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IS BOREDOM PRONENESS RELATED TO SOCIAL MEDIA OVERLOAD AND FATIGUE? A STRESS-STRAIN-OUTCOME APPROACH

Abstract

Purpose

Social media overload and fatigue have become common phenomena that are negatively affecting people's well-being and productivity. It is therefore important that we understand the causes of social media overload and fatigue. One of the reasons why many people engage with social media is to avoid boredom. Thus, the purpose of this paper is to investigate how boredom proneness relates to social media overload and fatigue.

Design/methodology/approach

Building on the stress-strain-outcome framework, our paper tests a model hypothesizing the relationships between a social media user's boredom proneness, information and communication overload, and social media fatigue. We test the model by collecting data from 286 social media users.

Findings

The results suggest a strong association between boredom proneness and both information and communication overload, which in turn are strongly associated with social media fatigue. In addition, social media usage was found to amplify the effects of information overload on social media fatigue, but unexpectedly, attenuates the effects of communication overload.

Originality/value

Prior research has largely overlooked the connection between boredom and problematic social media use. The present study addresses this important gap by developing and testing a research model relating boredom proneness to social media overload and fatigue.

Keywords: Social media, Information overload, Communication overload, Social media fatigue, Boredom.

1   Introduction

In 2012 the average person spent 90 minutes per day consuming social media. In 2018, that figure has risen to 136 minutes per day (Statista, 2019). Evidence of our social media obsession is around us. One only has to look at a bus shelter, a queue, or even a lecture hall to see people drawn to the likes of Facebook, YouTube, WhatsApp, Instagram, and Twitter, usually through the ubiquitous smartphone. Studies investigating how the use of social media affects personal well-being report conflicting results. Some studies conclude social media use is associated with higher subjective happiness (Brailovskaia and Margraf, 2016), life satisfaction (Lönnqvist and Große Deters, 2016) and social support (Ellison et al., 2007). Other studies implicate social media use with depression (Brooks and Longstreet, 2015), lower happiness (Brooks, 2015), addiction (Islam et al., 2019; Li et al., 2018; Xue et al., 2018), exhibitionism (Mäntymäki and Islam, 2016), higher employee turnover (Yingjie et al., 2019), and stress (Meier et al., 2016).

While emerging research is mixed, it is clear that many people are struggling to cope with the deluge of information and communications they are subjected to through social media channels, a condition known as social media overload (Maier et al., 2014; Zhang et al., 2016). Information overload from social media occurs when the information that needs to be processed (e.g., attempting to absorb all the news updates recommended by Facebook) exceeds one's information processing capabilities (Eppler and Mengis, 2004; Whelan and Teigland, 2013). Similarly, communication overload indicates the status when communication demands from social media (e.g., partaking in multiple WhatsApp group communications simultaneously) exceed the communication abilities of an individual (Cho et al., 2011). Once a person becomes overloaded from processing social media content, they are likely to feel fatigued. This association between overload and social media fatigue, which refers to the subjective and self-

evaluated feeling of tiredness from social media use, is established in the literature (Cao and Sun, 2018; Lee et al., 2016; Maier et al., 2014). It is important that we understand the causes of social media overload and fatigue so behavioral interventions and design solutions can be developed to ensure users receive more of the benefits of social media and less of the costs.

In this paper, we consider whether a person's proneness towards boredom is a stressor which triggers feelings of overload and fatigue. The insights gained from this study help advance our knowledge and understanding of problematic Internet usage (Bright and Logan, 2018; Li, 2019; Salo et al., 2018; Turel et al., 2019). The ability to develop evidence-based interventions and solutions is compromised as existing research has largely overlooked the connection between boredom, social media use, and social media overload (Cao and Sun, 2018). Boredom proneness refers to the susceptibility of an individual to feel the emotion of boredom (Farmer and Sundberg, 1986). We seek to answer the research question: "Is boredom proneness related to social media overload and fatigue?". In addition, we extend previous research by examining how social media usage interacts with perceptions of information and communication overload to influence social media fatigue. Phrased differently, if a social media user is experiencing information or communication overload, does her fatigue diminish if she uses social media less intensely?

To help address our research question, we adopt the influential stress-strain-outcome (S-S-O) framework (Koeske and Koeske, 1989, 1993). We adopted this framework as it theorizes the relationships among stress, strain, and outcome factors. In particular, we conceptualize boredom proneness as a stress factor, information and communication overload as strain factors, and social media fatigue as outcome factors, and investigate the interrelationships between these factors. In addition, we model social media use intensity as a moderator in the strain-

outcome relationships.

2. Theoretical framework

2.1 Stress-Strain-Outcome framework

Providing an important theoretical foundation to our understanding of stress, the S-S-O framework (Koeske and Koeske, 1989, 1993) links stressors with outcomes and places strain as the mediating factor. Stress is generated by demands in one's environment that are perceived by an individual as problematic. Stress is a stimulus from an individual's environment that is perceived as irritating, troublesome, or disruptive. According to Berg et al. (2010), stress is "…adverse feelings, such as anxiety, fear, irritation, pressure, and sadness that are caused by an imbalance between the individual's motivations and abilities, and the environment's requirements and supports" (Berg et al., 2010, p. 988).

Similar to the way that the fear of missing out has been found to generate stress in social media users (Whelan et al., 2019), we conceptualize boredom proneness as a stressor for the same population. It is an all too familiar sight in modern society to see people instantly engage with their social media apps in order to 'kill time', rather than face the unpleasantness of boredom. As advocated by the S-S-O, stress can lead to strain; the emotional and psychological reactions of the individual experiencing stress. For example, a poorly written or impulsive response to a colleague's Facebook post could be evidence of the strain an overloaded social media user is experiencing.

