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Online social media fatigue and psychological wellbeing—A study of compulsive use, fear of missing out, fatigue, anxiety and depression

Amandeep Dhir[a,b,*], Yossiri Yossatorn[c], Puneet Kaur[b,d], Sufen Chen[e,d]

[a] Department for Management of Science and Technology Development & Faculty of Social Science and Humanities, Ton Duc Thang University, Ho Chi Minh City, Vietnam
[b] Department of Industrial Engineering and Management, School of Science, Aalto University, P.O. Box 15500, FI-00076, Finland
[c] Navamindradhiraj University, Wachira Phayaban, Dusit, Bangkok 10300, Thailand
[d] Optentia Research Focus Area, North-West University, Vanderbijlpark, South Africa
[e] Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, Taiwan

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ABSTRACT

The constant development of online social media features and related services has constantly attracted and increased the number of social media users. But, at the same time, a myriad of users have deviated themselves, temporarily or permanently, from social media use due to social media fatigue. Scholars have investigated different antecedents and consequences of social media fatigue. However, empirical relationships between psychosocial wellbeing and social media fatigue are currently not known. To bridge this gap, the current study utilises the stressor-strain-outcome framework (SSO) to examine whether psychosocial wellbeing measures, such as compulsive media use and fear of missing out, trigger fatigue and, furthermore, whether social media fatigue results in anxiety and depression. The study utilised repeated cross-sectional methodology whereby two waves of data (N = 1554, 1144) were collected to test the research model with adolescent social media users in India. The study findings suggest that compulsive media use significantly triggered social media fatigue, which later result in elevated anxiety and depression. Fear of missing out indirectly predicted social media fatigue through mediation of compulsive social media use. The theoretical and practical implications, limitations of the present study and agenda for future studies are presented and discussed.

1. Introduction

An increasing number of social media users are straying from their participation on social media because of encountering social media fatigue (Guest Post, 2017). Prior research has defined social media fatigue as a situation whereby social media users suffer from mental exhaustion after experiencing various technological, informative and communicative overloads through their participation and interactions on the different online social media platforms (Bright, Kleiser, & Grau, 2015; Lee, Son, & Kim, 2016; Ravindran, Kuan, Chua, & Hoe Lian, 2014; Zhang, Zhao, Lu, & Yang, 2016).

This phenomenon has recently motivated scholars from around the world to conduct empirical investigations to determine the antecedents and consequences of social media fatigue (Cramer, Song, & Drent, 2016; Luqman, Cao, Ali, Masood, & Yu, 2017; Sasaki, Kawai, & Kitamura, 2016; Yoa & Cao, 2017). The relative determinants of social media fatigue can be stemmed from psychological and behavioural stress-related conditions, such as information overload and connection overload as well as social interactive activities (Bright et al., 2015; LaRose, Connololy, Lee, Li, & Hales, 2014; Lim, Park, Iijima, & Ahn, 2017; Walton, 2017; Zhang, Zhao, Lu, & Yang 2016). Due to this emotional suffering, social media users are likely to refrain, either temporarily or permanently, from participating in online social media interactions (Oghuma, Libaque-Saenz, Wong, & Chang, 2016; Swar, Hameed, & Reychav, 2017).

Scholars argue that social media fatigue has significant negative implications for both users as well as the businesses and service operators (Oghuma et al., 2016; Shin & Shin, 2016). On a user level, social media fatigue results in deterioration in both mental and physiological strengths whereby users are likely to develop unhealthy behaviours (Choi & Lim, 2016; Shin & Shin, 2016; Sun et al., 2017). Similarly, social media fatigue can be detrimental for businesses and service operators because fatigue results in withdrawal from service use, which translates into lower profits for companies and service operators. Despite these serious implications, research examining social media fatigue is still in its early stage wherein most existing studies have

* Corresponding author at: Department for Management of Science and Technology Development & Faculty of Social Science and Humanities, Ton Duc Thang University, Ho Chi Minh City, Vietnam.
E-mail addresses: amandeep.dhir@tdt.edu.vn (A. Dhir), yossiri@nmu.ac.th (Y. Yossatorn), puneet.kaur@aalto.fi (P. Kaur), sufchen@mail.ntust.edu.tw (S. Chen).

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Table 1
Literature Review.

Study	Context	Sample	Method & Analysis	Study variable
Chen & Lee (2013)	SNS	513 users in the US[@]	Questionnaire survey and structural equation modeling	Facebook interaction, communication overload, self-esteem, and psychological distress
Rainie, Smith, and Duggan (2013)	SNS	1006 users in the US[@]	Telephone interview	Reasons for Facebook breaks, frequency and time spent on Facebook use
Lee, Chou et al. (2014)	SNS	315 users in Taiwan with age ranging from under 15 to over 40 years old* (50% female)	Questionnaire survey and structural equation modeling	Personality traits (openness, conscientiousness, extraversion, agreeableness, neuroticism) and social media fatigue, and fatigue behavior
Ravindran et al. (2014)	SNS	201 users in Singapore with age ranging from 18 to 55 years old (M = 40) and 60% female	In-depth interview and activity analysis	Social dynamics, content, Immersion, platform, and life cycle-related factors
Bright et al. (2015)	SNS	747 users in the US with age ranging from 18 to 49 years old (M = 32.52) and 52.5% female	Questionnaire survey and confirmatory regression analysis	Social media confidence, helpfulness, self-efficacy, privacy, and social media fatigue
Lin (2015)	SNS	236 users in Taiwan with age ranging from 20 to 25 years old* and 64% male	Questionnaire survey and item covariance matrix analysis	Low ease of use, privacy concern, advertising interference, rumour dissemination, fatigue, normative pressure, satisfaction, usage behavior, and continuance intention
Cramer et al. (2016)	SNS	267 users in the US with age ranging from 18 to 51 years old (M = 23.63) and 67% female	Questionnaire survey and regression analyses	Social comparison, motives for social comparison, Facebook fatigue, self-esteem, and positive affect
Lee, Lee et al. (2016)	MIM	267 users in Korea with age ranging from 20 to 50 years old* and 55.4% male	Field interviews, Questionnaire survey and structural equation modeling	Communication overload, social insecurity, compulsive usage, work overload, invasion of life, work-home conflict, strain, productivity, quality of life, and tie strength
Shin & Shin (2016)	MIM	334 users in Korea with age ranging from under 20 to over 50 years old* and 50.3% male	Questionnaire survey and structural equation modeling	Mobile messenger overload, mobile messenger fatigue, relational self-concept, mobile shunning behavior
Tromholt (2016)	SNS	1095 users in Denmark with average age at 34 years old[@]	Questionnaire survey, causal and partial causal analyses	Life satisfaction, emotions, intensity of Facebook use, Facebook envy, and active and passive Facebook use
Zhang et al. (2016)	SNS	525 users in China with age ranging from under 18 to over 35 years old* and 52.4% male	Questionnaire survey and regression analysis	System feature fatigue, information overload, social overload, social network fatigue, dissatisfaction, and discontinuous usage intention
Lee, Son et al. (2016)	SNS	201 users in Korea with age ranging from under 29 to over 40 years old* and 59.2% male	Questionnaire survey and Structural equation modeling	SNS fatigue, system feature overload, system pace of change, communication overload, information relevance, overload, equivocality, and system complexity
Luqman et al. (2017)	SNS	360 users in China with age ranging from 19 to 44 years old* and 62.8% female	Questionnaire survey, Structural equation modeling and regression analyses	Excessive social use, excessive hedonic use, excessive cognitive use, SNS exhaustion, technostress, and discontinuance intention
Lim et al. (2017)	SNS	210 users in Japan with age ranging from under 20 to more than 60 years old* and 58% male	Questionnaire survey and Structural equation modeling	Discontinuous usage intention, dissatisfaction, Facebook interaction, social overload, and threat to freedom usage

