649.
Pai, P. and Tsai, H.T. (2016), "Reciprocity norms and information-sharing behavior in online consumption communities: An empirical investigation of antecedents and moderators", *Information and Management*, Vol. 53 No. 1, pp. 38–52.
Pang, H. (2020), "Examining associations between university students' mobile social media use, online self-presentation, social support and sense of belonging", *Aslib Journal of Information Management*, Vol. 72 No. 3, pp. 321–338.
Pang, H. (2021), "How compulsive WeChat use and information overload affect social media fatigue and well-being during the COVID-19 pandemic? A stressor-strain-outcome perspective", *Telematics and Informatics*, Vol. 64, p. 101690.
Papacharissi, Z. (2002), "The presentation of self in virtual life: Characteristics of personal home pages", *Journalism and Mass Communication Quarterly*, Vol. 79 No. 3, pp. 643–660.
Pavithra, M.B., Madhukumar, S. and Mahadeva, M. (2015), "A study on nomophobia-mobile phone dependence, among students of a medical college in Bangalore", *National Journal of Community Medicine*, Vol. 6, pp. 340–344.
Pavot, W. and Diener, E. (2008), "The Satisfaction With Life Scale and the emerging construct of life satisfaction", *Journal of Positive Psychology*, Vol. 3 No. 2, pp. 137–152.
Peter, J., Valkenburg, P.M. and Schouten, A.P. (2005), "Developing a model of adolescent friendship formation on the Internet", *Cyberpsychology and Behavior*, Vol. 8 No. 5, pp. 423–430.
Poley, M.E.M. and Luo, S. (2012), "Social compensation or rich-get-richer? the role of social competence in college students' use of the Internet to find a partner", *Computers in Human Behavior*, Vol. 28, pp. 414–419.
Ponnusamy, S., Iranmanesh, M., Foroughi, B. and Hyun, S.S. (2020), "Drivers and outcomes of Instagram Addiction: Psychological well-being as moderator", *Computers in Human Behavior*, Vol. 107, p. 106294.
Primack, B.A., Shensa, A., Sidani, J.E., Escobar-Viera, C.G. and Fine, M.J. (2021), "Temporal Associations Between Social Media Use and Depression", *American Journal of Preventive Medicine*, Vol. 60 No. 2, pp. 179–188.

Primack, B.A., Shensa, A., Sidani, J.E., Whaite, E.O., Lin, L. yi, Rosen, D., Colditz, J.B., Radovic, A. and Miller, E. (2017), "Social Media Use and Perceived Social Isolation Among Young Adults in the U.S.", *American Journal of Preventive Medicine*, Vol. 53 No. 1, pp. 1–8.

Radloff, L.S. (1977), "The CES-D Scale: A Self-Report Depression Scale for Research in the General Population", *Applied Psychological Measurement*, Vol. 1 No. 3, pp. 385–401.

Ragu-Nathan, T.S., Tarafdar, M. and Ragu-Nathan, B.S. (2008), "The Consequences of Technostress for End Users in Organizations : Conceptual Development and Empirical Validation", *Information System Research*, Vol. 19 No. 4, pp. 417–433.

Raza, S.A., Qazi, W., Umer, B. and Khan, K.A. (2020), "Influence of social networking sites on life satisfaction among university students: a mediating role of social benefit and social overload", *Health Education*, Vol. 120 No. 2, pp. 141–164.

Reinecke, L., Aufenanger, S., Beutel, M.E., Dreier, M., Quiring, O., Stark, B., Wölfling, K. and Müller K.W. (2017), "Digital Stress over the Life Span: The Effects of Communication Load and Internet Multitasking on Perceived Stress and Psychological Health Impairments in a German Probability Sample", *Media Psychology*, Vol. 20 No. 1, pp. 90–115.

Rodríguez-García, A.M., Belmonte, J.L. and Moreno-Guerrero, A.J. (2020), "Nomophobia: An individual's growing fear of being without a smartphone—a systematic literature review", *International Journal of Environmental Research and Public Health*, Vol. 17, p. 580.

Romer, D., Jamieson, P.E. and Jamieson, K.H. (2006), "Are news reports of suicide contagious? A stringent test in six U.S. cities", *Journal of Communication*, Vol. 56 No. 2, pp. 253–270.

