Social Media Overload, Exhaustion, and Use Discontinuance: Examining the Effects of Information Overload, System Feature Overload, and Social Overload

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Abstract

While users' discontinuance of use has posed a challenge for social media in recent years, there is a paucity of knowledge on the relationships between different dimensions of overload and how overload adversely affects users' social media discontinuance behaviors. To address this knowledge gap, this study employed the stressor–strain–outcome (SSO) framework to explain social media discontinuance behaviors from an overload perspective. It also conceptualized social media overload as a multidimensional construct consisting of system feature overload, information overload, and social overload. The proposed research model was empirically validated via 412

valid questionnaire responses collected from Facebook users. Our results indicated that the three types of overload are interconnected through system feature overload. System feature overload, information overload, and social overload engender user exhaustion, which in turn leads to users' discontinued usage of social media. This study extends current technostress research by demonstrating the value of the SSO perspective in explaining users' social media discontinuance.

1. Introduction

Facebook is probably one of the most successful information systems (IS) applications offered to users. Although its users' passion remains strong, and the number of its global monthly active users keeps growing, Facebook is also facing the challenge of user discontinuance in the competitive environment. According to the report from Pew Research Centre (2018), 26% of Facebook users have deleted the Facebook app from their mobile phones in 2017.

IS user behaviors, such as IS use and continuance, have been extensively studied in the IS field in recent years. This line of research helps explain why individuals use particular systems. Recently, IS discontinuance has attracted the attention of scholars, leading to research examining why individuals might stop using specific systems. A few scholars have examined the drivers of discontinued IS usage intentions for social media users from various perspectives. For instance, social cognitive theory has been applied to illustrate discontinuous usage intentions on Facebook by testing the relationships among self-observation, judgmental process and behaviors (Turel, 2015). Social support theory has also been used to examine social media discontinuance by investigating the negative direct impact of social overload on social media discontinuance intentions (Maier et al., 2015a). Discontinuance intentions refers to a user's intention to change behavioral patterns by reducing usage intensity or even taking the radical step of suspending their behaviors (Maier et al., 2015a). Noticeably, whilst existing studies focus on discontinuous intentions as the outcome, discontinuous usage behaviors — referring to the next stage of discontinuous intentions in the IS lifecycle — have received little attention to date (Furneaux & Wade, 2011; Maier et al., 2015b). Specifically, there is limited knowledge concerning the psychological mechanisms underlying social media discontinuance behaviors. Uncovering these mechanisms is important because IS developers are keen to understand why users abandon their systems.

One potential reason for IS use discontinuance is exhaustion from overload (users' weariness from the demands of their IS usage), which can manifest in different forms. First, to meet users' needs or profitability goals, social media is constantly adding or updating features. Individual users can find it hard to adapt to new functions or

interfaces, and thus they perceive a *system feature overload* (Zhang et al., 2016). Second, individual users spend considerable time processing information on social media, which includes irrelevant information like gossip, spam, rumors and forced content. This in turn can increase users' *information overload* (Zhang et al., 2016). Third, the number of individual users' social media friends increases with the popularity of social media. Individual users have to interact with their contacts on social media to show that they care about them, which can involve reading their posts, answering their questions or helping with their problems. Users need to give a lot of social support to their contacts on social media, but offering them too much social support might lead to *social overload* (Maier et al., 2015a). Maier et al. (2015a) found that some individuals experience social overload in their social media use, and they argued that social overload is an explanation for social media discontinuance.

However, studies on the different dimensions of overload remain scarce. Little is known on how the different types of overload (such as system feature overload, information overload, and social overload) as stressors lead to users' social media discontinuance behaviors. Specifically, the ways by which the different dimensions of overload are interconnected remain unaddressed. This work offers an important extension of current research in the form of a detailed theoretical understanding of the psychological mechanisms underlying social media discontinuance.

To address the above gap in research, this study applies the *stressor–strain–outcome* (SSO) perspective to investigate the relationships between the different dimensions of social media overload and how different types of overload can relate to discontinued Facebook use. More specifically, this study extends Maier et al.'s (2015a) study by investigating a set of distinct types of overload (system feature, information and social overload) instead of only social overload as stressors. Furthermore, this study extends Zhang et al.'s (2016) study by examining the relationships between different compositions of overload, which provides a deeper understanding of the role of overload in explaining discontinuance usage. The proposed research model was empirically validated in the context of Facebook use using 412 valid responses from Facebook users collected via a survey questionnaire. The findings yield two key contributions. The first contribution applies to the compositions of system feature, information and social overload and the empirical validation of their relationships. The second contribution is the understanding of social media discontinuance from overload perspective enabled by the SSO framework.

The manuscript consists of eight sections, inclusive of the introduction. The next section reviews extant literature on IS discontinuance, the SSO framework, social media exhaustion, and overload. Afterwards, this study constructs the research model, which hypothesizes the effects of social media exhaustion, enabled by overload, on discontinuous usage behaviors. Then, the methodology is introduced, followed by the report of the results from the data analysis. After discussing the research findings, the paper highlights the implications for theory and practice, as well as the limitations of

this research and proposing meaningful avenues for future studies. Finally, the conclusions of this study are presented.

2. Literature review

2.1. IS discontinuance

IS discontinuance has been widely studied in IS literature as a post-adoption behavior (Shen, Li, & Sun, 2018), and it refers to a user-level decision to abandon or reduce the use of an IS (Parthasarathy & Bhattacherjee, 1998). Discontinuance and continuance have often been considered the two sides of IS use (Turel, Connelly, & Fisk, 2013). More recent research has theorized that IS discontinuance is a distinct behavior, not simply the opposite of IS continuance (Cao & Sun, 2018; Maier et al., 2015b; Shen et al., 2018). Past studies mainly conducted IS discontinuance research from the perspectives of individual users and organizations. At the level of individual users, Maier et al. (2015b) reported that the stress creators (e.g., complexity, uncertainty, and invasion) of social networking services (SNSs) and SNS exhaustion induce individuals' discontinuous usage intentions, whereas switching-stress creators and switching-exhaustion lower those intentions. Shen et al. (2018) explicated that neutral disconfirmation shows positive impacts on attitudinal ambivalence and neutral satisfaction, both of which in turn drive intermittent discontinuous usage intentions. Through empirical research in habituated IS, Turel (2015) found that user satisfaction decreases their discontinuance intentions via habit cultivation, while users' feelings of guilt and self-efficacy to discontinue increase both discontinuous usage intentions and behaviors. At the level of organizations, Furneaux and Wade (2010) attested to the essential role of system supportability, system suitability and system performance in reducing organizational discontinuous usage intentions by proposing a model of IS discontinuance. Furthermore, through surveying senior IS decision makers in organizations, Furneaux and Wade (2011) found that system capability shortcomings contribute to organizational intentions to discontinue the use of an IS, while system support availability and technical integration can reduce the discontinuance intentions.