Information and communication overload can occur when people turn to social media in order to alleviate their boredom. Therefore, information overload and communication overload are conceptualized as the strain factors. Strain can lead to various negative outcomes, such as

dissatisfaction, emotional exhaustion, fatigue or even the discontinued use of a particular service (Maier et al., 2014; Ragu-Nathan et al., 2008; Tarafdar et al., 2011). In this paper, we suggest that information and communication overload lead to social media fatigue. For example, users reported feeling low on energy and unable to concentrate on important tasks after a period of heavy social media use (Whelan et al., 2019). Furthermore, an important facet of the S-S-O paradigm are factors that potentially moderate the relationships among stress, strain, and outcome (Koeske and Koeske, 1993). Consistent with the S-S-O approach, we examine if the intensity with which one uses social media moderates the relationship between the strain of overload and the outcome of fatigue.

2.2   Boredom Proneness

Boredom ensues when the current situation no longer provides emotional stimulation. To alleviate boredom, people seek out alternative experiences, even if those experiences negatively impact well-being (Bench and Lench, 2013), such as overloading on social media content. Boredom is an unpleasant but much needed emotion. It has been argued in the field of evolutionary biology that without boredom, mankind could never have advanced further than other species. The avoidance of boredom is what ultimately sparked our ancestors to rub sticks together to create fire or create the wheel to carry heavy loads (Elpidorou, 2014). Indeed, our brains are hungry for external stimuli to circumvent boredom. To encourage us to seek out new challenges and experiences, our brains release the neurotransmitter dopamine, and feelings of joy and excitement ensue (Derringer et al., 2010). Social media provides a nearly-endless glut of experiences. Users can connect with others anywhere in the world and communicate, share information, multimedia, and news, and play games. The opportunities to learn something new, meet new people, or watch something interesting are limitless, so it is understandable why many

individuals turn to social media platforms to address their boredom and provide mental/emotional stimulation.

However, too much stimulation can be a bad thing. To support our hypotheses linking boredom proneness to social media overload, we can draw from studies of addiction which suggest boredom is associated with problematic uses, such as Internet addiction (see Lin et al., 2009). Addictive behavior is reflected in the pathological pursuits of rewards or stress relief in a compulsive manner (Martin et al., 2013). If social media becomes a pathological pursuit for a user to alleviate boredom, the usage can become problematic. Recent studies have applied constructs from the addiction literature to explain problematic technology use (Turel et al., 2014; Turel and Qahri-Saremi, 2016; Turel et al., 2016). Though whether or not social media addiction is a real disorder is open to debate, it is clear that information and communication overload are the result of maladaptive use (Karr-Wisniewski and Lu, 2010). Thus, viewing social media overload through the addiction lens has merit. It has been found that problematic gamblers (Blaszczynski et al., 1990) and excessive online poker players (Hopley and Nicki, 2010) display significantly higher boredom proneness than others. Likewise, proneness to boredom also predicts Internet sex addiction (Chaney and Blalock, 2006) and over eating (Crockett et al., 2015). Thus, the link from boredom proneness to problematic outcomes has been previously established.

2.3   Social Media Overload

While terms such as infobesity, data smog, and information glut have entered lexicon in recent years, information overload has been a problem for centuries. The earliest examples can be traced back to the library of Alexandria where archaeological evidence shows there was more information in one place than one human being could deal with in one lifetime. The limited

capacity model (Lang, 2000) explains people only have a limited amount of mental resources to process information. Social media users can be subjected to various types of overload. For example, 'connection overload' has been defined as the enhanced stress associated with the constant reception, maintenance, and updating of social media (LaRose et al., 2014). The term 'social overload' has been used to describe the situation when an individual perceives they are providing too much social support to friends through social media (Maier et al., 2014). 'Replacement overload' ensues when users rapidly switch between various social media applications and non-technological alternatives in an effort to secure the required functionality (Maier et al., 2015). Researchers have also studied 'system feature overload' which occurs when the social media technology is too complex for a given task or the addition of new features is outweighed by the impact of technical resources and the complexity of use (Karr-Wisniewski and Lu, 2010; Lee et al., 2016).

In this study, we follow the approach of Lee et al. (2016) and Cao and Sun (2018), and conceptualize social media overload as the extensive adoption and use of social media which exposes people to a massive amount of information and communication demands which often require energy and cognitive processing beyond their capabilities. Thus, information and communication overload are central components of social media overload. To further specify, information overload arises when the information that needs to be processed surpasses the person's information processing capabilities (Eppler and Mengis, 2004; Whelan and Teigland, 2013), whereas communication overload indicates the status when communication demands from ICT platforms, such as social media, exceed the communication abilities of an individual (Cho et al., 2011). Communication overload is a relatively new phenomenon emerging in parallel with the appearance of social media in the past decade.

A large volume of recent research has been dedicated to causes and consequences of social media overload. Causes include use intensity (Maier et al., 2014), communication rate and processing time (Cho et al., 2011), information characteristics (Lee et al., 2016), and lack of cognitive control (LaRose et al., 2014; Whelan et al., 2017), while decreased performance (Karr-Wisniewski and Lu, 2010), stress (LaRose et al., 2014), regret (Cao and Sun, 2018), discontinuance intentions (Cao and Sun, 2018; Maier et al., 2014), reduced job satisfaction (Yin et al., 2018) and fatigue (Cao and Sun, 2018; Lee et al., 2016) result when users become overloaded from social media. It is to social media fatigue we now turn.