Note. * = average or mean age not provided, @ = neither mean age nor gender distribution provided, SNS = Social networking sites, MIM = Mobile instant messaging.

exclusively focused on its relationship with frequency of service use, service satisfaction, privacy, discontinuity, excessive social media use, social media exhaustion and technostress, as well as technology and physical overload (see Table 1). In comparison to this body of literature, the relationship between psychosocial wellbeing and social media fatigue has not yet been well-studied. This gap is addressed by the present study, which utilises a repeated cross-sectional research methodology to investigate this relationship over time. Two waves of cross-sectional data sets were collected in May 2017 (N = 1554) and September 2017 (N = 1144) with adolescent social media users. The current study investigates whether compulsive social media use and fear of missing out among adolescent social media users trigger social media fatigue? Furthermore, whether social media fatigue contributes to increase in anxiety and depression among adolescent social media users.

The current study also addresses three main limitations in the prior literature on social media fatigue, namely limited focus on specific age and cultural groups, and exclusive focus on single shot studies (i.e. cross-sectional surveys at a single point of time). Our review of prior literature revealed that the main focus has been on university-attending young-adults, either from the Western world or East Asian countries. In comparison to this, adolescent social media users from developing countries, such as India, are rarely studied. Similarly, most prior studies are purely cross-sectional in nature wherein data are collected at a single point of time. To address these limitations, the current study utilised repeated cross-sectional studies whereby the same measures were evaluated with similar target user groups over time, i.e., data were collected twice over a period of five months. Furthermore, the study focused on adolescents in a lesser studied cultural and demographic group of social media users. The study concluded with significant theoretical and practical implications for scholars as well as practitioners.

2. Background literature

2.1. Social media fatigue

A systematic review of prior social media fatigue literature was performed (see Table 1). Prior studies on social media fatigue have looked into two types of online social media, namely online social networking sites (e.g., Facebook) and mobile instant messengers (e.g., KakaoTalk) (Bright et al., 2015; Chen & Lee, 2013; Ravindran et al., 2014; Shin & Shin, 2016). Most of the prior studies were conducted in industrialised Asian countries, for example South Korea, Taiwan, Japan and China (Lee, Chou, & Huang, 2014; Lin, 2015; Luqman et al., 2017; Zhang et al., 2016), and some western countries, such as the US and Denmark (Cramer et al., 2016; Tromholt, 2016). An overwhelming number of prior studies have utilised cross-sectional surveys with varied statistical analyses, in which structural equation modelling and regression analysis were favoured.

Prior studies have investigated different determinants of social media fatigue, for example, concerns and interpersonal comparison (Cramer et al., 2016), stress (Chen & Lee, 2013; Yamakami, 2012) and personal traits (Lee, Chou et al., 2014). Similarly, prior literature also revealed the possible outcomes or consequences of encountering social media fatigue. These include platform shift, temporary usage retreat, unresponsive interaction or usage cessation (Luqman et al., 2017; Ravindran et al., 2014; Shin & Shin, 2016). Moreover, on experiencing social media fatigue, users become susceptible to psychological and physical demarcations, such as the decline in life satisfaction and performance productivity (Lee, Lee, & Suh, 2016; Zhang et al., 2016). In comparison to this existing body of literature, the present study has studied relationships between social media fatigue and psychosocial wellbeing, which were mostly overlooked by the prior literature. The present study, hence, aims to investigate the association of psychosocial wellbeing measures, namely compulsive use, fear of missing out, anxiety and depression, with social media fatigue.

2.2. Compulsive media use and fatigue

Compulsive use behaviour refers to an abnormality in controlling behavioural consumptions where an individual is unable to rationally manage his/her routine performances (Hirschman, 1992). Compulsive use has been chiefly studied in the context of unhealthy physiological activities, such as drug abuse, gambling and excessive food intake (Hirschman, 1992; Meerkerk, van den Eijnden, Franken, & Garretsen, 2010; Parylak, Koob, & Zorilla, 2011). Scholars have linked compulsive use behaviour with various mental and physical problems, such as emotional exhaustion, interpersonal conflict and deterioration of working performance (Beranuy, Oberst, Carbonell, & Chamarro, 2009; James, Lowry, Wallace, & Warkentin, 2017; Lin, Tsai, Chen, & Koo, 2013; Quinones & Griffiths, 2017; Turel, Serenko, & Bontis, 2008).

In comparison to the large body of existing literature on compulsive use behaviour, only recently have scholars started investigating the antecedents and consequences of compulsive use of different forms of new media. This includes relatively recent investigations on the compulsive use of social media and other Internet-enabled platforms, such as virtual games (Hsiao, 2017; James et al., 2017; Lin et al., 2013; Quinones & Griffiths, 2017; Yoa & Cao, 2017). In this growing body of literature, fewer recent empirical studies have linked fatigue as a consequence of compulsive media use. To begin with, Lin et al. (2013) found that compulsive Internet use resulted in elevation of emotional fatigue among 564 Taiwanese nurses, which later translates into poor physical performances and perceptions. Ho et al. (2014) found that extreme Internet use resulted in mental suffering such as anxiety and depression. Findings by Brand, Young, Laier, Wölfling, and Potenza (2016) suggest that irregularly uncontrollable Internet use results in negative cognitive states which affect the mental and physical functions and decisions. Similarly, Elhai, Levine, Dvorak, and Hall (2016) discovered that compulsive use of mobile phone disrupted behavioural and social interactions among 308 North American participants. A recent study by Oberst, Wegmann, Stodt, Brand, and Chamarro (2017) found that heavy social media users are more likely to suffer from psychological distress while Pontes (2017) found that compulsive social media use can deteriorate emotional conditions. Based on these studies, it is likely that compulsive social media use will negatively influence the cognitive performances and result in social media fatigue. Therefore, we hypothesise that compulsive social media use results in social media fatigue and this relationship is consistent over time.