Ross, C., Orr, E.S., Sisic, M., Arseneault, J.M., Simmering, M.G. and Orr, R.R. (2009), "Personality and motivations associated with Facebook use", *Computers in Human Behavior*, Vol. 25, pp. 578–586.

Rucker, D.D., Preacher, K.J., Tormala, Z.L. and Petty, R.E. (2011), "Mediation Analysis in Social Psychology: Current Practices and New Recommendations", *Social and Personality Psychology Compass*, Vol. 5 No. 6, pp. 359–371.

Ruppel, E.K., Burke, T.J., Cherney, M.R. and Dinsmore, D.R. (2018), "Social compensation and enhancement via mediated communication in the transition to college", *Human Communication Research*, Vol. 44 No. 1, pp. 58–79.

Russell, D., Peplau, L. a and Cutrona, C.E. (1980), "The revised UCLA Loneliness Scale: concurrent and discriminant validity evidence.", *Journal of Personality and Social Psychology*, Vol. 39 No. 3, pp. 472–480.

Salo, M., Pirkkalainen, H. and Koskelainen, T. (2019), "Technostress and social networking services: Explaining users' concentration, sleep, identity, and social relation problems", *Information Systems Journal*, Vol. 29 No. 2, pp. 408–435.

Samaha, M. and Hawi, N.S. (2016), "Relationships among smartphone addiction, stress, academic performance, and satisfaction with life", *Computers in Human Behavior*, Vol. 57, pp. 321–325.

Sasaki, Y., Kawai, D. and Kitamura, S. (2015), "The anatomy of tweet overload: How number of tweets received, number of friends, and egocentric network density affect perceived information overload", *Telematics and Informatics*, Vol. 32 No. 4, pp. 853–861.

Savci, M. and Aysan, F. (2017), "Technological addictions and social connectedness: Predictor effect of internet addiction, social media addiction, digital game addiction and smartphone addiction on social connectedness", *The Journal of Psychiatry and Neurological Sciences*, Vol. 30 No. 3, pp. 202–216.

Schneider, C. and Wang, X.A. (2016), "Technology addictions and technostress: an examination of Hong Kong and the U.S.", *Twenty-Second Americas Conference on Information Systems*, pp. 1–10.

Selkie, E., Adkins, V., Masters, E., Bajpai, A. and Shumer, D. (2020), "Transgender Adolescents' Uses of Social Media for Social Support", *Journal of Adolescent Health*, Vol. 66 No. 3, pp. 275–280.

Shahzad, F., Abbas, A., Fateh, A., Kasim, R.S.R., Akram, K. and Ashraf, S.F. (2021), "Late-Night Use of Social Media and Cognitive Engagement of Female Entrepreneurs: A Stressor–Strain–Outcome Perspective", *SAGE Open*, available at: https://doi.org/10.1177/21582440211037652 (accessed 15 September 2022).

Sheeks, M.S. and Birchmeier, Z.P. (2007), "Shyness, sociability, and the use of computer-mediated communication in relationship development", *Cyberpsychology and Behavior*, Vol. 10 No. 1, pp. 64–70.

Sheldon, P., Rauschnabel, P.A. and Honeycutt, J.M. (2019), *The Dark Side of Social Media: Psychological, Managerial, and Societal Perspective*, edited by Chaiprasert-Paguio, J., Nikki Levy.

Shi, C., Yu, L., Wang, N., Cheng, B. and Cao, X. (2020), "Effects of social media overload on academic performance: a stressor–strain–outcome perspective", *Asian Journal of Communication*, Vol. 30 No. 2, pp.