2.4   Social Media Fatigue

Advances in mobile applications and smartphone technology enable users to engage with social media anytime and anywhere. Indeed, the most popular social media applications are designed to encourage compulsive use (Alter, 2017). Many people are unable to override their impulsive habitual use of social media (Turel and Qahri-Saremi, 2016) and smartphones (Soror et al., 2015), and so become overwhelmed with the volume of content and connection demands (LaRose et al., 2014). One unintended consequence of using social media is increased exhaustion levels. The cognitive effort needed to pay constant attention to social media deplete energy levels, resulting in social media fatigue - the subjective and negative feeling of tiredness and burnout resulting from social media activities (Ravindran et al., 2014). This fatigue may arise when old friends find users on Facebook and begin sending friend requests, posts about social games, what they ate for breakfast, and photos from their smartphones (Bright et al., 2015). Fatigue can also arise from how the information is provided. For example, when social media platforms make interface changes, many people may find that the new features are overwhelming and that adaptation is difficult. As suggested by the cybernetic theory of stress

(Edwards, 1992), people will alter their environment to limit the effects of the stressor. Supporting the cybernetic view, individuals' intentions to discontinue using social media has been found to be positively associated with exhaustion (Cao and Sun, 2018; Maier et al., 2014; Ravindran et al., 2014; Zhang et al., 2016).

Social media fatigue is a relative term, as it is experienced by different people in differing ways. Users with greater self-efficacy tend to experience more social media fatigue, while the opposite is true for those with greater confidence (Bright et al., 2015). Men are more likely to both experience and suffer more from social media fatigue than women (Zhang et al., 2016). Age and mindfulness are also significant moderators. The effects of social media overload on fatigue are more pronounced the older a user becomes (Zhang et al., 2016). Likewise, workers with low mindfulness experience increased burnout when they use social media at work. Interestingly, using social media at work decreases burnout when employees possess a high level of mindfulness (Charoensukmongkol, 2016).

When used in a sustainable manner, social media use can bestow positive outcomes, such as enhanced innovativeness (Parise et al., 2015), work performance (Wu, 2013), and life happiness (Brailovskaia and Margraf, 2016). However, users are withdrawing from using social media services due to perceptions of fatigue and missing out on the positive benefits of the technology. Thus, it is important for individual users, their employers, and social media providers to understand the psychological factors leading to social media fatigue so that effective interventions and solutions can be developed. Our study contributes to this goal by considering how boredom proneness contributes directly and indirectly to social media fatigue.

3.   A Model of Social Media Overload

The research model tested by this study is depicted in Figure 1. Drawing from the S-S-O paradigm, boredom proneness is hypothesized to be positively associated with social media fatigue directly, and indirectly thorough information and communication overload. Social media use intensity is also hypothesized to moderate the effects of information and communication overload on social media fatigue.
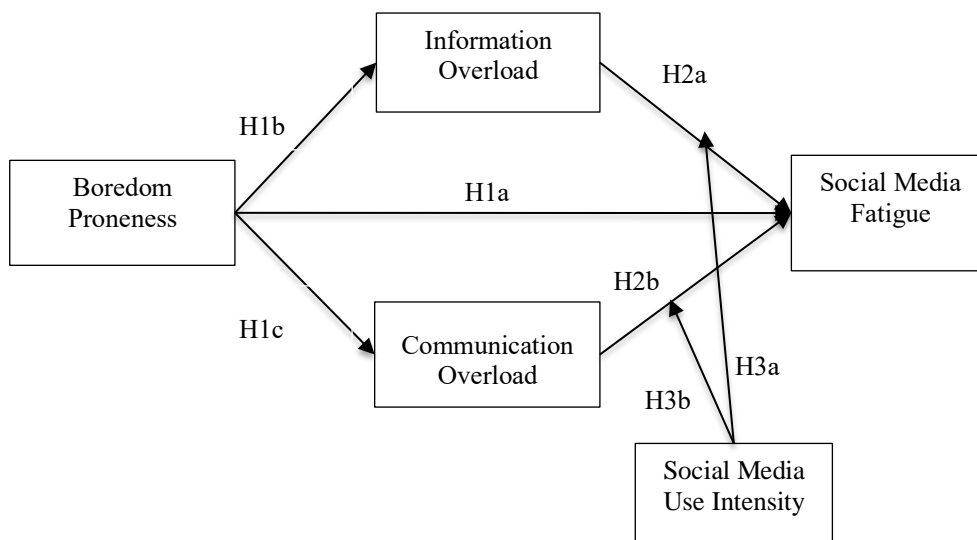

Figure 1 – The Research Model

3.1   Boredom Proneness and Overload

Boredom has been depicted as being due to both cognitive and attentional deficits (Fisher, 1998; Kass et al., 2010; Mikulas and Vodanovich, 1993), which usually emerges when "…the individual feels a pervasive lack of interest in and difficulty concentrating on the current activity" (Fisher, 1993, p. 396). A boredom-prone individual is highly distractible (Farmer and Sundberg, 1986) and will be more likely to engage in secondary tasks during the time they should be working on primary tasks (such as work duties). When an individual is performing

tasks that are more utilitarian and not entertaining, there will be a cognitive pull to do something more enjoyable and hedonic, such as use social media.