H1. Compulsive social media use results in social media fatigue and this relationship is consistent over time.

2.3. Fear of missing out and fatigue

Fear of missing out (FoMO) is defined as an apprehension or concern of being disconnected, absent or missing an experience which others (i.e., peers, friends, family) might receive or enjoy (Pollard, 2012; Przybylski, Murayama, DeHaan, & Gladwell, 2013). On experiencing FoMO, people are likely to persistently and desirably seek and acknowledge others' activities (Pollard, 2012; Przybylski et al., 2013). Scholars suggest that people who confront FoMO are likely to be engrossed in psychological demands towards being connected, related and intimate with others (Beyens, Frison, & Eggermont, 2016; Deci & Ryan, 1985). Moreover, people with a poor emotional state and life satisfaction are likely to confront FoMO (Cohen, 2013; Przybylski et al., 2013). Relatively recent studies have linked FoMO with different negative psychological and physiological conditions, e.g., high level alcohol consumption and engagement in risky behaviour (Riordan, Flett, Hunter, Scarf, & Conner, 2015), and depression and other emotional and physical problems (Baker, Krieger, & LeRoy, 2016; Elhai et al., 2016; Lin et al., 2016; Przybylski et al., 2013).

Scholars have recently started investigating the negative consequences in relation to FoMO experienced by social media users (Alt,

2015; Beyens et al., 2016; Elhai et al., 2016; Hetz, Dawson, & Cullen, 2015; Przybylski et al., 2013; Wolniewicz, Tiamiyu, Weeks, & Elhai, in press). Several studies have demonstrated that social media users with high FoMO are likely to spend more time on social media use and suffer from depression and negative emotions (Baker et al., 2016); insomnia, compulsive social media use and eating disorder (Beyens et al., 2016); low life satisfaction, competency and personal interconnection (Elhai et al., 2016); emotional tensions (James et al., 2017; Lai, Altavilla, Ronconi, & Aceto, 2016); deterioration of physical as well as mental well-being (Alt, 2015); depressive and anxious feelings (Oberst et al., 2017); problems in regulating mobile phone usage and emotional control (Wolniewicz et al., 2018); and inadequate sleep and poor sleep quality (Adams et al., 2017).

These prior FoMO studies have clearly suggested that high level of FoMO has negative psychological and physiological consequences. However, it is not yet clear whether FoMO is significantly related to social media fatigue, although it is known that people with high FoMO are more likely to showcase high engagement with social media use as well as engage in compulsive social media use (Oberst et al., 2017; Wolniewicz et al., 2018). Furthermore, frequent and excessive engagement in social media use results in social media fatigue (Karapanos, Teixeira, & Gouveia, 2016; Yoa & Cao, 2017; Zheng & Lee, 2016). Therefore, it is likely that high level of FoMO could possibly trigger social media fatigue. Consequently, we hypothesise that FoMO results in social media fatigue and this relationship is consistent over time.

H2. FoMO results in social media fatigue and this relationship is consistent over time.

2.4. Depression and fatigue

Depression is an emotional state wherein pleasurable feelings are either diminished or disappeared. Sapolsky (2004) stated that a state of depression involves two extremes of emotions, where positive is low and negative is high (Sapolsky, 2004). Scholars have linked a state of depression with different psychological symptoms, such as distress, depressive moods and anguish (Bianchi, Schonfeld, & Laurent, 2014; Błachnio, Przepiorka, & Pantic, 2015) and suggested that depression has an influential effect on both mental and physical processes (Sydenham, Beardwood, & Rimes, 2017). Recent studies have associated depression with interference in daily routines, such as sleeping, eating and moving (National Institute of Mental Health, 2016), loss of concentration and motivation, fatigue and even delaying of physical movements and responses (National Institute of Mental Health, 2016; Sapolsky, 2004).

In the past few years, scholars have carried out various empirical studies investigating the causations and consequences of depression in context of the use of new media. These investigations have focused on social media use (Banjanin, Banjanin, Dimitrijevic, & Pantic, 2015; Błachnio et al., 2015; Jelenchick, Eickhoff, & Moreno, 2013; Mok, Sing, Jiang, & See, 2014); intensity of social media use (Cotten, Ford, Ford, & Hale, 2012, Cotten, Anderson, & McCullough, 2013; Morrison & Gore, 2010); online communication (Wagner, Horn, & Maercker, 2014); and online threats (Raskauskas, 2010; Varghese & Pistole, 2017).

Lin et al. (2016) found that social media use was significantly associated with depression among 1787 adults in the US. The study suggests that depressive participants were inclined to closely interact with social media. Hoare, Milton, Foster, and Allender (2017) illustrated that a higher level of depressive conditions was prevalent among 2967 Australian adolescents with intense Internet usage. Scherr and Brunet (2017) illustrated that depressive users are likely to spend more time on Facebook so as to relieve themselves from stressful symptoms. In a study of 413 young adults, Ophir (2017) found that people with stressful feelings related to social pressure, high expectations and problems are more likely to use social media for mitigating these negative emotions. Varghese and Pistole (2017) demonstrated that cyberbullying victims developed negative mental feelings with lower self-confidence among 338 US college students. Hussain, Griffiths, and Sheffield (2017) observed that extreme Smartphone usage resulted in a higher level and more variety of depressive symptoms among 640 users who failed to suitably regulate their emotions. Scholars argue that experiencing depression can engender psychological problems and other health-related symptoms, such as emotional and behavioural regulations (Bashir & Bhat, 2017; Sapolsky, 2004; Wegmann, Stodt, & Brand, 2015). Consequently, depression can make people susceptible to psychological, physiological and interpersonal difficulties (Scherr & Brunet, 2017).

Several recent studies suggest that intensive engagement with the Internet or social media use results in depression (Hussain et al., 2017; Hoare et al., 2017; Lin et al., 2016; Scherr & Brunet, 2017). Similarly, intensive engagement with social media use also results in social media fatigue (Karapanos et al., 2016; Yoa & Cao, 2017; Zheng & Lee, 2016). Consequently, it is likely that, on experiencing social media fatigue, users tend to experience depression-related symptoms and this relationship is consistent over time. Therefore, we hypothesise that:

H3. Social media fatigue results in higher depression and this relationship is consistent over time.