179–197.
Shimoga, S. V., Erlyana, E. and Rebello, V. (2019), "Associations of social media use with physical activity and sleep adequacy among adolescents: Cross-sectional survey", *Journal of Medical Internet Research*, Vol. 21 No. 6, p. e14290.
Simsek, A., Elciyar, K. and Kizilhan, T. (2019), "A comparative study on social media addiction of high school and university students", *Contemporary Educational Technology*, Vol. 10 No. 2, pp. 106–119.
Sivashanker, K. (2013), "Cyberbullying and the digital self", *Journal of the American Academy of Child and Adolescent Psychiatry*, Vol. 52 No. 2, pp. 113–115.
Soror, A., Steelman, Z.R. and Turel, O. (2022), "Exhaustion and dependency: a habituation–sensitization perspective on the duality of habit in social media use", *Information Technology and People*, Vol. 35 No. 1, pp. 67–95.
Subramanian, K.R. (2017), "Influence of Social Media in Interpersonal Communication", *International Journal of Scientific Progress and Research*, Vol. 109 No. 02, pp. 70–75.
Sun, J. and Lee, S.K. (2021), "Flooded with too many messages? Predictors and consequences of instant messaging fatigue", *Information Technology and People*, Vol. 35 No. 7, pp. 2026–2042.
Syrek, C.J., Kühnel, J., Vahle-Hinz, T. and De Bloom, J. (2018), "Share, like, twitter, and connect: Ecological momentary assessment to examine the relationship between non-work social media use at work and work engagement", *Work and Stress*, Vol. 32 No. 3, pp. 209–227.
Tams, S., Legoux, R. and Pierre-Majorique, L. (2018), "Smartphone withdrawal creates stress: a moderated mediation model of nomophobia, social threat, and phone withdrawal context", *Computers in Human Behavior*, Vol. 81, pp. 1–9.
Tandon, A., Dhir, A., Islam, N., Talwar, S. and Mäntymäki, M. (2021a), "Psychological and behavioral outcomes of social media-induced fear of missing out at the workplace", *Journal of Business Research*, Vol. 136, pp. 186–197.
Tandon, A., Dhir, A., Talwar, S., Kaur, P. and Mäntymäki, M. (2021b), "Dark consequences of social media-induced fear of missing out (FoMO): Social media stalking, comparisons, and fatigue", *Technological Forecasting and Social Change*, Elsevier Inc., Vol. 171, p. 120931.
Tandon, A., Dhir, A., Talwar, S., Kaur, P. and Mäntymäki, M. (2022), "Social media induced fear of missing out (FoMO) and phubbing: Behavioural, relational and psychological outcomes", *Technological Forecasting and Social Change*, Vol. 174, p. 121149.
Tankovska, H. (2021), "Social media - Statistics & Facts", *Statista*, available at: https://www.statista.com/topics/1164/social-networks/ (accessed 3 May 2021).
Tarafdar, M., Cooper, C.L. and Stich, J.F. (2019), "The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research", *Information Systems Journal*, Vol. 29 No. 1, pp. 6–42.
Tarafdar, M., Maier, C., Laumer, S. and Weitzel, T. (2020), "Explaining the link between technostress and technology addiction for social networking sites: A study of distraction as a coping behavior", *Information Systems Journal*, Vol. 30 No. 1, pp. 96–124.
Taylor, S.H., Zhao, P. and Bazarova, N.N. (2022), "Social media and close relationships: a puzzle of connection and disconnection", *Current Opinion in Psychology*, Vol. 45, p. 101292.
Teng, L., Liu, D. and Luo, J. (2022), "Explicating user negative behavior toward social media: an exploratory examination based on stressor–strain–outcome model", *Cognition, Technology and Work*, Vol. 24, pp. 183–194.
Thadani, D.R., Baptist, H.K., Kong, H., Cheung, C.M.K., Baptist, H.K., Kong, H. and Lee, Z.W.Y. (2016), "Social networking site addiction: the cognitive bias perspective", *Pacific Asia Conference on Information System 2016 Proceedings*.
Thompson, C., Brodaty, H., Trollor, J. and Sachdev, P. (2010), "Behavioral and psychological symptoms associated with dementia subtype and severity", *International Psychogeriatrics*, Vol. 22 No. 2, pp. 300–305.
Toma, C.L. (2022), "Online dating and psychological wellbeing: A social compensation perspective", *Current Opinion in Psychology*, Vol. 46, p. 101331.
Tosuntaş, Ş.B., Karadağ, E., Emirtekin, E., Kircaburun, K. and Griffiths, M.D. (2020), "Sofalizing and its relationship with social media addiction and psychosocial factors: A new phenomenon among emerging adults", *Social Science Journal*, available at: https://doi.org/10.1080/03623319.2020.1809900 (accessed 3 December 2022).