Numerous studies have been conducted to explain why people use social media. Supporting the influence of boredom, seeking entertainment and killing time are strong predictors of use across various social media platforms (Ku et al., 2013; Quan-Haase and Young, 2010; Whiting and Williams, 2013). Boredom motivates a desire for changing the current goal to something that is more stimulating (Bench and Lench, 2013). Social media platforms are purposefully designed to exploit our psychological needs to seek stimulation (Alter, 2017), often drawing us away from less stimulating but important functions such as study, work, or a conversation with a colleague. With social media's ubiquity and ease of access, users can connect with the touch of a button.

Following the logic from addiction research described earlier, when people choose to use social media to alleviate their boredom, undesirable outcomes may emerge in the form of heightened perceptions of information and communication overload, and fatigue. Therefore, we propose the following hypotheses:

H1a. Boredom proneness is positively associated with social media fatigue

H1b. Boredom proneness is positively associated with information overload

H1c. Boredom proneness is positively associated with communication overload

3.2   Social Media Overload and Fatigue

Social media users back away from using the service when they become overwhelmed with too many sites, too many pieces of content, too many friends and contacts, and too much time spent keeping up with these connections (Zhang et al., 2016). Essentially, fatigue arises when users

face difficulties in managing the massive amount of information and communication from others (Lee et al., 2016).

Information overload occurs when the amount of input to a system exceeds its processing capacity (Milord and Perry, 1977). Too much information on social media can quickly cross users' cognitive limits in processing information and make them feel overwhelmed (Wurman, 1990). Information overload can lead to dysfunctional consequences such as information anxiety, stress, and distraction from important tasks (Eppler and Mengis, 2004; McFarlane and Latorella, 2002; Misra and Stokols, 2012; Norman and Bobrow, 1975). In the social media context, prior studies implicate information overload as one of the major antecedents of social media fatigue (Lee et al., 2016; Zhang et al., 2016). Consequently, we propose the following hypothesis:

H2a. Information overload is positively associated with social media fatigue

Social media services also offer the opportunity to network with many people. Thus, social media users may have to deal with too many communication requests from their networks at the same time; for example, when receiving multiple Snapchat notifications on a smartphone, Discord alerts when a group member posts a comment, or Facebook announcements when a contact sends an instant message. While it is possible to eliminate the noise from these notifications, the applications still provide visual cues that someone is messaging the user or that new information has been provided. These interruptions may distract users from their primary tasks, and also may cause them to become overwhelmed, as they cannot deal with the situation effectively. Interruptions can exacerbate communication overload in two ways. First, they take time away from working on current work activity, potentially resulting in a feeling of psychological strain (Speier et al., 1999). Second, the interruptions themselves can place greater

demands on cognitive processing as the user is forced to decide between their current activities and switching tasks to the interrupting event, resulting in an increase in communication load and task processing demands (Kononova et al., 2016).

Too many interruptions can have negative consequences such as decreased work productivity (Norman and Bobrow, 1975) and increased fatigue (Klapp, 1986). In the social media use context, Lee et al. (2016) reported communication overload as a source of fatigue. Consequently, we hypothesize the following:

H2b. Communication overload is positively associated with social media fatigue

3.3   The Moderating Effects of Social Media Use

Previous studies have not considered how the intensity of a person's use of social media might moderate the effects of social media overload on fatigue levels. Drawing from studies on the problematic use of IT, it is logical to assume social media use intensity will amplify the effects of overload on fatigue. The excessive social, hedonic, and cognitive uses of Facebook have been found to be sources of social media exhaustion (Luqman et al., 2017). The extent of technology use is also positively associated with social overload (Maier et al., 2014), negative life consequences (Soror et al., 2015), and stress and anxiety (Reinecke et al., 2017). Likewise, the inability to control social media use explains poor performance (Turel and Qahri-Saremi, 2016) and organizational deviance (Turel, 2017). Fatigue can also be caused by poor sleep quality and emerging research links the extent of social media use to sleep curtailment (Levenson et al., 2016; Woods and Scott, 2016). However, we do acknowledge the possibility that social media use may negatively moderate the relationship between overload and fatigue i.e. increasing social media consumption would lead to a person in a high state of communication overload becoming less fatigued. In line with such a potential, a study of 1614

participants found that people recovered from high levels of work-related fatigue by playing video and computer games (Reinecke, 2009). Yet, in the present study, we expect social media use intensity to positively moderate the effects of information and communication overload on fatigue and hypothesize the following:

H3a. Social media use intensity positively moderates the relationship between information overload and social media fatigue

H3b. Social media use intensity positively moderates the relationship between communication overload and social media fatigue

4. Study Design

4.1 Data collection

To evaluate our research model, survey data was collected from the students of an Irish university. We gather data from University students not just because of convenience, but because they are heavy social media users. University students (i.e., young adults) represent a large percentage of social media users (Pew Research Center, 2018). Previous studies have also gathered data from students as they are highly representative of contemporary social media users (Turel and Qahri-Saremi, 2016; Turel and Serenko, 2012). Invitations to participate in the research were sent to 423 fulltime students on who had taken an introductory MIS course in 2016. A total of 286 usable responses were received. Six responses were removed as the time taken to complete the survey was significantly faster than the average. This yielded a response rate of 67%. Approximately 52% of the respondents were male.