2.5. Anxiety and fatigue

Anxiety is defined as a pervasively apprehensive state of mind which is concerned about prospective difficult situations or threats (Freeman & DiTomasso, 2002; Stein & Sareen, 2015). Traditional psychology literature suggests that anxious people are likely to suffer from multiple perceptive and evaluative disorders, such as incorrect interpretation of dangers and threats and giving false alarms, and engaging in irrational judgement making and unsystematic information processing (Beck & Greenberg, 1988; Beck, Emery, & Greenberg, 1985; Freeman & Simon, 1989; Wells, 1997). Scholars argue that anxious people tend to see their anxious state as problematic, chronic and inescapable (Freeman & DiTomasso, 2002). Furthermore, they tend to believe that their ability to engage and concentrate on tasks is detrimental (Madan, Mrug, & Wright, 2014). According to the American Psychiatric Association (2000), during an anxious state people are likely to complain about fatigue, exhaustion and physical pain. Several recent studies have determined different antecedents and outcomes of anxiety, such as psychiatric and physiological illnesses, substance abuse, emotional malfunctions, exhaustion, distress and even suicidal commitment (Baldwin et al., 2014; Fernández et al., 2016; Foster & Neufeld, 2013; Katzman et al., 2011; Kuss & Griffiths, 2011).

In the recent past, scholars have started investigating the prevalence of anxiety among social media users. Excessive social media use is linked with distraction and alleviation of psychological suffering (George, Dellasega, Whitehead, & Bordon, 2013; Ha, Kim, Libaque-Saenz, Chang, & Park, 2015; Seidman, 2013) and mental exhaustion and attention deficiency (Sriwilai & Charoensukmongkol, 2016). Lepp, Barkley, and Karpinski (2013) found that compulsive mobile device users are more likely to suffer from an anxious state compared to non-compulsive users. Primack et al. (2017) observed that anxious users are more likely to use different social media platforms in order to mitigate their unfavourable emotions. In order words, anxious users are likely to invest in different coping strategies, e.g., high engagement in social media use. Similarly, Vannucci, Flannery, and Ohannessian (2017) also found that anxious users tend to be more engaged with social media to alley their anxious state, e.g., searching for attention, support or a sense of belonging on social media.

Relatively recent studies have linked fatigue and state of anxiety. Scholars argue that, on experiencing fatigue, the cognitive capabilities of users get declined, which, subsequently, makes them prone to inadequately regulate and control mood and concentration (Becker,

Alzahabi, & Hopwood, 2013; Chen & Yan, 2016; Richards, Caldwell, & Go, 2015). Similarly, scholars also argue that anxious users are inclined to experience detrimental outcomes such as fatigue and exhaustion (Boksem, Lorist, & Meijman, 2005; Chaouali, 2016; Lorist, 2008). Therefore, it is likely that, on experiencing fatigue, social media users are likely to experience anxiety. Consequently, we hypothesise that:

H4. Social media fatigue results in higher anxiety and this relationship is consistent over time.

3. Research methodology

3.1. Research model

Prior literature has utilised different theoretical frameworks for studying social media fatigue, including the limited capacity model (LCM), the stressor-strain-outcome (SSO) model and the transactional theory of stress and coping (TTSC), in order to determine causal relationships and consequences in relation to social media fatigue (Blabst & Diefenbach, 2017; Bright et al., 2015; Lee, Chou et al., 2014; Lee, Son et al., 2016; Lim et al., 2017; Luqman et al., 2017; Zhang et al., 2016). In the present study, we have utilised a SSO framework for understanding the relationship between psychosocial wellbeing and social media fatigue. The main reason behind choosing SSO over other models was that the SSO framework is exactly aligned with the main objective of the study, i.e., to investigate which factors trigger social media fatigue and what are its outcomes or consequences. Moreover, the SSO model has been well-utilised for studying stress-related situations and their outcomes in the context of technology use (Ayyagari, Grover, & Purvis, 2011; Cheung & Tang, 2010; Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008). Consequently, the application of the SSO framework will provide the deeper explanations which are crucial for understanding the antecedents and consequences of social media fatigue.

The SSO framework comprises of three principle components, namely, stimulators (stressor), emotionally stressed states (strain) and psychological or physical results (outcome). Technostress is a form of stressor resulting from the use of technological platforms (i.e., mobile phones, social media sites) (Lee, Lee et al., 2016). Under this stress, users are likely to experience emotional decline, such as psychological fatigue, mental weaknesses and satisfaction decay (Hsiao, 2017). Furthermore, strain in the form of fatigue or exhaustion results in different negative psychological or physical outcomes.

Our research model based on the SSO framework is presented in Fig. 1. This model considers compulsive mobile usage and FoMO as stressors. Excessive use of technological devices and apprehensive concern can trigger stress because of losing the abilities to control mobile activities and being unable to limit the incoming communication (Hsiao, 2017). The strain of this present model is social media fatigue. Finally, the fatigue state could lead to depressive and anxious sufferings. Prior literature suggests that prolonging confrontation of stress degenerates psychiatric and physiological strengths (Charles, Piazza, Mogle, Sliwinski, & Almeida, 2013; Lazaratou, Konsta, Magklara, & Dikeos, 2017; Salehan & Negahban, 2013). Moreover, intense social media participation and reception can be extremely troublesome, since undesirable behaviours can be instigated and severely developed (Lemola, Perkinson-Gloor, Brand, Dewalk-Kaufmann, & Grob, 2014; Li, Lepp, & Barkley, 2015; Thomée, Harenstam, & Hagberg, 2011). The different measures of the research model were measured using a five-point response scale where 1 = Never and 5 = Always (see Table 2)

3.2. Study participants and procedure

The data collection process was influenced from repeated cross-sectional research methodology. Scholars have regarded repeated cross-sectional studies as pseudo-longitudinal whereby participants in repeated studies can be selected outside of the original pool of participants. Consequently, repeated cross-sectional studies are cost-effective, since these studies address the problem of participant attrition faced by longitudinal studies (Levin, 2006; Yee & Niemeier, 1996). Our data sampling consisted of two data sets: Study A (Wave 1) comprises of 1554 adolescent social media users (54.5% (n = 847) were male) aged 12–18 years (14.63 (SD = 1.73) years) who participated in early May 2017. Five months later, Study B (Wave 2) was organised with 1144 adolescent social media users (56.0% (n = 641) were male) aged 12–18 years (14.88 (SD = 1.41) years) who participated in late September 2017. In both studies, study measures as well as participating schools were the same, and the target user group was adolescent social media users from India. However, the participants of Study A and Study B may or may not differ from each other.

