



Do you get tired of socializing? An empirical explanation of discontinuous usage behaviour in social network services



Shuwei Zhang, Ling Zhao*, Yaobin Lu, Jun Yang

School of Management, Huazhong University of Science and Technology, Wuhan 430074, China

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ABSTRACT

Based upon the stressor-strain-outcome framework, this study proposes that perceived system feature overload, information overload, and social overload are stressors which induce strain, in terms of social network fatigue and dissatisfaction. Both of social network fatigue and dissatisfaction further influence discontinuous use intention. The empirical results indicate that three types of perceived overload exert greater effects on social network fatigue than dissatisfaction, both of which further increase users' intention of discontinuance. The study also finds that demographic characteristics, such as gender and age, also have moderating effects on these relationships.

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1. Introduction

In the past decade, social networking services (or social networking sites (SNSs)) such as Facebook, MySpace, and Google+ have all experienced rapid growth only to confront major challenges. For instance, after the peak in 2012, users' passion for Facebook began to cool down [17] and there was a decrease in the number of active users. GlobalWebIndex (GWI) once used "Facebook fatigue" to describe the reduction in frequency of key Facebook activities (e.g., sending digital presents, searching for new contacts, and sending messages to friends) [32]. MySpace was once the second largest SNS in the world but was stymied in 2011 [30]. Even Qzone in China, the SNS provided by Tencent with the third largest global user base [21], has also faced a loss of users and a decrease in use.

Addressing this phenomenon, many researchers have paid great attention to how to encourage continuous usage of SNSs [4,53], and SNS providers have also tried to improve service quality, for example, by adding new and fresh functions, or encouraging more interaction among users to inhibit the decline in active use. However, it seems that these strategies are not always as effective as expected. For example, Facebook has added many new features since 2012, such as mention tagging, privacy concern, trending,

and so on, but these additions have not stemmed the decrease in active Facebook users. According to a survey by the Pew Research Center, 61% of respondents have voluntarily taken a break from Facebook and 20% have totally abandoned the platform temporarily due to boredom and weariness toward excessive gossip and messages from friends, irrelevant information, and frequent system updates [69]. A report from GWI indicated that Facebook still saw a drop in active usage of 8% in 2014 [17]. Meanwhile, increasingly more users use Facebook as a place to browse rather than post and share, and are moving from such traditional social networks toward newer, smaller platforms, as well as mobile messaging apps, such as Pinterest, Tumblr, and Snapchat.

This trend has led to more research on the discontinuous use of SNSs, which is driven by different factors compared with continuous use [83]. For example, a series of studies conducted by Maier and his coauthors [54,55] considered discontinuous usage as users' coping strategy toward stress resulting from SNS activities, such as SNS exhaustion and social overload. These studies shed light on the negative side of SNS use, and highlight the important role of stressful experience in inducing discontinuance behavior. However, as Berger et al. [10] pointed out, studies belonging to this stream were still limited and several questions were not fully addressed.

Moreover, Ravindran et al. [70] proposed the concept of "social network fatigue" to explain users' discontinuous usage behavior in relation to Facebook. Adapted from the clinical and occupational area, social network fatigue is a subjective and negative feeling of tiredness, boredom, and burnout resulting from SNS activities. However, this study did not provide empirical support for its

* Corresponding author.

E-mail addresses: M201373403@mail.hust.edu.cn (S. Zhang), lingzhao@smail.hust.edu.cn (L. Zhao), luyb@mail.hust.edu.cn (Y. Lu), jun_yang@mail.hust.edu.cn (J. Yang).

importance. Building on Ravindran et al. [70], Bright et al. [14] and Lee et al. [49] provide empirical support for the effect of overload on social network fatigue, but they also did not empirically examine the importance of social network fatigue on other outcomes.