2.2. Social media exhaustion

The phenomenon of exhaustion is universal in the mobile Internet era (Maier et al., 2015a). Exhaustion can be described as a user's weariness of activities owing to stress and/or overwork (Maier et al., 2015a). In the context of social media, users experience exhaustion when they are overwhelmed with different activities related to the usage of social media, such as interacting with many contacts and friends and reading and/or commenting on numerous fragmented contents. Social media exhaustion is a self-evaluated and subjective perception of tiredness from social media use. For instance, some social media users may find it hard to handle numerous social interactions in

social media and thus feel tired of using it. Social media exhaustion reflects the negative perceptions of individuals on social media like perceived stress (Bright, Kleiser, & Grau, 2015), anxiety (Dhir et al., 2018), tiredness (Zhang et al., 2016), boredom (Ravindran, Yeow Kuan, & Hoe Lian, 2014) and depression (Dhir et al., 2018).

Both the antecedents and consequences of social media exhaustion have been examined in the IS literature. Ravindran et al. (2014) identified five categories of antecedents of social media exhaustion, namely, platform-, content-, life cycle-, social dynamics-, and immersion-related antecedents, and found that social media exhaustion leads to suspended activities related to social media use, such as having short breaks in social media use or controlled social media use. Bright et al. (2015) proposed four precursors of social media exhaustion, including privacy concerns, social media confidence, social media helpfulness and social media self-efficacy. Dhir et al. (2018) indicated that fear of missing out and compulsive SNS use can result in social media exhaustion, which in turn drives anxiety and depression. Bright and Logan (2018) confirmed again the strong impact of fear of missing out on social media exhaustion. Whilst past research has analyzed the antecedents and impacts of perceived social media exhaustion, the impact of social media exhaustion on exit mechanisms in social media has received limited attention form researchers.

2.3. Overload

Overload describes an individual's subjective perception and evaluation of the number of information, people or objects that are beyond one's capability to process (Saegert, 1973). Overload is regarded as the crucial factor that leads to negative outcomes due to the usage of information and communication technologies (ICTs) (Lee, Son, & Kim, 2016). In the Internet era, organizations and individuals increasingly rely on technology devices and applications for communication and collaboration. Varieties of devices and applications can increase an individual's perceived overload (Yin et al., 2018).

In the IS literature, overload has been applied to explain the perception of various objects that exceed individuals' capability to process like system feature overload (Grandhi, Jones, & Hiltz, 2005), information overload (Zhang et al., 2016), social overload (Maier et al., 2015a), work overload (Ahuja et al., 2007) and communication overload (Lee et al., 2016). A summary of the prior studies on overload in the IS research is provided in Table 1.

Table 1. A summary of prior studies on overload in IS research

Ahuja et al., 2007	Work	Turnover model	Work overload	- Work–family conflict - Work exhaustion

Soto-Acosta et al., 2014	Shopping websites	Organizational perspective	Information overload	- Perceived risk of the website - Purchase intention
Maier et al., 2015a	SNS	Social support theory	Social overload	- SNS exhaustion - SNS satisfaction - SNS discontinuous usage intention
Zhang et al., 2016	SNS	- Perceived overload - Social network fatigue	- System feature overload - Information overload - Communication overload	- Social network fatigue - Dissatisfaction - Discontinuous usage intention
Lee, Son, & Kim, 2016	SNS	- Person–environment fit model - Transactional theory of stress and coping	- System feature overload - Information overload - Communication overload	SNS fatigue
Swar et al., 2017	Healthcare information search on the Internet	- Information processing theory - Theory of planned behavior	Information overload	- Negative affect - Trait anxiety - Depressive symptoms - Trait anger
Saunders et al., 2017	Mobile ICTs	Input–processing–output model	- Memories of past cognitive overload - Memories of past emotional overload	- Communication overload - Feature overload - Information overload
Yin et al., 2018	Mobile ICTs	Coping model of user adaptation	- Information overload - Interruption overload	Reduced job satisfaction
Chen, 2018	Websites	None	Information overload	Low-performance website structure
Salo et al., 2019	SNS	Technostress	A combination of information, technology and social overload (without an examination of their separate effects)	- Concentration problems - Sleep problems

Overload has also been reported to be highly associated with users' psychological changes in online contexts like online shopping (Soto-Acosta et al., 2014), SNS (Lee et al., 2016), and online information searches (Swar, Hameed, & Reychav, 2017). Overload thus serves as a core antecedent of users' internal psychological processing in online contexts. However, little is known about how overload leads to users' discontinuous usage behaviors through inducing psychological changes. To fill in the research gap, this study focuses on information overload, system feature overload and

social overload, which are prevalent in the context of social media (Lee et al., 2016; Maier et al., 2015a; Salo, Pirkkalainen, & Koskelainen, 2019).

System feature overload refers to social media users' perceptions of technological features, and it can be defined as the perception that the features offered by social media exceed users' demands (Thompson, Hamilton, & Rust, 2005). System feature overload captures device and application proliferation that induces cognitive and/or physical burdens on individuals owing to the use of diverse system features (Grandhi et al., 2005). System feature overload has been studied in relation to personal or daily uses of IS by examining IS consumerization and information technology devices adopted by users for daily purposes (Yun, Kettinger, & Lee, 2012; Zhang et al., 2016). In the context of social media, individuals use Facebook in multi-faceted ways, and several features are offered for different purposes, which could lead to system feature overload (Zhang et al., 2016).