Turel, O. and Serenko, A. (2012), "The benefits and dangers of enjoyment with social networking websites", *European Journal of Information Systems*, Vol. 21 No. 5, pp. 512–528.
Turel, O., Serenko, A. and Giles, P. (2011), "Integrating Technology Addiction and Use: An Empirical Investigation of Online Auction Users", *MIS Quarterly*, Vol. 35 No. 4, pp. 1043–1061.
Udwan, G., Leurs, K. and Alencar, A. (2020), "Digital Resilience Tactics of Syrian Refugees in the Netherlands: Social Media for Social Support, Health, and Identity", *Social Media and Society*, Vol. 6 No. 2, pp. 1–11.
Ungerman, O. and Myslivcová, S. (2014), "Model of communication usable for small and medium-sized companies for the consumer communication in social media", *Economics and Management*, Vol. 17 No. 1, pp. 167–184.
Utz, S. and Breuer, J. (2017), "The relationship between use of social network sites, online social support, and well-being: Results from a six-wave longitudinal study", *Journal of Media Psychology*, Vol. 29 No. 3, pp. 115–125.
Vannucci, A., Flannery, K.M. and Ohannessian, C.M.C. (2017), "Social media use and anxiety in emerging adults", *Journal of Affective Disorders*, Vol. 207, pp. 163–166.
Vidal, C., Lhaksampa, T., Miller, L. and Platt, R. (2020), "Social media use and depression in adolescents: a scoping review", *International Review of Psychiatry*, Vol. 32 No. 3, pp. 235–253.
Vujić, A. and Szabo, A. (2022), "Hedonic use, stress, and life satisfaction as predictors of smartphone addiction", *Addictive Behaviors Reports*, Vol. 15, p. 100411.
Wang, C., Lee, M.K.O. and Hua, Z. (2015), "A theory of social media dependence: Evidence from microblog users", *Decision Support Systems*, Vol. 69, pp. 40–49.
Wang, T. and Deng, X. (Nancy). (2022), "User characteristics, social media use, and fatigue during the coronavirus pandemic: A stressor–strain–outcome framework", *Computers in Human Behavior Reports*, Vol. 7, p. 100218.
Wegmann, E., Müller, S.M., Turel, O. and Brand, M. (2020), "Interactions of impulsivity, general executive functions, and specific inhibitory control explain symptoms of social-networks-use disorder: An experimental study", *Scientific Reports*, Vol. 10 No. 3866, pp. 1–12.
Weidman, A.C., Fernandez, K.C., Levinson, C.A., Augustine, A.A., Larsen, R.J. and Rodebaugh, T.L. (2012), "Compensatory internet use among individuals higher in social anxiety and its implications for well-being", *Personality and Individual Differences*, Vol. 53 No. 3, pp. 191–195.
Whelan, E. and Clohessy, T. (2021), "How the social dimension of fitness apps can enhance and undermine wellbeing: A dual model of passion perspective", *Information Technology and People*, Vol. 34 No. 1, pp. 68–92.
Whelan, E., Golden, W. and Tarafdar, M. (2022), "How technostress and self-control of social networking sites affect academic achievement and wellbeing", *Internet Research*, Vol. 32 No. 7, pp. 280–306.
Wu, X.S., Zhang, Z.H., Zhao, F., Wang, W.J., Li, Y.F., Bi, L., Qian, Z.Z., Lu, S.S., Feng, F., Hu, C.Y., Gong, F.F. and Sun, Y.H. (2016), "Prevalence of Internet addiction and its association with social support and other related factors among adolescents in China", *Journal of Adolescence*, Vol. 52, pp. 103–111.
Xiao, L. and Mou, J. (2019), "Social media fatigue -Technological antecedents and the moderating roles of personality traits: The case of WeChat", *Computers in Human Behavior*, Vol. 101, pp. 297–310.
Yang, C., Holden, S.M. and Ariati, J. (2021a), "Social Media and Psychological Well-Being Among Youth: The Multidimensional Model of Social Media Use", *Clinical Child and Family Psychology Review*, Vol. 24 No. 3, pp. 631–650.
Yang, H., Liu, B. and Fang, J. (2021b), "Stress and Problematic Smartphone Use Severity: Smartphone Use Frequency and Fear of Missing Out as Mediators", *Frontiers in Psychiatry*, Vol. 12, p. article 659288.
Yang, H. and Zhang, S. (2022), "Social media affordances and fatigue: The role of privacy concerns, impression management concerns, and self-esteem", *Technology in Society*, Vol. 71, p. 102142.
Ye, D., Cho, D., Chen, J. and Jia, Z. (2022), "Empirical investigation of the impact of overload on the discontinuous usage intentions of short video users: a stressor-strain-outcome perspective", *Online Information Review*, available at: https://doi.org/10.1108/OIR-09-2021-0481 (accessed 29 November 2022).
Yildirim, C. and Correia, A.P. (2015), "Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire", *Computers in Human Behavior*, Vol. 49, pp. 130–137.
Yogurtcu, D.D. (2018), *The Relationship between Five Personality Traits and Nomophobia Levels among University Students*, Yeditepe University.
Yu, L., Cao, X., Liu, Z. and Wang, J. (2018), "Excessive social media use at work: Exploring the effects of social