Addressing the gap existing in previous research, our study adopted the stressor–strain–outcome framework to investigate the antecedents and outcomes of fatigue in the SNS context. Two research questions are addressed in this research: (1) how does perceived overload lead to users' social network fatigue and dissatisfaction while using social networks? and (2) how do social network fatigue and dissatisfaction influence discontinuous usage intention in the social network context? This study contributes by improving researchers' understanding of social network fatigue, a construct that has attracted great attention but still needs more empirical research. This study also contributes by examining the antecedents of social network fatigue from a stress perspective, and proposing a more appropriate classification of stressors that captures all the important aspects of the cognitive experiences of SNS users and how they lead to strain in the SNS context. Finally, we include social network fatigue and dissatisfaction as two different strain factors resulting from perceived overload. Thus, this study extends the postadoption research in the SNS context by including more determinants of discontinuous intention into consideration other than dissatisfaction.

The paper is organized as follows. In Section 2, we review the theoretical background of perceived overload on SNSs and social network fatigue. Then, we present the research model and hypotheses of the study in Section 3. In Section 4, we describe the research methodology including measurement, data collection, and data analysis. Section 5 includes a discussion and interpretation of the results, and finally we summarize the limitations and theoretical and practical implications in Section 6.

2. Literature review

2.1. Perceived overload on SNSs

Overload has been described both objectively and subjectively in previous studies. From a subjective perspective, overload refers to an individual's subjective evaluation and perception of the amount of objects or people that exceeds one's ability to handle [73]. Many researchers have applied this concept to different research areas to describe the perception of kinds of things that exceed individuals' ability to handle, such as "information overload" [20,39,63], "knowledge overload" [36], "work overload" [89], and "communication overload" [57].

With the development of information technology, a few researchers have started to investigate the phenomenon of "technology overload" [79] and explain the technology dilemma that more information technology does not always result in a higher level of work productivity [41]. Karr-Wisniewski and Lu [41] identify three salient dimensions of technology overload, namely system feature overload, information overload, and communication overload. System feature overload occurs when the given information technology does not fit the given task and the technology is perceived as being too complex for the task. Information overload occurs when the information that needs to be processed exceeds the workers' processing capabilities. Communication overload occurs when workers are interrupted by too many communication requirements through various media, such as e-mail, instant message, and so on. These three aspects reflect different dimensions of users' experiences of interacting with technology and capture their demands for utilitarian and hedonic values when using information technology. We adopt this framework and propose three types of perceived overload in the

SNS context, namely system feature overload, information overload, and social overload.

System feature overload captures SNS users' perception of technological characteristics, and it is defined as the perception that the features provided by the SNS platform exceed users' demands [80]. *Information overload* is defined as the condition induced by the large amount of information generated on SNSs, which exceeds the capacity an individual can process [39]. Instead of using communication overload as proposed by Karr-Wisniewski and Lu [41], we use social overload to suit the context of our study. The study of Karr-Wisniewski and Lu [41] was conducted in the context of a workplace where the main aim of communication is to improve work efficiency and efficacy. However, in the case of SNS, the main aim of communication is to socialize. Social demands on SNSs involve more communication protocol tasks than those in the workplace context [46].

Social overload was initially proposed as a sociological concept by McCarthy and Saegert [56] to describe the negative effects of population crowding. It indicates that individuals have to enhance social contacts and interactions, and invest more time and attention in maintaining social relationships with the increase of regional populations, which sequentially leads to mental and psychological distress for residents. SNSs are like a virtual society, and social overload also exists in this context. For instance, Joinson et al. [40] proposed "*digital crowding theory*" to describe online personal network expansion and defined it as excessive self-disclosure, socialization, and contact. Maier et al. [54] defined social overload in SNSs as a feeling that an individual has to respond to too many social support demands required by friends on SNSs. LaRose et al. ([46], p. 59) also proposed a similar concept, "*connection overload*," which occurs "*when the demands imposed by the reception, maintaining and updating of social media have detrimental effects on people's lives*." Thus, social overload in this study is described as perceptions of crowding in an online space – users perceive too many social demands to process and perceive that they have to invest too much time and attention to maintain relationships with their growing number of contacts in the online social network.