Information overload arises when the information individuals assess exceeds their ability to accommodate and handle it (Farhoomand & Drury, 2002). The concept of information overload compares ones' personal information processing ability with information processing demands. In the era of mobile Internet, users are forced to handle too much information. Jacoby et al.'s (1974) study revealed that user performance increases first and then decreases as the amount of information received increases (Jacoby et al., 1974). More recently, information overload has been studied in various contexts like SNS (Zhang et al., 2016), online shopping (Soto-Acosta et al., 2014), online healthcare information searches (Swar et al., 2017) and mobile technologies (Yin et al., 2018).

Social overload was originally proposed by McCarthy and Saegert (1978) in a sociological context to describe the phenomenon of real-world crowded populations. They found that when the demands of handling social connections and contacts exceed people's interaction ability, they will perceive social overload (McCarthy & Saegert, 1978). The concept of social overload also applies to social media since users need to spend time keeping in touch with other users. For instance, social overload has been extended to describe social media users' feeling of providing excessive social support to other users (Maier et al., 2015a).

2.4. Stressor–strain–outcome

Developed by Koeske and Koeske (1993), the SSO framework was originally applied in psychology research to depict the stress process. Based on the framework, stressors exert impacts on users' strain, which in turn leads to their behavioral outcomes. Specifically, the term stressor refers to the environmental factors that induce stress and influence the psychological states of individuals. Strain refers to the psychological outcomes caused by stressors. The outcome can be conceptualized as the response to strain, and avoidance and approach behaviors are usually regarded as typical outcomes (Nawaz et al., 2018). The underlying principles of the SSO framework are in line with

the majority of technostress research (c.f. Fischer & Riedl, 2017; Tarafdar et al., 2019), which employs similar ideas and concepts based on the transactional view of stress (Lazarus, 1966; Lazarus & Folkman, 1984).

The SSO framework has been utilized extensively in various contexts to explore stress-related conditions and the corresponding outcomes in IS use situations (Ayyagari, Grover, & Purvis, 2011; Dhir et al., 2018; Ding, Zhang, & Wang, 2017; Ragu-Nathan et al., 2008). For instance, in the context of workplace ICTs, scholars have employed SSO to investigate users' job performance. Technostress creators (stressors), like techno-overload, techno-insecurity and techno-invasion, reduced job satisfaction (strain), which in turn leads to users' reduced organizational and continuance commitment (outcome) (Ragu-Nathan et al., 2008).

In the context of social media, the fear of missing out, excessive use of social media, and overload are the stressors affecting individuals' emotions and attitudes (strain, such as exhaustion, regret, or dissatisfaction) towards social media, which in turn lead to various adverse outcomes, such as decreased job or academic performance and discontinuous social media usage intentions (Cao et al., 2018; Dhir et al., 2018; Nawaz et al., 2018; Yu et al., 2018). In the online shopping context, overload (e.g. information overload) has been found to be the stressor inducing users' negative emotions (strain), such as website anxiety, which results in attitude changes (outcomes), such as subjective states towards purchase decisions (Ding, Zhang, & Wang, 2017).

Based on the prior literature, the SSO framework was selected as the basic theoretical framework in this study to explore individuals' discontinuous usage of social media. As shown in the literature, the SSO framework fits user behavior research from the level of the individual user perspective. Although the SSO framework has been applied to investigate both IS usage and discontinuous usage intentions, there has been little research exploring discontinuous usage behaviors using the SSO framework (apart from the work of Maier et al., 2015b, and Furneaux & Wade, 2011). Scholars have suggested that the SSO framework is also suitable for examining the antecedents of negative behavioral outcomes (Nawaz et al., 2018; Zhang et al., 2016). Furthermore, utilizing the SSO framework can be beneficial because it explicitly distinguishes general psychological strain and other behavioral outcomes, but not bundles various psychological and behavioral outcomes together under the concept of strain. Considering the essential roles of technological features and internal psychological processes in affecting user behaviors, SSO therefore provides a minimal framework for examining the negative impact of social media stressors on user psychology and discontinuous usage behaviors.

3. Hypotheses formulation and research model development

Following the SSO framework and the literature reviewed above, the research hypotheses of this paper are structured and depicted in Figure 1. Specifically, overload is set as the stressor owing to its significant role in causing negative emotions (Lee et

al., 2016; Maier et al., 2015a) and is decomposed with three different overloads, including information overload, system feature overload and social overload (Zhang et al., 2016). Social media exhaustion is set as the strain because it can serve as the antecedent of behavioral changes (Ravindran et al., 2014; Zhang et al., 2016) and the outcomes of overload (Lee et al., 2016; Zhang et al., 2016). Discontinuous usage behavior is set as the outcome because it is the common behavioral response caused by exhaustion (Moore, 2000). This study therefore examines whether information overload, system feature overload and social overload would lead to discontinuous usage behaviors by inducing social media exhaustion. Even though Maier et al. (2015a) and Zhang et al. (2016) sought to comprehend how overload manifests in social media discontinuance, the interdependences between the different sorts of overloads have been largely ignored. Thus, this study also examined the relationships between the three different overloads in order to get a deeper understanding of overload in social media use. Prior research has indicated that individuals' demographic characteristics may have an impact on their online behaviors. Thus, demographic characteristics are incorporated as control variables into our research model.

3.1. Interactions among stressors

Social media providers frequently introduce or update their system features to enhance the user experience. Pace of change exerts a positive impact on perceived system feature overload in social media (Lee et al., 2016). Meanwhile, updating social media system features may also require users to constantly obtain new information in order to learn how to use them. For instance, users may need to read technical manuals, terms of service or privacy policies to adapt to these system features. Furthermore, users can get used to information being presented and organized in certain ways. System feature updates change the appearance of the user interface to which the user needs to adjust. They may find that the information is badly organized, and they need to spend time considering what information is relevant to them and what is not (Cenfetelli & Schwarz, 2011). This can lead to information overload. Similarly, the speed and convenience of communication via social media could have been optimized in the updated system features, which encourages users to utilize social media to stay connected. They may then be exposed to increasing numbers of posts and messages in their social network. This may lead to an increase in users' social load. Therefore, system feature overload in social media positively relates to information overload and social overload. Thus, the following hypotheses are proposed.