A number of approaches can be used to estimate minimum sample size for partial least squares-based structural equation modelling (PLS-SEM). For our study, the standard "10 times rule"

(Hair et al., 2011) yields a minimum sample of 50, while the inverse square root method (Kock and Hadaya, 2018) returns a minimum sample of 86. Other scholars recommend 150 observations for models with three or more indicators on constructs (Anderson and Gerbing, 1984). Thus, our sample of 286 more than exceeds the minimum sample size threshold.

The study's constructs were measured using well-established survey instruments and adapting the wording to the context of social media. The boredom proneness measures were taken from the external stimulation section of the scale (Vodanovich et al., 2005). The boredom proneness scale factors identified by Vodanovich et al. (2005) are external stimulation and internal stimulation. The items on the external stimulation subscale reflect a need for variety and change, whereas the internal stimulation subscale refers to a perceived inability to generate sufficient stimulation for oneself. Similar to previous studies (e.g., Brooks, 2015), since we are interested in social media usage, an external-focused activity, the internal stimulation section of the boredom proneness scale does not apply and were not captured.

The measures for information overload and communication overload were adapted from Karr-Wisniewski & Lu (2010). Four items from the eight item Facebook use intensity scale (Ellison et al., 2007) were adapted to measure social media use intensity. The remaining four items from the original scale were not adapted to this study as they related specifically to Facebook (e.g., About how many total Facebook friends do you have?). Finally, the measures of social media fatigue were adapted from Lee et al. (2016). All the items were measured on a five-point Likert scale with response choices ranging from "Strongly disagree (1)" to "Strongly agree (5)". The measurement items are presented in Appendix 1.

4.2   Data analysis

The analysis utilized the PLS-SEM approach with SmartPLS software. We evaluated the convergent validity by examining item loadings, composite reliabilities (CR), and average variance extracted (AVE) values. Regarding item loadings, (Fornell and Larcker, 1981) have recommended values of at least 0.7 to be acceptable. Based on this criterion, three items from boredom proneness, one item from social media use intensity, and one item from communication overload were removed. The three items from boredom proneness that did not load significantly ("Having to look at someone's home movies or travel pictures bores me tremendously"; "It seems that the same old things are on television or the movies all the time; it's getting old."; "When I was young, I was often in monotonous and tiresome situations.") are likely not relevant to the subject pool. Given the proliferation of social media, people are not forced to look at home movies and travel pictures very often. These items are now uploaded to social media and users have the ability to view or not as they decide. Concerning television and movies, with the multitude of social media and streaming services, users have more choices than ever before. Finally, since this subject pool is university students, many of them are still considered "young". As such, the question likely does not apply. We removed one item from communication overload even though it had a loading of 0.65, which was nearly acceptable. Keeping the item did not change the results. Therefore, we preferred to remove it following the 0.7 threshold.

The CRs being above 0.8 and AVE values exceeding 0.5 further support satisfactory convergent validity. The loadings, CRs and AVEs are shown in Appendix 1. We evaluated the discriminant validity by comparing the square roots of AVE values to the inter-construct correlations. Table 1 shows the correlation matrix with the square root of AVE values presented diagonally. As

can be seen from the table, the square roots of the AVE values for the variables are consistently greater than the off-diagonal correlation values, suggesting satisfactory discriminant validity between the variables. Appendix 2 shows that all items have cross loading coefficients lower than the factor loading on their respective assigned latent variable, suggesting that discriminant validity on the item level is met for all the constructs.

	Boredom Proneness	Communication Overload	Information Overload	Social Media Use Intensity	Social Media Fatigue
Boredom Proneness	**0.75**				
Communication Overload	0.40	**0.77**			
Information Overload	0.34	0.60	**0.84**		
Social Media Use Intensity	0.11	0.09	0.18	**0.87**	
Social Media Fatigue	0.41	0.59	0.59	0.14	**0.81**

Table 1. Correlations between latent variables (square root of AVEs in the main diagonal)

We also investigated possible gender differences in the composite scores of the constructs using t-tests. There were no overall gender differences in the composite score for communication overload, information overload, social media fatigue, and boredom proneness.

To detect possible model misspecification, we examined how well our model fitted the data (Henseler and Sarstedt, 2013). To this end, we followed Henseler and Sarstedt (2013) and used the goodness-of-fit (GoF) and standardized root mean square residual (SRMR) statistics. We calculated GoF using the equation presented in Wetzels et al. (2009) and obtained a value of 0.41. According to Wetzels et al. (2009)'s criteria (small = 0.1, medium = 0.25, and large = 0.36), our model had good fit. For SRMR, we obtained a value of 0.08. According to Hu and Bentler (1999), SRMR below 0.10 or, more conservatively, 0.08 indicates good model fit. As a result, we conclude that our model exhibited good fit to the data.

To evaluate the risk of common method bias (CMB) (Podsakoff and Organ, 1986) in our data, we conducted several tests. First, we conducted Harman's (1976) single factor test. We

conducted a principal component analysis and found no single construct accounted for most of the total variance. Second, Pavlou et al. (2007) suggested a correlation above 0.9 is an indication of possible CMB. We examined the correlation matrix shown in Table 1 and observed that the correlations ranged from 0.11 to 0.60. These tests ensure that CMB is not a major concern in our study.