The process of data collection was as follows: The formal approval for conducting this repeated cross-sectional study was obtained from the participating schools in North India. The participating schools were typical private schools with English as the medium of instruction and communication and catering students belonging to middle economic class families. All participant schools were clearly briefed on the study aims, objectives, research questions and anticipated benefits. The study was advertised among the target user group via school administration and specific time slots were announced for participating in the study. A short pilot study with 12 adolescent social media users was performed to locate any problematic or confusing measurement items. Based on the pilot study, the cross-sectionals survey was revised. Before the

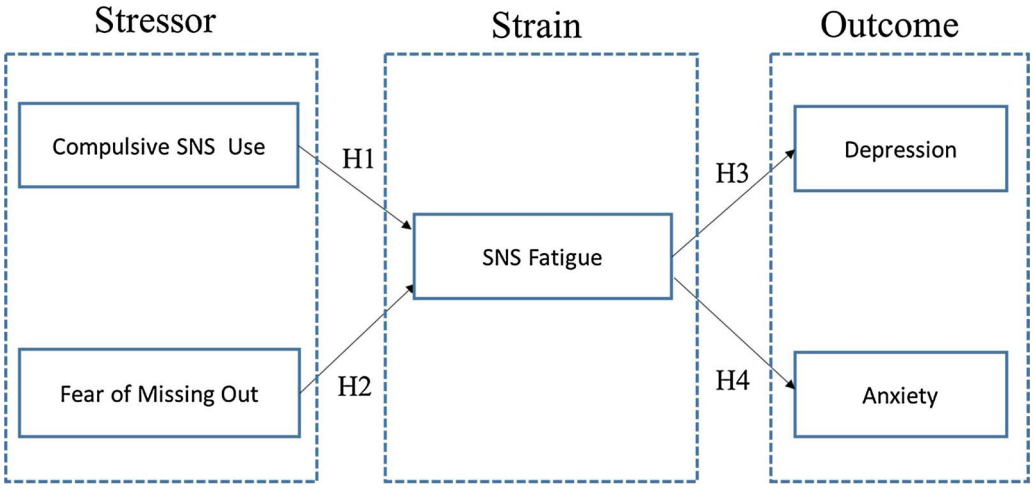

Fig. 1. Our Research Model.

Table 2
Study measures and factor loadings for the measurement and structural model.

Study Measures (Reference)	Measurement items	Study A		Study B	
		Loading (CFA)*	Loading (SEM)**	Loading (CFA)*	Loading (SEM)**
Compulsive Use (CU)(Andreassen, Torsheim, Brunborg, & Pallesen, 2012)	CU1: Spent a lot of time thinking about FB or planned use of FB?	0.74	0.75	0.72	0.72
	CU2: Felt an urge to use FB more and more?	0.87	0.87	0.75	0.75
	CU3: Used FB in order to forget about personal problems?	0.74	0.74	0.73	0.72
	CU4. Become restless or troubled if you have been prohibited from using FB?	0.61	0.60	0.63	0.63
Fear of Missing out (FoMO)(Przybylski et al., 2013)	FoMO1: I fear others have more rewarding experiences than me	0.79	0.77	0.83	0.81
	FoMO2: I fear my friends have more rewarding experiences than me	0.84	0.88	0.81	0.86
	FoMO3: I get worried when I find out my friends are having fun without me	0.63	0.60	0.61	0.57
Anxiety (AX) (La Greca & Lopez, 1998)	AX1: I worry about what others say about me	0.69	0.64	0.74	0.74
	AX2: I worry that others don't like me	0.83	0.80	0.90	0.90
	AX3: I'm afraid that others will not like me	0.85	0.86	0.90	0.90
	AX4: I worry about what others think of me	0.82	0.83	0.86	0.86
	AX5: I feel that others make fun of me	0.74	0.75	0.77	0.77
Depression (DEP)(Salokangas, Poutanen, & Stengård, 1995)	DEP1: I have felt lonely	0.67	0.68	0.71	0.72
	DEP2: I did not enjoy my life	0.74	0.76	0.74	0.74
	DEP3: I have felt myself unworthy	0.78	0.80	0.77	0.78
	DEP4: I have felt all the joy had disappeared from my life	0.76	0.72	0.81	0.79
	DEP5. I have felt my sadness was not relieved even with help of family/friends	0.65	0.60	0.72	0.69
Fatigue due to SNS use (FSNS)(Bright et al., 2015)	FMIM1: I am likely to receive too much information when I am searching on FB	0.69	0.70	0.83	0.83
	FMIM2: I am frequently overwhelmed by amount of information available on FB	0.96	0.93	0.84	0.84
	FMIM3: Amount of information available on FB makes me tense & overwhelmed	0.59	0.61	0.40	0.41

Note: *CFA = factor loading for measurement model, **SEM = factor loading for structural model, FB = Facebook.

actual study, study participants were again informed about the proposed study aims, objectives, research questions, anticipated benefits and related research process. The study participation was kept voluntary and anonymous, participants had freedom to withdraw their participation at any time during the study and informed oral consent was obtained.

3.3. Data analysis

The study utilised IBM SPSS 23.0 and IBM AMOS 23.0 for data analysis. The skewness and kurtosis coefficients for the measurement items were evaluated to determine their normal distribution. According to Westland (2010), normally distributed data is crucial for performing Structural Equation Modelling (SEM). All measurement items across Study A and Study B were normally distributed since the absolute values for skewness and kurtosis coefficients were less than 3 and 8, respectively. The research model and its different hypotheses were tested using the two-step approach proposed by Anderson and Gerbing (1988). In the first step, quality of the measurement model was evaluated using model fit indices and different forms of instrument validity and reliability were examined. Later, in the second step, the structural model was accessed in order to answer the different research hypotheses.

4. Results

4.1. Measurement model

A confirmatory factor analysis (CFA) using the measurement model was performed to evaluate the model fit by utilising different goodness of model fit indices. A good model fit suggests that the theoretical model fits well with empirical data. Scholars have suggested different threshold values for goodness of model fit indices for demonstrating good model fit, namely Chi-square/degree of freedom (X^2/df) > 3, Comparative Fit Index (CFI) ≥ 0.95, Tucker–Lewis Index (TLI) ≥ 0.95, and Root Mean Square Error of Approximation (RMSEA) ≤ 0.06 (Hu & Bentler, 1999). The measurement model revealed good fit across both Study A (Wave 1) ($X^2/df = 6.94$, $CFI = 0.94$, $TLI = 0.93$ and $RMSEA = 0.06$) and Study B (Wave 2) data sets ($X^2/df = 3.66$, $CFI = 0.96$, $TLI = 0.96$ and $RMSEA = 0.05$).

4.2. Validity and reliability

Different forms of instrument validity and reliability were accessed using CFA of the measurement model across Study A and Study B.