2.2. Social network fatigue

The phenomenon of fatigue has been examined in previous clinical and occupational studies [2,9,67]. There is no unified definition of the concept of fatigue and it varies across different disciplines, such as health care, psychology, and occupational domains. For example, Lewis and Wessely [51] defined fatigue as lassitude or exhaustion of mental and physical strength resulting from bodily labor or mental exertion. Piper et al. [67], p. 19) described fatigue as "*a subjective, unpleasant feeling of tiredness that has multiple dimensions varying in duration, unpleasantness and intensity*." Combining these two definitions, we can conclude that fatigue exists in two forms: physical fatigue and psychological fatigue. Physical fatigue refers to a reduction in the physiological capacity [25], which leads to an imbalance in an individual's physical state, such as muscle fatigue and eye fatigue. Psychological fatigue refers to a negative perception, such as tiredness [67], exhaustion [87], stress [9], burnout [33], boredom [28], and anxiety [86]. However, these two forms of fatigue are not expected to arise at the same time, and research in different contexts usually focuses on one or both forms of fatigue.

As physical fatigue is more likely to occur in a mandated environment related to physical work rather than the voluntary SNS context, social network fatigue can be regarded as a form of psychological fatigue. Ravindran et al. ([70], p. 2317) define it as "*a subjective, multidimensional user experience comprising feelings such as tiredness, annoyance, anger, disappointment, guardedness, loss of*

interest, or reduced need/motivation associated with various aspects of social network use and interactions.” Hence, we define social network fatigue as negative emotional reactions to social network activities, such as tiredness, boredom, burnout, indifference, and lower interest [1,49,70].

Although some studies have examined the antecedents and outcomes of perceived fatigue in the occupational area [22,74,82], few have investigated perceived fatigue in the social network context. Through a mixed-method approach, Ravindran et al. [70] categorized the antecedents of social network fatigue into five stress creators, related to social dynamics, content, immersion, platform, and life cycle. They also proposed that users tended to respond to social network fatigue by having a short break or suspending social network activities. The social dynamics dimension refers to users’ weariness, feelings of being overwhelmed, and low interest regarding information on SNSs. The content dimension refers to disappointment and frustration with posts on SNSs. The immersion dimension is defined as addiction. The platform dimension refers to dissatisfaction with platform design features and the life cycle dimension is expressed as high–low–high activity life cycle use on SNSs. Bright et al. [14] treated social network fatigue as information overload on SNSs, and empirically ascribed social network fatigue to four factors: social media confidence, social media self-efficacy, privacy concern, and social media helpfulness. Lee et al. [49] empirically tested three types of overload on SNSs as the stimulus for social network fatigue and the SNS characteristics that lead to these overloads, including system feature overload, information overload, and communication overload. However, these two studies did not examine the outcomes of social network fatigue.

3. Research model and hypotheses

Based on above literature review, we developed our research model as presented in Fig. 1. To develop the research model, we adopted the stressor–strain–outcome framework, which has been applied in previous research on technostress [5,68]. Stressors refer to those factors that create stress, and overload perception is usually considered as a representative stressor. Thus, we proposed perceived system feature, information, and social overload on SNSs as stressors. Strain refers to psychological outcomes of stress in individuals. It could take various forms and we considered social network fatigue and dissatisfaction as the strain factors. Finally,

discontinuous usage intention is the outcome of strain, which refers to behavioral response to a stressful situation.

3.1. Social network fatigue, dissatisfaction, and discontinuous behavior

In IS[A1] behavioral research, discontinuance behavior is defined as a cessation of use [29,72]. Ravindran et al. [70] classified three types of discontinuous behavior on social network sites: short breaks, control activities, and suspend behavior. Thus, in the SNS context, discontinuous usage intention could be defined as an individual’s intention to decrease SNS use intensity, stop SNS use temporarily or permanently, or switch to other alternative SNSs [54,70].

According to expectancy disconfirmation theory (EDT[A2]), individuals usually have expectations toward a product or service before using it and then form an evaluation of the actual performance of the product or service after adoption. When the evaluation of the actual performance is better than the expectation, positive disconfirmation or satisfaction occurs, whereas when the evaluation is worse than the expectation, negative disconfirmation or dissatisfaction occurs [64]. Thus, both satisfaction and dissatisfaction reflect affective response to an individual’s overall experience with a product or service, but in contrast to satisfaction, dissatisfaction describes negative feelings, such as a sense of frustration and bitterness [16]. Many studies have found a positive relationship between satisfaction and continuance intention toward SNSs [47,53,90]. From the negative perspective, research focusing on dissatisfaction also found that such negative feeling would lead to causal attribution activity, such as avoidance of the recurrence of the situation or switching to alternatives [19,27,66]. Thus, we could also expect a positive association between dissatisfaction and discontinuous usage intention toward SNSs. Hence, we hypothesize as follows:

H1. Dissatisfaction toward the SNS is positively related to discontinuous usage intention.