H1a: *System feature overload is positively associated with information overload.*
H1b: *System feature overload is positively associated with social overload.*

3.2. Stressors and strain

Frequently updated system features have become one of the external stressors for users in the context of social media. For instance, Facebook updates its system features and the look of the user interface on an almost weekly basis (AndroidAPKsFree, 2019). Users might need to spend time and direct more attention to using Facebook in order to adjust to these frequent changes. This is especially true when the changes to Facebook's design do not match the preferences of the users (Ayyagari et al., 2011). For example, the users may have been accustomed to a certain look and find changes to the system overwhelming. Even if the updated functions and features meet user needs, these functions and features should be easier for users to utilize than the previous versions. Otherwise, users may also experience technical overload and thereby feel social media exhaustion (Lee et al., 2016). Unwanted updates to the user interface will contribute to social media exhaustion (Ayyagari et al., 2011; Ravindran et al., 2014). System feature overload has been proven to be a stressor for users in the context of social network services (Lee et al., 2016). Based on the above discussion, the following hypothesis is suggested.

H2a: *System feature overload is positively associated with social media exhaustion.*

The speed of information production and dissemination is growing rapidly with the development of mobile communication networks (i.e. 4G and 5G). Continuously growing information transmitted via social media can quickly meet a user's cognitive threshold, exhaust their ability to handle new information and thus lead to tiredness (Karr-Wisniewski & Lu, 2010). Accepting external information that is trivial or irrelevant to a user's preferences can also cause information overload. When a user processes information that aligns with their interests, the probability that the user will perceive an information overload is low (Ayyagari et al., 2011). In such a situation, users also experience less exhaustion. Conversely, when users are exposed to unwanted and/or uninteresting information constantly, they experience psychological exhaustion. Moreover, even if the information is of interest to the user, the information might not be logically presented in a way that the user can easily make sense of it, which creates cognitive overload for the users. Overwhelming and frequently changing social media content can make users perceive an information overload and thus feel overwhelmed (Cherubini et al., 2010). Furthermore, previous research has found that information overload is associated with social media exhaustion (Bright et al., 2015). Thus, the following hypothesis is put forward.

H2b: *Information overload is positively associated with social media exhaustion.*

Early sociological studies have confirmed that social overload caused by a large number of unnecessary social needs can lead to negative consequences such as psychological disturbance (Baum & Davis, 1980; Evans et al., 1989). On social media, like Facebook, excessive social interactions compel users to constantly respond to their social media friends, which requires users to commit considerable amounts of effort to doing so (Ravindran et al., 2014). Once users receive a notification, they may think about all the time and energy that they need to put into it, leaving them with a sense of exhaustion. Users could even start fearing the notifications that they constantly receive,

which results in negative emotions or stress. Meanwhile, many users maintain a large number of social relationships that exceed their cognitive thresholds (Walther et al., 2008; Zhang et al., 2016). When the social relationship maintained reaches a threshold, the extra-social relationship will lead to a decline in psychological well-being (Kim & Lee, 2011; Zhang et al., 2016). Recent studies have also alleged that social overload exerts positive impacts on social exhaustion and stress (Cao & Sun, 2018; Salo et al., 2019; Zhang et al., 2016). Thus, the following hypothesis is proposed.

H2c: *Social overload is positively associated with social media exhaustion.*

3.3. Strain and outcomes

The social media environment contains stressors that induce users' internal strain, which eventually leads to continuous or discontinuous behavioral outcomes towards social media. Research from psychology has proven that psychological exhaustion can induce low participation and performance (Horsboel et al., 2015; Pires et al., 2018), increase the tendency to change behaviors (Podsakoff et al., 2003), and exert negative impacts on individuals' continuous behaviors (Cao & Sun, 2018). In the context of social media, exhaustion can also reduce users' willingness to use it (Luqman et al., 2017). Depending on the level of exhaustion, users may suspend their social media participation or even withdraw from social media entirely (Ravindran et al., 2014). When the feeling of exhaustion exceeds the threshold of user tolerance, users may terminate their social media accounts (Dhir et al., 2019). Meanwhile, feelings of stress and exhaustion, which are highly correlated with social exhaustion, will also lead to discontinuance (Maier et al., 2015b). Thus, the following hypothesis is proposed.

H3: *Social media exhaustion is positively associated with discontinuous usage behaviors on social media.*

Users' demographic characteristics, such as gender, age, and social media use experience and frequency, affect their social media usage behaviors (Cao & Sun, 2018; Soror et al., 2015; Turel & Qahri-Saremi, 2016). Specifically, due to gender differences in social media engagement (McAndrew & Jeong, 2012), there may be differences in men's and women's reactions to the negative effects of social media usage. Age can affect the perceived negative outcomes induced by IT usage (Ragu-Nathan et al., 2008) and serves as a critical demographic variable in exploring users' responses to social media usage (Agarwal et al., 2009). Facebook experience and the frequency of using Facebook can impact users' dependence on social media and may affect their discontinuous usage behaviors (Maier et al., 2015a). Thus, these demographic variables were included as control variables in the model estimation. The research framework is depicted in Figure 1.
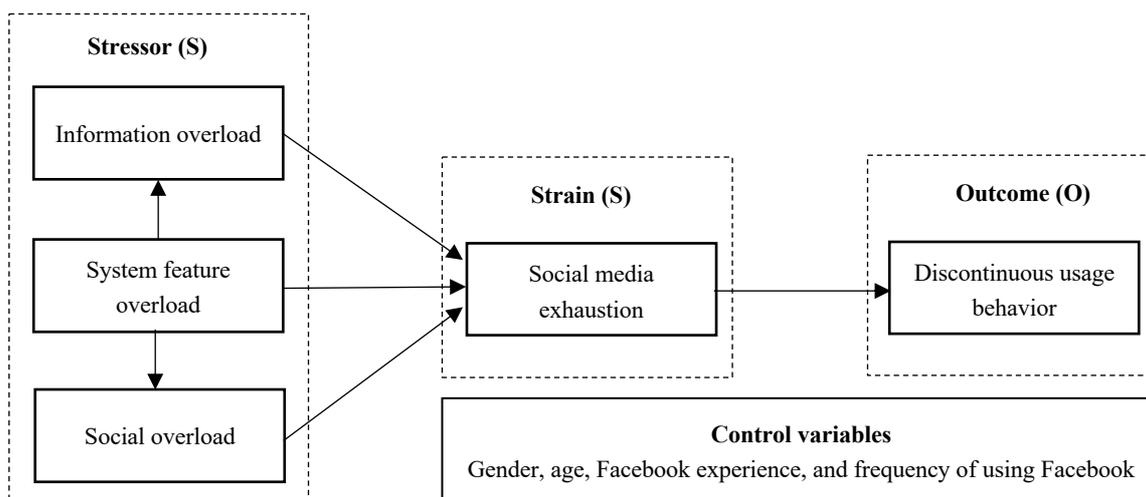
Figure 1. Research model.