4.2.1. Construct validity

The factor structure was accessed using CFA of the measurement model across two studies. The results suggest the five factor structure has good model fit across both the data sets. This suggests the presence of sufficient construct validity in the context of the measurement model.

4.2.2. Discriminant validity

Discriminant validity is the extent to which study constructs are different from each other statistically. Scholars have suggested different criteria for establishing the presence of sufficient discriminant validity. This includes examination of the Fornell-larker criterion and correlation values between any two measures (Henseler, Ringle, & Sarstedt, 2014). According to the Fornell-larker criterion, the square root of the Average Variance Explained (AVE) of any study measure should be greater than the value of corresponding inter-measure correlation (Fornell &

Table 3
Mean, Standard deviation, convergent and discriminant validity of Study A (N = 1554).

Variables	Mean	SD	CR	AVE	MSV	ASV	DEP	CU	FSNS	AX	FoMO
DEP	2.32	0.93	0.84	0.52	0.39	0.22	**0.72**				
CU	2.09	0.94	0.83	0.56	0.27	0.16	0.38	**0.75**			
FSNS	2.29	0.99	0.80	0.58	0.27	0.10	0.22	0.52	**0.76**		
AX	2.37	1.04	0.89	0.62	0.39	0.23	0.63	0.33	0.19	**0.79**	
FoMO	2.46	1.02	0.80	0.58	0.37	0.21	0.53	0.37	0.23	0.61	**0.76**

Note: DEP = Depression, CU = Compulsive SNS use, FSNS = Fatigue due to SNS use, AX = Anxiety, FoMO = Fear of Missing Out.

Table 4
Mean, Standard deviation, convergent and discriminant validity of Study B (N = 1144).

Variables	Mean	SD	CR	AVE	MSV	ASV	DEP	CU	FSNS	AX	FoMO
DEP	2.19	0.99	0.88	0.57	0.41	0.21	**0.75**				
CU	1.67	0.82	0.80	0.50	0.36	0.14	0.31	**0.71**			
FSNS	1.96	0.93	0.75	0.52	0.36	0.11	0.18	0.60	**0.72**		
AX	2.24	1.13	0.92	0.70	0.44	0.20	0.53	0.22	0.10	**0.84**	
FoMO	2.32	1.03	0.80	0.57	0.44	0.23	0.64	0.24	0.12	0.67	**0.76**

Note: DEP = Depression, CU = Compulsive SNS use, FSNS = Fatigue due to SNS use, AX = Anxiety, FoMO = Fear of Missing Out.

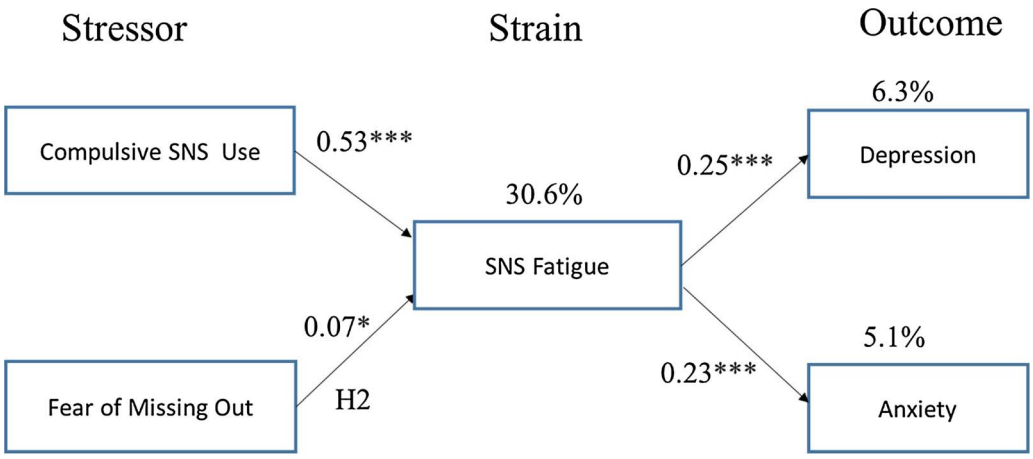

Fig. 2. Results of the main analysis (Study A).

Bookstein, 1982). Moreover, Maximum Shared Variance (MSV) and Average Shared Variance (ASV) for any given measure should be less than corresponding AVEs (Sarstedt, Ringle, Smith, Reams, & Hair, 2014). Similarly, Brown (2015) emphasised that, for sufficient discriminant validity, the correlation between any two given measures should not exceed the threshold limit of 0.80. This is important to distinctively discriminate between any two given measures because, if correlation value exceeds this threshold, then it suggests possible redundancy between two given measures and possible presence of collinearity (Brown, 2015). The study measures have fulfilled both these criteria across Study A and Study B, which indicates confirmation of sufficient discriminant validity for study measures (see Tables 3 and 4).

4.2.3. Convergent validity

Convergent validity is the extent to which the measurement items reflect the same underlying concept, phenomenon or measure. Scholars suggest different criteria for confirming the presence of sufficient convergent validity. These include substantial standardised factor loadings for measurement items, i.e., factor loadings should be above 0.70 (Hair, Hult, Ringle, & Sarstedt, 2013) and AVEs of the study measures must be greater than 0.50, which suggest that a given measure possesses at least half of the variance explained (Hair et al., 2013). The study measures have satisfied both these criteria across Study A and Study B, which suggests that they have sufficient convergent validity (see Tables 3 and 4).

4.2.4. Construct reliability

The construct reliabilities of the study measures were investigated by examining the composite reliability (CR). According to Clark and Watson (1995), CR should be above 0.70 for establishing sufficient construct reliability. All study measures have CR values above the threshold limit of 0.70, hence, construct reliability was established (see Tables 3 and 4).