media overload on job performance", *Information Technology and People*, Vol. 31 No. 6, pp. 1091–1112.
Yu, L., Zhong, Y., Sun, Y. and Qin, G. (2022), "The impact of excessive social media use at work: a usage experience–stressor–strain perspective", *Behaviour and Information Technology*, available at: https://doi.org/10.1080/0144929X.2022.2054358 (accessed 4 August 2022).
Yue, Z., Zhang, R. and Xiao, J. (2022), "Passive social media use and psychological well-being during the COVID-19 pandemic: The role of social comparison and emotion regulation", *Computers in Human Behavior*, Vol. 127, p. 107050.
Zhang, K., Kim, K., Silverstein, N.M., Song, Q. and Burr, J.A. (2021), "Social media communication and loneliness among older adults: The mediating roles of social support and social contact", *Gerontologist*, Vol. 61 No. 6, pp. 888–896.
Zhang, L. and Jung, E.H. (2022), "How does WeChat's active engagement with health information contribute to psychological well-being through social capital?", *Universal Access in the Information Society*, Vol. 21, pp. 657–673.
Zhang, S., Zhao, L., Lu, Y. and Yang, J. (2016), "Do you get tired of socializing? An empirical explanation of discontinuous usage behaviour in social network services", *Information and Management*, Vol. 53 No. 7, pp. 904–914.
Zhang, Y., He, W. and Peng, L. (2022), "How Perceived Pressure Affects Users' Social Media Fatigue Behavior: A Case on WeChat", *Journal of Computer Information Systems*, Vol. 62 No. 2, pp. 337–348.
Zhao, N. and Zhou, G. (2021), "COVID-19 Stress and Addictive Social Media Use (SMU): Mediating Role of Active Use and Social Media Flow", *Frontiers in Psychiatry*, Vol. 12, p. 635546.
Zolkepli, I.A., Isawasan, P., Mustafa, H. and Shamugam, L. (2021), "What Digital Marketers Should Learn from the Struggles of an Ageing Society on Social Media", *Digital Marketing & ECommerce Conference*, pp. 209–224.
Zywica, J. and Danowski, J. (2008), "The faces of facebookers: Investigating social enhancement and social compensation hypotheses; Predicting Facebook and offline popularity from sociability and self-esteem, and mapping the meanings of popularity with semantic networks", *Journal of Computer-Mediated Communication*, Vol. 14 No. 1, pp. 1–34.

Appendix A. Measurement items

Construct and measures items	Scale
Social media use	
Daily average time spent on social media apps, such as QQ, WeChat, Sina Weibo, etc.	A. Never B. Less than15 minutes C.15-30 minutes D. 0.5-1 hour E 1-2 hours F.2-3 hours G. More than 3 hours
Perceived social support	
• "There is always a person (such as family, friends, significant others) taking care of my needs."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "I have someone (such as family, friends, significant others) I can confide in on my happiness and despair."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "I get the emotional help and support I need from my family/ friends/ significant others."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
Nomophobia	
• "If my mobile phone were low on power or could not connect network, I would feel restless, moody, depressed, or irritable."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "If I did not have a mobile phone with me, I would feel anxious because my friends would find it hard to get in touch with me."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "If I forgot to take my mobile phone with me, I would feel unsettled."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
Loneliness	
• "I feel isolated from others."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "My interests and ideas are not shared by those around me."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "I cannot find companionship when I want it."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
Depression	
• "I was bothered by things that usually do not bother me."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "I felt that I could not shake off the blues even with the help of my family or friends."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "I thought my life had been a failure."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
Perceived stress	
• "In the last month, how often have you felt nervous and 'stressed'?"	Never 1 2 3 4 5 6 7 Very often
• "In the last month, how often have you found that you could not cope with all the things that you had to do?"	Never 1 2 3 4 5 6 7 Very often
• "In the last month, how often have you been upset because of something that happened unexpectedly?"	Never 1 2 3 4 5 6 7 Very often
Life satisfaction	
• "In most ways, my life is close to my ideal."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "I am satisfied with my life."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree
• "So far, I have achieved the important things I want in life."	Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Appendix B: Model testing results