4. Research Methodology

4.1. Construct measurement

This study employs a field survey for data collection. The measurement items for the constructs in the proposed research model are adapted from the existing literature to fit the Facebook context. The measures for system feature overload and information overload are adapted from the work of Zhang et al. (2016). The measurements for social overload and social media exhaustion are taken from the work of Maier et al. (2015a). The construct of discontinuous usage behavior is measured with items taken from the work of Maier et al. (2015b). Each construct item was measured using a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). The list of measurement items for the constructs is presented in Appendix A.

4.2. Sample and data collection

A pre-test of the questionnaire was conducted among 15 doctoral candidates who had experience using Facebook to ascertain the reliability and validity of the proposed instrument. An online survey was then conducted via the online crowdsourcing platform Amazon's Mechanical Turk (MTurk). MTurk is a new and innovative way to recruit research participants, and it has been widely adopted in various research fields, like IS, marketing, accounting and psychology.

Through the use of MTurk, it was specified that only Facebook users could participate in the research and each respondent could only fill in the online questionnaire once. A moderate amount of compensation ($0.20 per respondent) was offered to the research participants as higher payment does not ensure data quality and lower pay might have prolonged our data collection period. The participants were also

informed of the importance of paying attention when answering the online questionnaire in order to receive payment for it.

On the front page of the survey questionnaire, the respondents were informed of the importance of this study and asked to sign a consent form before proceeding to the questionnaire. The participants were free to withdraw from the online survey at any time. The survey respondents were asked to assess their Facebook use based on their past experiences of using Facebook. A total of 489 responses were collected in one week. After deleting 77 responses due to their unreliability (such as those who completed the survey in a very short period of time), 412 of the respondents were used as the valid sample for the data analysis. As suggested in previous studies, a research should obtain five to ten subjects per item, up to a total of about 300 respondents (Tinsley & Tinsley, 1987; Kass & Tinsley, 1979). This study has 20 measurement items. Furthermore, previous studies on (dis)continuance (e.g., Gan & Li, 2018; Shen et al., 2018), Facebook usage (e.g., Beyens et al., 2016; Malik et al., 2016), and (dis)continuance of Facebook usage (e.g., Luqman et al., 2017) have utilized similar sample sizes, ranging (for example) from 290 to 430. Therefore, the sample size in our study is appropriate.

A demographic breakdown of the sample is provided in Appendix B. As Appendix B shows, the participants included 209 males (50.73% of the sample) and 203 females (49.27%). Most participants reported using two social network sites (n = 119; 28.88%), whereas only 22 (5.34%) reporting using more than five social network sites. In total, 205 of the participants (49.76%) reported having more than eight years of Facebook experience. Most of the participants (n = 317; 76.94%) reported using Facebook less fewer than two hours every day. Also worthy of note is that most participants reported using Facebook several times per day (n = 253; 61.41%).

5. Data analysis and results

5.1. Measurement model

The structural equation modelling technique was used to test the research framework. SmartPLS 3.0 (Gefen, Rigdon, & Straub, 2011) was employed to test the reliability and validity of each latent variable measurement as well as the paths between the constructs and their significance level.

Measurement reliability refers to the consistency and stability of a tested measurement (Cook, Campbell, & Day, 1979), which can be assessed by checking its Cronbach's alpha (Cronbach's α), composite reliability (CR) and average variance extracted (AVE) (Fornell & Larcker, 1981). Table 2 shows that the CR values for all of the constructs were greater than 0.9, and all AVE figures were above 0.7, meeting the recommended threshold values of 0.7 and 0.5, respectively (Fornell & Bookstein, 1982; Fornell & Larcker, 1981). The test results imply that the related measurements have acceptable reliability (Hinton, McMurray, & Brownlow, 2014; Moss *et al.*, 1998).

As shown in Table 3, the item loadings for all construct items are above 0.7, indicating that these constructs have good convergent validity.

Guided by Barclay, Higgins and Thompson (1995), the discriminant validity of all latent constructs was evaluated. As shown in Table 2, the discriminant validity holds since the square root of the AVE of each construct surpassed its correlation with any other constructs. This implies that each construct possesses more distinctive variance as compared to its shared variance with other constructs (Fornell & Larcker, 1981). Table 3 shows that all items loaded with higher respective constructs than the others, which offers additional evidence for discriminant validity. Taken together with the preceding results, our measurement model thus exhibits sufficient convergent as well as discriminant validity.

Given that the questionnaires were collected in a cross-sectional survey, a common method bias (CMB) problem may exist. Harman's one-factor test, a widely applied method in evaluating CMB, was conducted to analyze this problem (Podsakoff et al., 2003). The variance explained by the first primary component was 39.05%, showing that CMB is not a possible contaminant of the results. Meanwhile, the variance inflation factors (VIF) for all focal constructs in our study fell below 10, eliminating the potential multicollinearity issue (Neter et al., 1996).