4.3. Structural model

Structural equation modelling (SEM) was performed to evaluate the structural model. The different research hypotheses were accessed based on the magnitude and significance of the structural path. Moreover, squared multiple correlation (R^2) values were examined to determine the percentage variance explained in dependent variables. Similarly, Roldán and Sánchez-Franco (2012) suggest that predictive relevance of study measures is determined based on significance level and R^2 values. Figs. 2 and 3 present the path coefficients and the significance level indicating the predictive relevance of different hypotheses across Study A and Study B. The structural model based on Study A data set revealed acceptable model fit ($X^2/df = 9.20$, $CFI = 0.91$, $TLI = 0.90$ and $RMSEA = 0.07$). The percentage variance explained in social media fatigue, depression and anxiety were 30.6%, 6.3% and 5.1%, respectively. The structural model suggests that compulsive social media use ($\beta = 0.53$, $p < .001$) was the strongest

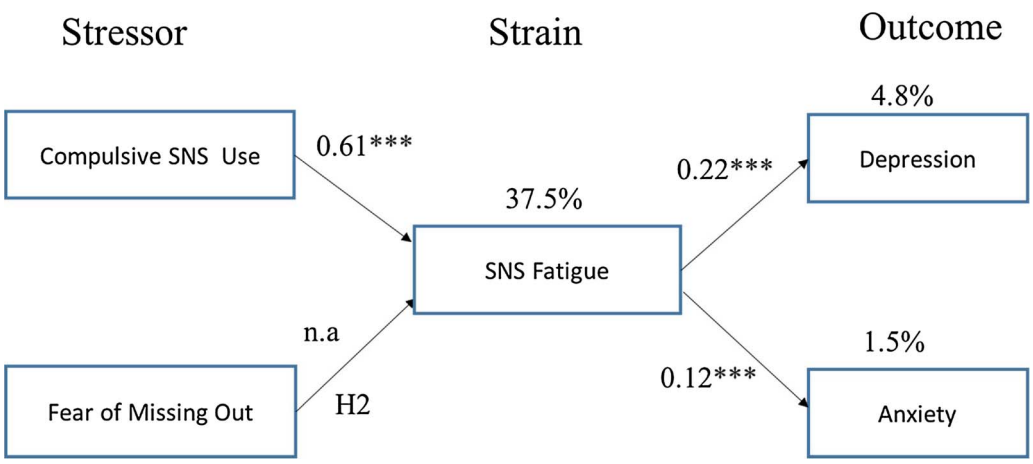

Fig. 3. Results of the main analysis (Study B).

predictor, and FoMO was a statistically significant ($\beta = 0.07$, $p < .05$), but weak predictor of social media fatigue. Furthermore, social media fatigue significantly predicted anxiety ($\beta = 0.23$, $p < .001$), and depression ($\beta = 0.25$, $p < .001$).

The structural model based on Study B also revealed acceptable model fit ($X^2/df = 7.45$, $CFI = 0.91$, $TLI = 0.90$ and $RMSEA = 0.07$). The percentage variances explained in social media fatigue, depression and anxiety were 37.5%, 4.8% and 1.5%, respectively. The structural model results suggest that compulsive social media ($\beta = 0.61$, $p < .001$) was again a significant predictor of social media fatigue, but FoMO ($\beta = -0.004$) was insignificant. Furthermore, similar to Study A results, social media fatigue significantly predicted anxiety ($\beta = 0.12$, $p < .001$) and depression ($\beta = 0.22$, $p < .001$) among adolescent social media users.

The study findings suggest that relationships between psychosocial wellbeing measures and social media fatigue are fairly stable across both study samples. We found support for hypotheses H1, H3 and H4 but only partial support for hypothesis H2 was obtained (see Table 5).

5. Discussion

Prior literature has examined the different antecedents and consequences or outcomes of social media fatigue. However, the empirical linkages between psychosocial wellbeing and social media fatigue were not known. This gap is addressed by the current study using the stressor-strain-outcome (SSO) framework. This study utilised repeated cross-sectional methodology, which consisted of two large cross-sectional surveys with adolescent social media users, separated over a period of five months. Two cross-sectional studies examined whether compulsive social media use and FoMO trigger social media fatigue. Moreover, whether social media fatigue results in depression and anxiety among adolescent social media users.

The first research hypothesis (H1) examined whether compulsive use of social media triggers social media fatigue and if this relationship is also consistent or stable over time. Both data sets have shown that compulsive social media was a significant predictor of social media fatigue among adolescent social media users. This finding is consistent with prior extended literature on new media use that suggests maladaptive behaviour and excessive use of digital devices and computer-mediated communication platforms (e.g., social media) result in emotional exhaustion and fatigue (Brand et al., 2016; Elhai et al., 2016; Ho et al., 2014; Lin et al., 2013; Oberst et al., 2017). According to substance abuse literature, when excessive users are unable to appropriately control their use behaviours, then it results in development of compulsive use behaviour (Hirschman, 1992; Meerkerk et al., 2010; Parylak et al., 2011). Furthermore, compulsive use behaviour involves different physiological and psychological activities which may require intensive cognitive processing and which might drain mental strength and, thus, result in fatigue (Boksem & Tops, 2008; Boksem et al., 2005; van der Linden & Eling, 2006).

Table 5
Confirmation of the hypotheses.

H #	Hypothesis	Support
H1	Compulsive SNS use is positively related to SNS fatigue over time	**Yes**
H2	FoMO is positively related to SNS fatigue over time	**No**
H3	SNS fatigue is positively related to depression over time	**Yes**
H4	SNS fatigue is positively related to anxiety over time	**Yes**

The second research hypothesis (H2) investigated whether FoMO results in social media fatigue and if this relationship is also consistent over time. The study findings suggest that FoMO was a weak predictor ($p < .05$) in Study A and not a significant predictor in Study B. Consequently, H2 was not fully supported. Scholars have observed that people experiencing FoMO are likely to constantly check social media. When the frequency of such usage increases, then they are likely to develop a usage habit in abnormal ways, e.g., compulsivity (Przybylski et al., 2013). Moreover, the psychological outcome of FoMO can be compulsive social media use (Alt, 2015; Clayton, Leshner, & Almond, 2015; Ho et al., 2014; Oberst et al., 2017; Przybylski et al., 2013; Wolniewicz et al., 2018). In light of the findings of prior literature as well as those of the present study results, it appears that compulsive social media use might act as a mediating variable between FoMO and social media fatigue. To test this, we have performed mediation analysis between these three variables across Study A and Study B (see Fig. 4). Our findings confirm that compulsive social media use acts as a mediating variable between FoMO and social media fatigue. In other words, FoMO indirectly results in social media fatigue via compulsive social media use.