4.3   Results

Figure 2 shows the results of the structural model test. The model explained 50% of variance in social media fatigue, 16% variance in communication overload, and 12% variance in information overload. Boredom proneness had significant effect on social media fatigue (β=0.37, p<0.001), information overload (β=0.34, p<0.001), and communication overload (β=0.40, p<0.001). Thus, H1a, H1b, and H1c are all supported. Both information overload (β=0.36, p<0.001) and communication overload (β=0.27, p<0.001) had significant effects on social media fatigue, supporting H2a and H2b. As hypothesized in H3a, the interaction term of information overload and use intensity (β=0.21, p<0.01) had a significant positive effect on social media fatigue. However, the outcome of H3b, the interaction effect of communication overload and social media use intensity (β=-0.17, p<0.05) on social media fatigue, was directly opposite to what we hypothesized. Instead of amplifying the effects of overload, social media usage significantly attenuates the effects of communication overload on social media fatigue.
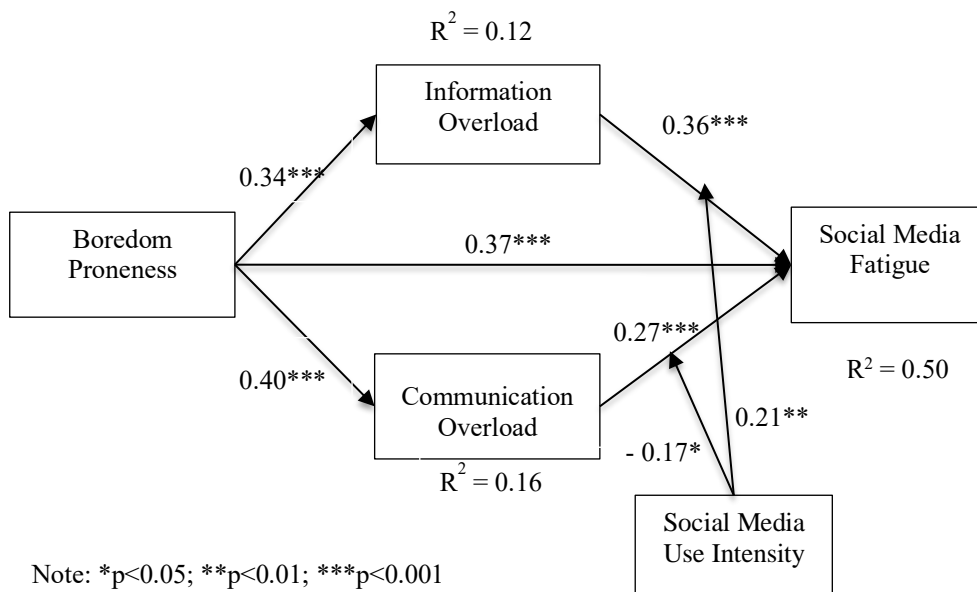
$R^2 = 0.12$

Information Overload

0.36***

0.34***

Boredom Proneness

0.37***

Social Media Fatigue

0.40***

Communication Overload

0.27***

$R^2 = 0.50$

0.21**

- 0.17*

$R^2 = 0.16$

Social Media Use Intensity

Note: *p<0.05; **p<0.01; ***p<0.001

Figure 2. Structural Model Results

5. Discussion and Implications

Our paper asked the question "Is boredom proneness related to social media overload and fatigue?" The answer is yes. The analysis of our survey data from 286 university students confirms proneness to boredom is positively related to both information and communication overload, and social media fatigue. Additionally, the two types of social media overload, information and communication, exert positive influences on social media fatigue. Taken together, this study confirms the nomological validity of the S-S-O framework, which was initially developed for a general workplace environment (Koeske and Koeske, 1993).

People use social media to varying degrees of intensity which impacts their affective states (Brooks, 2015; Brooks and Longstreet, 2015; Turel, 2017). Thus, our study extends previous research on the S-S-O framework by examining how social media use intensity interacts with perceptions of information and communication overload to influence social media fatigue. As expected, social media use intensity positively moderates the relationship between information

overload and fatigue. However, contrary to our expectations, use intensity negatively moderates the effects of communication overload on social media fatigue. There are three possible explanations for this specific finding.

Firstly, communication with friends, colleagues, and relatives through social media has become a standard in today's connected life. Therefore, reducing social media use due to communication overload may in fact reinforce more stress as one cannot fulfill the needed communication demands of today's connected world. Users who develop a dependency on their smartphone, often referred to nomophobia, become stressed and anxious when separated from the device for a period of time (Hartanto and Yang, 2016; Tams et al., 2018). Even though a person is in a state of overload from social media communications, it is possible they will feel even more stressed if they stopped using social media less intensely. The link between stress, anxiety, and fatigue is well established in the clinical literature (e.g., Kocalevent et al., 2011). Yet in our study, use intensity had markedly contrasting effects for information and communication overload on social media fatigue. Recent research suggests people are driven to use social media intensely for the social interactions they have with others (Dhir et al., 2017) and not by exposure to information (Dhir and Tsai, 2017). Likewise, social media users require more cognitive resources to process information than communications (Cao and Sun, 2018). It could thus be argued that information overload is a more unpleasant experience, and any reduction in social media use reduces fatigue. Whereas communication overload is similar to a state of flow (Csikszentmihalyi, 1990) where the continuation of use reduces feelings of fatigue.

Secondly, similar to the way playing video games in the evening aids recovery from workplace strain (Reinecke, 2009), it is possible that participants in our sample used social media

communications as a way to cope with academic strain. Thus, when one is feeling overloaded, engaging in communications through social media with friends reverses perceptions of fatigue.