Table 2. Variable reliability, correlations and AVE

SFO	0.816	0.890	0.729	**0.854**				
IO	0.868	0.911	0.720	0.624	**0.849**			
SO	0.930	0.950	0.826	0.466	0.431	**0.909**		
SME	0.958	0.969	0.888	0.483	0.566	0.387	**0.942**	
DUB	0.922	0.943	0.769	0.236	0.285	0.170	0.513	**0.877**

Notes: System feature overload: SFO; Information overload: IO; Social overload: SO; Social media exhaustion: SME; Discontinuous usage behavior: DUB; Composite reliability: CR; Average variance extracted: AVE.

Table 3. Loading and cross-loading matrix

	SFO	IO	SO	SME	DUB
SFO1	**0.882**	0.610	0.366	0.483	0.240
SFO2	**0.809**	0.472	0.384	0.348	0.132
SFO3	**0.869**	0.497	0.455	0.388	0.217
IO1	0.585	**0.901**	0.373	0.491	0.217
IO2	0.570	**0.894**	0.446	0.492	0.202
IO3	0.585	**0.883**	0.469	0.551	0.314
IO4	0.337	**0.699**	0.106	0.364	0.229
SO1	0.410	0.377	**0.911**	0.315	0.162
SO2	0.435	0.423	**0.932**	0.396	0.181
SO3	0.438	0.375	**0.930**	0.377	0.166
SO4	0.411	0.391	**0.861**	0.305	0.101
SME1	0.477	0.553	0.370	**0.933**	0.441
SME2	0.477	0.533	0.369	**0.938**	0.434
SME3	0.436	0.525	0.353	**0.946**	0.514
SME4	0.434	0.523	0.368	**0.952**	0.539
DUB1	0.223	0.316	0.084	0.424	**0.729**
DUB2	0.183	0.224	0.145	0.456	**0.896**
DUB3	0.214	0.259	0.161	0.465	**0.929**
DUB4	0.202	0.230	0.125	0.444	**0.925**
DUB5	0.212	0.222	0.226	0.454	**0.890**

Notes: System feature overload: SFO; Information overload: IO; Social overload: SO; Social media exhaustion: SME; Discontinuous usage behavior: DUB.

5.2. Structural model

Firstly, this study examined the interactions between different stressors. Consistent with our expectations, system feature overload was positively associated with information overload ($\beta = 0.622$; $p < 0.001$) and social overload ($\beta = 0.468$; $p < 0.001$).

Then, this study analyzed the impact of stressors on the users' strain (i.e. internal psychological outcomes). The results are shown in Figure 2. Consistent with our expectations, system feature overload ($\beta = 0.166$; $p < 0.01$), information overload ($\beta = 0.405$; $p < 0.001$) and social overload ($\beta = 0.132$; $p < 0.05$) were positively associated with social media exhaustion. The variance explained by social media exhaustion was 35.5%.

Next, this study tested whether the users' strain had an effect on their behavioral outcomes. Social media exhaustion was positively associated with discontinuous usage behaviors ($\beta = 0.469$; $p < 0.001$). The variance explained by discontinuous usage behaviors was 34.7%.

Finally, the test results of the control variables indicated that participants' age ($\beta = -0.179$; $p < 0.001$), Facebook experience ($\beta = -0.135$, $p < 0.01$) and frequency of using

Facebook (β = 0.219, p < 0.001) showed significant effects on discontinuous usage behaviors. Conversely, participants' gender (β = 0.068; p = 0.100) showed an insignificant effect on discontinuous usage behaviors.
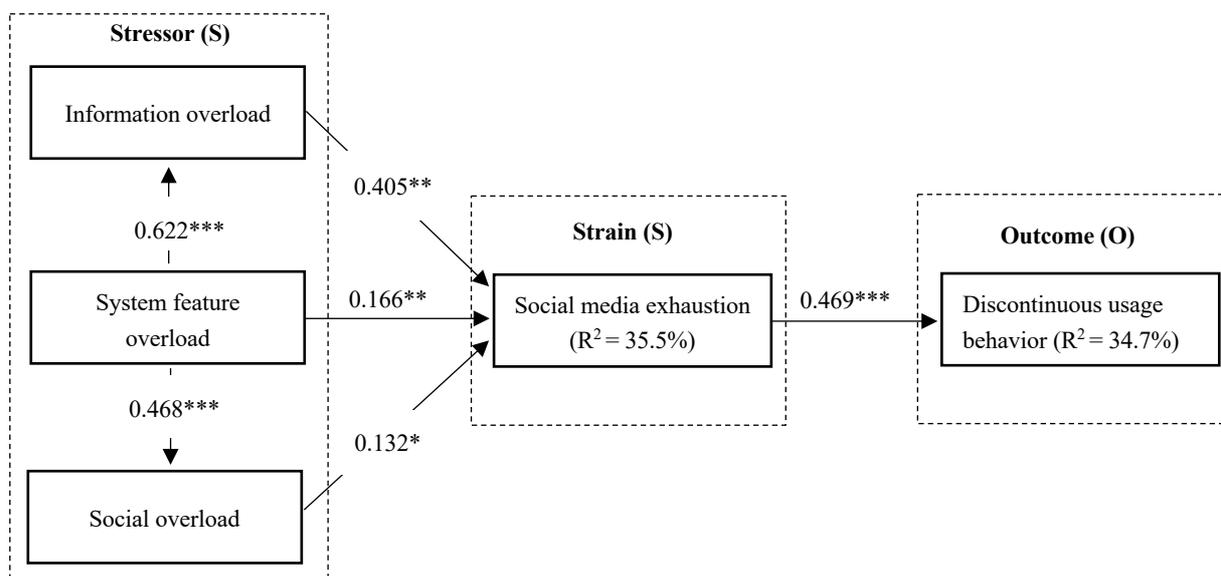

Figure 2. Research model with results. (*: P< 0.05, **: P< 0.01, ***: P<0.001)

5.3. Post hoc analysis

The SSO framework emphasizes the mediating role of strain on the relationship between stressors and outcomes (Koeske & Koeske, 1993; Um & Harrison, 1998). Adhering to the guidelines prescribed by SmartPLS (2019), mediation analysis was performed to ascertain whether information overload, system feature overload and social overload are fully or partially mediated by social media exhaustion. Table 4 shows the results of our mediation analysis. Specific indirect effects for all independent variables (IVs) are significant, which in turn affirms the mediating role of social media exhaustion. Furthermore, as pointed out by SmartPLS (2019), if the direct effect between an IV and dependent variables (DV) is non-significant, the mediating effect can be judged as a full mediation. Otherwise, it should be regarded as a partial mediation. Information overload (β = 0.002, p = 0.975), system feature overload (β = 0.001, p = 0.978) and social overload (β = -0.038, p = 0.486) had an insignificant direct effect on discontinuous usage behaviors. Consequently, our results demonstrate that social media exhaustion fully mediates the impact of information overload, system feature overload and social overload on discontinuous usage behaviors.