The third research hypothesis (H3) examined whether social media fatigue results in elevation of depression level among adolescent social media users and if this relationship is consistent over time. The study results have demonstrated that social media fatigue was a statistically significant predictor of depression across both studies. However, the prior literature suggests that depressive users are more likely to use social media in order to cope with depression (Hussain et al., 2017; Hoare et al., 2017; Lin et al., 2016; Ophir, 2017; Scherr & Brunet, 2017). Furthermore, in seeking to cope with depression, they are more likely to excessively engage in social media use, which might result in depletion of mental strength and, thus, make them susceptible to psychological suffering, such as distress and exhaustion (Bright et al., 2015; Ophir, 2017). Therefore, on combining the results from previous studies and this study, fatigue and depression are in a reciprocal relationship. In the future, longitudinal data can help us to understand the

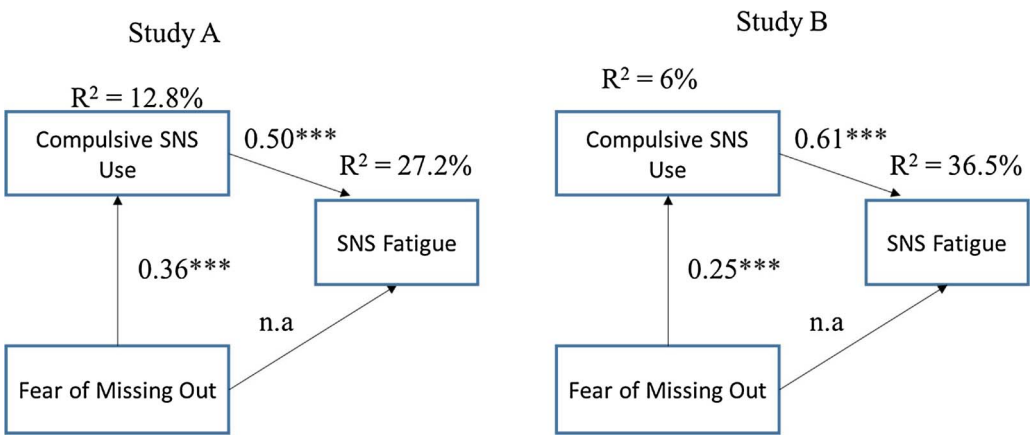

Fig. 4. Mediation analysis among FoMO, compulsive SNS use and SNS fatigue.

causal relationship.

The fourth research hypothesis (H4) examined whether social media fatigue results in elevation of anxiety level among adolescent social media users and if this relationship is also stable over time. The results provide support for this hypothesis since social media fatigue significantly predicted anxiety across both studies. This finding is consistent with prior literature, which suggests that, on experiencing fatigue, users are likely to suffer from decline in cognitive capabilities, e.g., they become anxious (Becker et al., 2013; Chen & Yan, 2016; Richards et al., 2015). However, similar to depression, in future, longitudinal data can help us to better understand the causal relationship between anxiety and fatigue.

6. Study implications

The present study findings have several theoretical and practical implications. The theoretical implications are as follows: First, prior literature has not yet examined the psychosocial wellbeing related aspects of social media fatigue. Therefore, the present study is possibly the first empirical study that has examined them, thus significantly contributing to theory development as well as prior mushrooming literature on social media fatigue. Second, the outcomes or consequences of social media fatigue have principally been studied in relation to discontinuity (Luqman et al., 2017; Oghuma et al., 2016; Sasaki et al., 2016; Shin & Shin, 2016; Zhang et al., 2016). Due to which, it was not known, other than discontinuity of service use, what are other possible consequences or outcomes when someone experiences social media fatigue. This gap is bridged by the present study by utilising newer outcome variables not previously studied. Third, a review of prior literature revealed that most previous studies are based on single cross-sectional studies, hence, the validity of the findings over time is not known. The present study is possibly the first repeated cross-sectional study in the domain of social media fatigue that has examined the similar relationship between measures over time.

With respect to practical implications, the current findings have significant implications for users, service operators, social media companies as well as administrators. These are: 1) social media users should understand that compulsive social media use results in social media fatigue, which can later result in depression and anxiety. Therefore, moderation in social media use must be taken into consideration. 2) Parents and guardians should pay attention (e.g., monitor, moderate) to the excessive social media use of adolescents. Recent studies have suggested that this generation is prone to self-control deprivation (Zheng & Lee, 2016). The lack of watchful supervision, support and participation might result in development of unfavourable health-harmful symptoms (Choi & Lim, 2016; Harris, Harris, Carlson, & Carlson, 2015; Ho, Lwin, & Lee, 2017). Therefore, monitoring and moderation can help parents to prevent distractions and inter or intra conflicts ensuing from the profusion of mobile use among young children (Zheng & Lee, 2016). 3) maintaining and attracting more users is one of the main priorities of service providers and social media companies, but, to achieve this goal, service providers should focus on user experience and satisfaction. However, according to the results of the present study, social media fatigue has significant influence on well-being, i.e., it can lead to depression and anxiety. Consequently, it becomes important for service providers as well as social media companies to purposely devise and develop features and interfaces which could likely cause minimum fatigue to users. This could likely facilitate daily social media use and alleviate the risk possibilities of encountering mental torments and satisfaction issues related to social media use. 4) the study methodology and research model can be a guide for scholars who are interested in further investigating crucial aspects of social media fatigue by using a different set of exploratory variables.

7. Study limitations and future work

The present study findings and related implications should be considered in the light of four important limitations. First, since the data were collected in one specific country and with one age group (i.e., adolescents), it is suspected that current findings may change if other age groups and cultural backgrounds are considered. To address this limitation, we encourage other scholars to validate a similar research model with other age and cultural groups. Second, the present study only focused on one social media platform, i.e., Facebook. Consequently, there is a need to validate the present study in the context of other equally popular platforms, such as Twitter, Snapchat, Instagram, LINE and YouTube. Third, despite the fact that the present study considered a variety of psychosocial wellbeing measures in relation to social media fatigue, further investigation should extend the study by exploring other factors, such as personality attributes, sleep conditions and online wellbeing-related aspects. Similar studies will render a more comprehensive understanding about social media fatigue and its attribution to emotional and physical wellbeing. Fourth, self-reported data are prone to methodological bias, consequently, future investigations should incorporate other research methodologies, such as interview and observation exercises, and explore other antecedents and consequences of social media fatigue. Apart from this, future studies should examine other variables and outcomes of social media fatigue in relation to academic points of view, e.g., whether social media fatigue negatively influences educational outcomes among adolescents.

8. Conclusion

Social media is a popular informative and communicative platform among users across the globe. Despite the various positive outcomes which are beneficial to users in various aspects in life, negative

consequences due to excessive social media use are also ineviTable Social media fatigue is a prevalent factor which negatively influences users' mental and behavioural conditions. The present study has examined the relationship between social media fatigue and psychosocial wellbeing by utilising different variables, namely compulsive usage, FoMO, anxiety, and depression, which have not been explored in prior literature. Our results demonstrate that compulsive social media use actually triggers social media fatigue while the effect of FoMO was not significant across both data-points. The results also demonstrate that confrontation of social media fatigue can lead to depression and anxiety. Our study has generated a deeper comprehensive understanding about social media fatigue by exploring the psychosocial variables and consequences in relation to social media fatigue through a repeated cross-sectional study. The findings are beneficial not only for theory, practitioners and businesses, but also for broader policy making concerning handling, organising and preventing potential detrimental possibilities in relation to social media fatigue. This will also pave the way for future investigations to further examine social media fatigue.

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