Third, social media provides both hedonic and utilitarian value to the user (Leftheriotis and Giannakos, 2014). A hedonic system is pleasure-oriented and strongly connected to home activities, while a utilitarian system is productivity-oriented and designed to help perform a specific task (Heijden, 2004). For the students in our sample, it is quite likely that the processing of communication loads from friends and acquaintances on Facebook and other platforms would provide hedonic value. In contrast, the processing of information loads, for example, synthesizing YouTube videos and Twitter feeds as part of a formal assignment or exam preparation, provide utilitarian value. In essence, using social media for communications is fun while using it to process information is work. Thus, people who are overloaded by social media communications probably continue to increase social media for hedonic purposes, which is pleasurable and offsets feelings of fatigue.

Regarding the antecedents of social media overload, existing studies implicate communication rate and processing time (Cho et al., 2011), information characteristics (Lee et al., 2016), and a lack of cognitive control (LaRose et al., 2014; Whelan et al., 2017). Our study takes a novel approach and draws from theories of addiction to explain problematic technology use. Excessive online poker playing (Hopley and Nicki, 2010) and Internet sex addiction (Chaney and Blalock, 2006) have already been linked to boredom proneness. We can now add social media overload to the list of problematic technology uses associated with boredom proneness. Our findings both support and extend those studies applying uses and gratifications theory to understand why people engage with social media (Ku et al., 2013; Quan-Haase and Young,

2010; Whiting and Williams, 2013). Avoiding boredom not only explains why people use social media, but also why they get overloaded and exhausted from it.

Aligning with prior studies (Cao and Sun, 2018; Lee et al., 2016; Maier et al., 2014; Zhang et al., 2016), we also find a strong positive relationship between social media overload and fatigue. However, in contrast to some studies (Cao and Sun, 2018; Lee et al., 2016), our results show that communication overload is more critical in creating social media fatigue than information overload is. This implies that we have ended up with too many communication channels with too many communication requests as the rise of social media continues. Responding to all these channels is an exhaustive task which can lead to fatigue if proper interventions are not enacted.

Our findings have two major practical implications for social media users and social media service providers. First, social media users should be aware of that fact that they may use social media more to alleviate boredom. However, it may lead to overload and fatigue. They should also be aware of the fact that once they are overloaded, it may not be enough to reduce their social media use for avoiding social media fatigue. Processing social media communication requests sequentially, as opposed to multitasking, may help alleviate social media fatigue. Yet, continuing to use social media intensely may lead to more fatigue through information overload. Therefore, we also suggest users develop strategies when being exposed to high loads of social media (e.g., take a break every 20 minutes) and use filters provided by the social media service providers to control the amount of relevant incoming information for consumption. Second, being overloaded and fatigued by social media will cause the user to avoid social media to alleviate boredom, and they will resort to finding a different stimulus. Therefore, social media providers should be aware that bombarding users with too much information and/or too many communication requests can drive users away from their platforms. Continuing to implement

techniques to allow users to control the amount of information that they have to process and make communication requests as obtrusive as desired can greatly assist users in limiting their exposure to overload and fatigue. For example, more control on what social media users want to see in their news feed, as well as automatically categorizing the incoming communication requests based on the priority set by the users, are possible example features that the social media service providers can offer to limit users' overload and fatigue.

5.1   Limitations and Future Research

One limitation of this study is the use of self-reported measures of social media usage at a specific point in time (i.e., cross-sectional snapshot). These types of measures have several inherent issues, including social desirability and simple memory failure. A better way to gather data would be through actual measures of social media usage. However, such measures are not without issues. To gather actual measures of usage, researchers would need some form of recording or logging software placed on subjects' computers or in their networks, which generates two major concerns. First, there are both ethical and legal issues involved in monitoring someone's Internet usage, especially if deception is involved. Second, even without deception, data collection could suffer from several biases that stem from subjects' knowing they are being monitored. If these issues can be overcome, a future study employing actual measures of usage and details on what the user is doing through social media could provide robust findings. Also, our study only considered the intensity with which users engaged with social media and not the specific activities e.g. relaxation, social interaction, information seeking, pass time, entertainment, relaxation, information sharing, etc. Future studies could apply the uses and gratifications lens to determine how social media engagement alters when

users are in an overloaded state, and what the resulting consequences are on important outcomes such as well-being and performance.

Another limitation was using student subjects for the data. Student subjects have been the topic of numerous pro and con articles. The general consensus is that student subjects are acceptable when the research question aligns with the applicability of the student. For this study, students are an acceptable sample as they are generally the most common users of social media. However, the findings may not be generalizable to the whole population of social media users. A future study should target non-student social media users to verify and corroborate our findings. Likewise, some of the items we used to measure the various constructs did not exhibit sufficient reliability to merit inclusion in the study. The construct measures we adopted are all from existing validated studies. However, these measures were originally created a number of years ago and may no longer be applicable to contemporary social media users. For example, the boredom proneness scale (Vodanovich et al., 2005) asks: *Having to look at someone's home movies or travel pictures bores me tremendously.* It is unlikely that many social media users have ever been in this position to be able to reliably answer this item. Likewise, the social media use intensity scale (Ellison et al., 2007) asks participants to consider if social media is part of their everyday activity. As social media use is now almost mandatory in classwork, family interactions, workplace communication, and social life, there is little variation in participant responses, as was the case in our study (the standard deviation was just 0.70). Thus, future studies should focus on updating or creating entirely new constructs and items applicable to the modern social media users.