Table 4. Results of the mediation analysis

IO	IO → SME → DU	0.002 n.s.	0.194***	Full mediation
SFO	SFO → SME → DU	0.001 n.s.	0.082**	Full mediation
SO	SO → SME → DU	-0.038 n.s.	0.065*	Full mediation

Notes: *: P < 0.05, **: P < 0.01, ***: P < 0.001, n.s.: not significant

System feature overload: SFO; Information overload: IO; Social overload: SO; Social media exhaustion: SME; Discontinuous usage behavior: DUB; Composite reliability: CR; Average variance extracted: AVE.

6. Discussions

This research applied the SSO framework to understand the use discontinuance of social media and empirically examined the theoretical relationships between system feature, information and social overload with regard to exhaustion and discontinuous usage behaviors.

System feature overload positively associates with information overload and social overload, supporting hypotheses H1a and H1b. These findings extend prior research that has not yet examined the relationships between different types of overloads. The findings highlight how system feature updates influence individuals' evaluations of the demands related to social interactions and information flows on social media. When users feel overloaded by system features (i.e. introducing or updating new system features on social media), they will likely find it difficult to process all the information that is distributed via social media. They might also feel like there is simply too much information transferred. Consequently, their capacity to handle the information can be exceeded, resulting in information overload. Similarly, they may find that there is too much social interaction and social information provided, which can lead to social overload. As such, these insights extend the understanding provided by previous studies (e.g. Maier et al., 2015a; Zhang et al., 2016).

System feature overload positively associates with social media exhaustion, lending support to hypothesis H2a. Consistent with previous studies (Ayyagari et al., 2011; Ravindran et al., 2014; Zhang et al., 2016), technical updates can create cognitive pressure, stress and costs for users, which in turn increase their psychosocial risks. Our findings serve as robust empirical proof for the phenomenon of "feature exhaustion" (Thompson et al., 2005, p. 431).

Information overload positively associates with social media exhaustion, thereby corroborating hypothesis H2b. This finding is in line with previous studies (e.g. Swar et al., 2017; Zhang et al., 2016). Social media has shifted personal communication from face-to-face to online. Users need to process messages sent by friends, third-party advertising and gossip news via social media. If the information a user encounters exceeds their processing abilities, the feeling of social media exhaustion increases.

Social overload is positively associated with social media exhaustion, supporting hypothesis H2c. This is consistent with Maier et al. (2015a) and Zhang et al. (2016) but inconsistent with the results of Shokouhyar, Siadat and Razavi (2018), who found that social overload insignificantly associated with social media exhaustion. The difference in the results can be attributed to the selection of the social media platform. In our study, Facebook is used as a general social media platform, whereas Shokouhyar et al. (2018) used Instagram, which is a photo-sharing social media platform. Facebook enables the sharing of different types of information, including messages and pictures, and is therefore less likely to cause social exhaustion for users. This may point to a need to interpret social overload in combination with the features of individual social media platforms. Based on testing the above-mentioned hypotheses, our findings offer robust evidence to show that overload does emerge as a stressor in reduced user psychological well-being.

Furthermore, our findings stand in contrast to the results of Zhang et al. (2016), who reported that social overload, of the three types of overload, shows the greatest effect on social media exhaustion among Chinese users. There are two possible reasons that may explain this difference. First, Zhang et al. (2016) focused on another social media service, Qzone, which differs from Facebook. Qzone is an online platform that is mainly for users to post updated moments, while Facebook offers both the function of chatting and sharing moments. Facebook users need to process a large amount of information sent by other users in the form of text, images, movies, documents and voice clips. Information overload therefore shows the greatest effect on social media exhaustion in our research context. Second, most of the respondents in Zhang et al.'s (2016) study were 24 years of age and under, while the majority of the participants in our study were over 25 years old. Younger users may be more inclined to communicate via social media (Cao & Sun, 2018) and therefore more likely to tire of it.

Social media exhaustion was also found to associate with users' discontinuous usage behaviors, thereby corroborating hypothesis H3. In the previous literature, social media exhaustion was argued to associate with IS discontinuance intentions (Cao & Sun, 2018; Luqman et al., 2017). Our research has confirmed that negative psychological strain can result in negative behavioral outcomes, which is the next stage of IS discontinuance intentions in the IS life cycle (Furneaux & Wade, 2011; Maier et al., 2015b). Users will avoid psychological exhaustion through engaging in behavioral changes. Furthermore, based on the mediation analysis, social media exhaustion plays a mediating role in the negative effect of overload on users' discontinuous usage behaviors. This again reinforces the mediating role of strain between stressors and outcomes (Peng & Kim, 2014).

Overall, by integrating different types of overload in one unified analysis, several new findings were obtained that diverged from those of prior studies. This may suggest that the relationships among stressors, strain and behavioral outcomes should be explained in specific contexts, and specific relationships between the three types of

overload need to be accounted for. Meanwhile, social media exhaustion can act as a mediator for the effects of overload on discontinuous usage behaviors.

7. Implications and limitations

7.1. Implications

This study's findings offer novel insights into the role of social media exhaustion in the relationship between overload and discontinuous usage behaviors in the context of social media. This study makes two key theoretical contributions.

Firstly, this study contributes to technostress research with regard to the composition of system feature, information and social overload and the empirical validation of their relationships. Specifically, this study conceptualized and empirically demonstrated how the three types of overload are interconnected through system feature overload. This insight is important because it extends technostress literature with the relationships between the overload constructs that affect individuals' well-being (i.e., strain) through their individual and shared effects. Such composition demonstrates the multifaceted nature of overload and its implications on IS use.