Main effects	Direct effect		Total effect	Hypotheses test
	Time 1	Time 2		
Social media use → Perceived social support	0.352***	0.163***		*Hypothesis 1* is supported
Social media use → Nomophobia	0.246***	0.161***		*Hypothesis 2* is supported
Perceived social support → Loneliness	−0.073***	−0.137***		*Hypothesis 3a* is supported
Perceived social support → Depression	−0.071***	−0.116***		
Perceived social support → Perceived stress	−0.068***	−0.062***		
Perceived social support→ Life satisfaction	0.635***	0.626***		*Hypothesis 3b* is supported
Nomophobia → Loneliness	0.480***	0.377***		*Hypothesis 4a* is supported
Nomophobia → Depression	0.471***	0.369***		
Nomophobia →Perceived stress	0.468***	0.378***		
Nomophobia → Life satisfaction	0.127***	0.058***		*Hypothesis 4b* is rejected
Social media use T1 → Social media use T2	0.293***			
Nomophobia T1 → Nomophobia T2	0.306***			
Perceived social support T1→ Perceived social support T2	0.293***			
Loneliness T1→ Loneliness T2	0.199***			
Depression T1→ Depression T2	0.200***			
Perceived stress T1→ Perceived stress T2	0.175***			
Life satisfaction T1→ Life satisfaction T2	0.115***			
Perceived social support T1→ Social media use T2	0.052*			*Hypothesis 5* is rejected
Nomophobia T1 → Social media use T2	0.100***			*Hypothesis 6* is supported
Loneliness T1→ Social media use T2	−0.055***			*Hypothesis 7a* is rejected
Depression T1→ Social media use T2	−0.046†			
Perceived stress T1→ Social media use T2	0.039n.s.			
Life satisfaction T1→ Social media use T2	−0.141***			*Hypothesis 7b* is supported
Social media useT1 → Loneliness T2			0.044***	*Hypothesis 8a* is supported
Social media use T1→ Depression T2			0.046***	
Social media use T1→ Perceived stress T2			0.053***	
Social media use T1→ Life satisfaction T2			0.131***	*Hypothesis 8b* is rejected
Control effects				
Gender → Loneliness	−0.073***	−0.067***		
Gender → Depression	−0.099***	−0.088***		
Gender → Perceived stress	−0.078***	−0.045***		
Gender → Life satisfaction	−0.066***	−0.059***		
Age → Loneliness	−0.034**	−0.006n.s.		
Age → Depression	−0.038**	−0.011n.s.		
Age → Perceived stress	−0.038***	0.001n.s.		
Age → Life satisfaction	−0.001n.s.	−0.030**		
Overall smartphone use → Perceived social support	0.044**	0.001n.s.		
Overall smartphone use → Nomophobia	0.221***	0.140***		
Overall smartphone use → Loneliness	0.021n.s.	−0.006n.s.		
Overall smartphone use → Depression	0.033*	−0.028*		
Overall smartphone use → Perceived stress	0.058***	0.023†		
Overall smartphone use → Life satisfaction	−0.072***	−0.059***		
Overall health status → Loneliness	−0.010n.s.	−0.057***		
Overall health status → Depression	−0.042***	−0.065***		
Overall health status → Perceived stress	−0.046***	−0.091***		
Overall health status → Life satisfaction	0.156***	0.093***		

Note: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$, $^{\dagger}p < 0.1$; $^{n.s.}p > 0.1$