Additionally, to extend this work, researchers can take three directions. The first would be to determine other factors that influence social media fatigue. Possibilities worth investigating

include personality traits such as susceptibility to addiction, usage patterns such as time of day and multitasking, and business-related pressures such as companies marketing through Facebook or needing to "like" a page to receive discounts. The second direction would be to investigate the influence that boredom proneness has on other usage-related outcomes. These outcomes may include acceptance, continued usage, addiction, discontinuance, and other related constructs. Finally, it is possible that other untested variables impact the relationship between boredom proneness and social media overload. It would be valuable to observe social media users to see the progression of usage into overload, and/or test other psychological variables that could impact overload.

5.2   Conclusion

In today's digitally connected world, one common choice for alleviating this boredom is to use social media. With all of the communication and information benefits that social media can provide, it is a natural choice. However, the adage "all things in moderation" continues to apply. When users turn to social media to fight the boredom, they may be overusing the platform to the point that they become overloaded, leading to fatigue. This fatigue could end up causing the user to lose interest in the platform, or it may not offer the same appeal for alleviating boredom as it used to. Either way, individuals that are prone to boredom need to be aware of their limits and recognize the signs of overload so that they do not miss the positive benefits of social media.

6. References

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Appendix 1: Item means, standard deviations (S.D.), loadings, CRs, AVEs and significance levels

Construct	Item	Mean	S.D	Loading
Boredom Proneness CR=0.79 AVE=0.56	*Bore1: Having to look at someone's home movies or travel pictures bores me tremendously	4.52	1.72	-
	Bore2: Many things I have to do are repetitive and monotonous	4.05	0.83	0.78
	Bore3: It would be very hard for me to find a job that is exciting enough	4.11	0.71	0.75
	Bore4: Unless I am doing something exciting, even dangerous, I feel half-dead and dull	3.88	1.04	0.71
	*Bore5: It seems that the same old things are on television or the movies all the time; it's getting old.	3.62	1.42	-
	*Bore6: When I was young, I was often in monotonous and tiresome situations.	2.35	1.03	-
Communication Overload CR=0.82 AVE=0.60	Comm_Overload1: I feel that in a less connected environment, my attention would be less divided allowing me to be more productive	3.71	1.04	0.77
	Comm_Overload2: I often find myself overwhelmed because technology has allowed too many other people to have access to my time	3.14	1.27	0.81
	*Comm_Overload3: I waste a lot of my time responding to messages that are not directly related to what I need to get done	3.13	1.34	-
	Comm_Overload4: The availability of electronic communication has created more of an interruption than it has improved communications.	2.98	1.27	0.74
Information Overload CR=0.88 AVE=0.71	Info_Overload1: I am often distracted by the excessive amount of information in social media	3.59	1.11	0.76
	Info_Overload2: I find that I am overwhelmed by the amount of information that I process on a daily basis from social media	3.07	1.12	0.89
	Info_Overload3: Usually, my problem is with too much information to make sense of, instead of not having enough information to make decisions	3.22	1.07	0.88
Social Media Use Intensity CR=0.86 AVE=0.76	SMUI1: In the past week, on average, approximately how many minutes per day have you spent on social media? 1 = less than 10, 2 = 10–30, 3 = 31–60, 4 = 1–2 hours, 5 = 2–3 hours, 6 = more than 3 hours	4.60	1.18	0.74
	*SMUI2: Social media is part of my everyday activity	4.46	0.70	-
	SMUI3: I feel out of touch when I haven't logged into social media for a while.	3.77	1.10	0.96
	SMUI4: I would be frustrated if I could not access social media.	3.18	1.05	0.77
Social Media Fatigue CR=0.90 AVE=0.66	Fatigue1: I find it difficult to relax after continually using social media	2.98	1.21	0.76
	Fatigue2: After a session of using social media, I feel really fatigued	2.78	1.14	0.86
	Fatigue3: Due to using social media, I feel rather exhausted	2.67	1.08	0.87
	Fatigue4: After using social media, it takes effort to concentrate in my spare time	3.34	1.09	0.77
	Fatigue5: During social media use, I often feel too fatigued	2.78	1.17	0.79

| | to perform other tasks well | | | | |

Appendix 2: Loadings and Cross-loadings

	Boredom Proneness	Communication Overload	Information Overload	Social Media Use Intensity	Social Media Fatigue
BORE2	**0.78**	0.38	0.34	0.01	0.37
BORE3	**0.75**	0.22	0.22	0.15	0.25
BORE4	**0.71**	0.26	0.15	0.14	0.27
Comm_Overload1	0.31	**0.77**	0.49	0.08	0.46
Comm_Overload2	0.28	**0.81**	0.54	0.11	0.49
Comm_Overload4	0.34	**0.74**	0.34	0.00	0.41
Info_Overload1	0.22	0.45	**0.76**	0.18	0.40
Info_Overload2	0.30	0.54	**0.89**	0.18	0.53
Info_Overload3	0.31	0.49	**0.88**	0.10	0.53
SMUI1	0.11	0.07	0.14	**0.74**	0.19
SMUI3	0.11	0.09	0.18	**0.96**	0.15
SMUI4	0.09	0.03	0.13	**0.77**	0.05
Fatigue1	0.28	0.50	0.45	0.01	**0.76**
Fatigue2	0.35	0.46	0.43	0.15	**0.86**
Fatigue3	0.35	0.47	0.45	0.10	**0.87**
Fatigue4	0.33	0.55	0.57	0.14	**0.77**
Fatigue5	0.35	0.39	0.44	0.16	**0.79**

Note: The numbers in bold represent item loadings on their respective assigned latent variables