Secondly, the research extends the literature on IS discontinuous usage behaviors. The findings of this study advance the existing understanding of IS post-adoption behaviors by drawing on the SSO framework and the relationships of the three types of overload. Specifically, the SSO framework was used to explain the psychological drivers of IS discontinuance. The SSO framework accounts for a combination of factors that relate to the demands associated with the external IS use environment (stressors), an individual's psychological responses to the demands of IS use (strain), and the behavioral, use-related outcome (outcome). Furthermore, the framework enables researchers to distinguish strain as a psychological response from outcomes as behavioral responses. These aspects provide a detailed understanding of the factors underlying use discontinuance.

On a practical front, our research provides important insights for developers of social media wishing to reduce user churn. Our findings can help social media developers understand the causes of social media exhaustion and thus reduce discontinuous usage behaviors. Social media developers can alleviate users' social media exhaustion through controlling the frequency of application updates, simplifying system functions and personalizing application features. Meanwhile, social media service providers should push less irrelevant information and control the amount of advertising. Social media users can also better manage their social media exhaustion based on our findings. To avoid lending excessive amounts of social support via social media, users should limit the number of social media friends that they have to a certain extent. For instance, users could set the threshold for the number of friends to Dunbar's number (Dunbar, 1992).

7.2. Limitations and further research directions

This study has several limitations which may represent avenues for future research. First, in our study, only information overload, system feature overload and social overload were analyzed; be doing so, this study has merely provided a starting point for further work. Since overload, as a broad concept, can be measured on many dimensions and in diverse ways, future work could bring in testing for other dimensions of overload. Further studies may also examine the relationships between the different types of overload and technostress creators, such as complexity, insecurity and uncertainty (e.g. Ragu-Nathan et al., 2008). Second, environmental stressors can exert complex effects on users' psychological status. Future research can consider factors other than social media exhaustion, such as negative emotions (e.g., anger or worry) and privacy, when investigating social media discontinuance. Third, since the questionnaire questions were set for a specific social media platform (i.e., Facebook), caution should be taken when extending the outcomes to users of other social media. That said, to empirically examine the generalizability of the research model, future research could replicate our work by examining users in other social media (e.g. Twitter) and in different user segments (e.g. age). Fourth, our study was limited because it was based on self-reporting via a questionnaire. Therefore, it would be beneficial to extend this research in an experimental or observational setting to account for the use patterns of Facebook users. Fifth, it is meaningful to conduct cross-cultural studies and investigate possible differences in social media abandonment among people of different nationalities.

8. Conclusions

The dark side of IS usage has attracted the attention of scholars in recent years. The demands of IS use affect individual users and societies at large. Such demands are among the key reasons for the IS discontinuance intentions of users. Individuals may simply feel exhausted due to IS use. Researchers have called for more research on this topic and stressed the importance of understanding the fundamental mechanisms that underlie such negative outcomes. Prior literature on technostress illustrates how users perceive overload, showcasing the prevalence of this concept for users in general. This study takes a further step by addressing the composition of different types of social media overload. The insights drawn from this study established conceptual relationships for overload that were empirically validated in terms of social media exhaustion and discontinuance behaviors. We believe that these conceptual extensions can aid researchers and practitioners in further understanding and addressing the dark side of IS usage.

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Appendix A: Measurement items

Construct	Items	Source
System feature overload (SFO)	(SFO1) I am often distracted by features that are included in Facebook but are not related to my main purpose in using Facebook.	Zhang et al., 2016
	(SFO2) Facebook is helpful by adding features, which makes social performance even harder.	
	(SFO3) The features of Facebook I use are often more complex than the tasks I have to complete using these features.	
Information overload (IO)	(IO1) I am often distracted by an excessive amount of information available to me on Facebook.	Zhang et al., 2016
	(IO2) I find that I am overwhelmed by the amount of information I have to process on a daily basis on Facebook.	
	(IO3) There is too much information about my friends on Facebook so I find it a burden to process.	
	(IO4) I find that only a small part of the information on Facebook is relevant to my needs.	
Social overload (SO)	(SO1) I care too much about my friends' well-being on Facebook.	Maier et al., 2015a
	(SO2) I deal too much with my friends' problems on Facebook.	
	(SO3) I care for my friends too much on Facebook.	
	(SO4) I pay too much attention to my friends' posts on Facebook.	
Social media exhaustion (SME)	(SME1) I feel tired from my Facebook activities.	Maier et al., 2015a
	(SME2) I feel drained from activities that require me to use Facebook.	
	(SME3) Using Facebook is a strain for me.	
	(SME4) I feel burned out from my Facebook activities.	
Discontinuous usage behavior (DUB)	(DUB1) I sometimes discontinue my use of Facebook, but that does not mean that I will completely abandon the use of it.	Maier et al., 2015b
	(DUB2) I have suspended my use of Facebook.	
	(DUB3) I have discontinued my use of Facebook.	
	(DUB4) I have stopped using Facebook.	
	(DUB5) I have quit Facebook.	

Appendix B: Demographics

Gender

- Male: 209 (50.73%)
- Female: 203 (49.27%)

Age

- 18 or younger: 0 (0.00%)
- 19-24: 34 (8.25%)
- 25-34: 184 (44.66%)
- 35-44: 108 (26.21%)
- 45-44: 44 (10.68%)
- Over 54: 42 (10.20%)

The number of social network sites in use

- 1: 49 (11.89%)
- 2: 119 (28.88%)
- 3: 109 (26.46%)
- 4: 87 (21.12%)
- 5: 26 (6.31%)
- More than 5: 22 (5.34%)

Facebook experience

Category	Value
Less than 1 year	0 (0.00%)
1–2 years	3 (0.73%)
2–4 years	34 (8.25%)
4–6 years	81 (19.66%)
6–8 years	89 (21.60%)
More than 8 years	205 (49.76%)

Frequency of using Facebook

Category	Value
Hourly	48 (11.65%)
Several times per day	253 (61.41%)
Once per day	63 (15.29%)
Several times per week	32 (7.77%)
Once per week	16 (3.88%)