As mentioned earlier, when individuals are in stressed, they will adopt behavioral or emotional coping strategies to relieve or avoid such unpleasant feelings [76], such as absenteeism and turnover in organizational behavior research [68]. Studies in psychology have already found that psychological fatigue will lead to low performance and participation [34,71,74,75] and have a deleterious impact on one’s continuance activities [8]. Although empirical

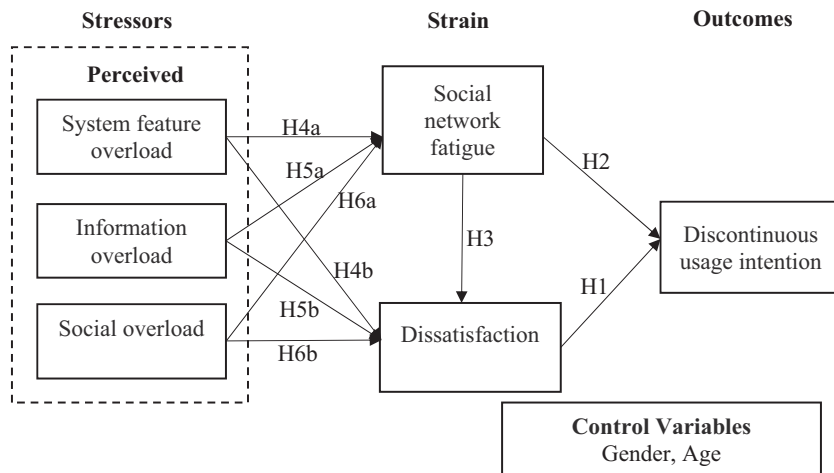


Fig. 1. The Research Model.

evidence in the SNS context is scarce, some researchers have tried to reveal a positive relationship between SNS fatigue and discontinuous usage. For instance, Ravindran et al. [70] found that individuals who were experiencing social network fatigue tended to reduce the intensity of use, had short breaks, or completely abandoned SNSs. Maier et al. [55] and Laumer et al. [48] indicated that when SNS users experience a higher level of exhaustion and frustration, they are more likely to discontinue using SNSs. Moreover, as lack of motivation is one dimension of social network fatigue, it is expected that social network fatigue will significantly influence discontinuous usage intention. Hence, we hypothesize the following:

H2. Social network fatigue is positively related to discontinuous usage intention.

Fatigue is a negative perception caused by the dissonance between reality and one's ability to deal with it [81]. As users usually want to experience positive outcomes (e.g., connectedness and pleasure; [53] when using SNSs, it is expected that their expectation is disconfirmed if they experience negative outcomes, such as fatigue. According to EDT, dissatisfaction results from the disconfirmation between the expectation and actual performance of a system [64]. An empirical study also found that SNS users experience the negative emotion of frustration, which leads to dissatisfaction toward SNSs [48]. Hence, we hypothesize as follows:

H3. Social network fatigue is positively related to dissatisfaction toward SNS.

3.2. Perceived overload, social network fatigue, and dissatisfaction

Users frequently encounter system updates and modifications in an SNS. Though these new features may attract users and enhance their positive experiences on SNSs to some extent, too many features lead to feelings of strain, such as fatigue and dissatisfaction. The feature fatigue effect caused by feature overload has been examined by a few researchers. It implies that users tend to give more weight to capabilities than usability before use but usually suffer from complexity after use, such as anxiety or stress [52,80]. This is consistent with the limited capacity model, according to which there is a capacity limit for humans to process added features [45]. Moreover, according to cognitive fit theory, unnecessary features would distract users' attention and increase individuals' cognitive load, which induces poorer individual performance [65]. Thus, when the misfit between system capacities and users' needs occurs, SNS users may have negative feelings, such as anxiety [58], stress [58], burnout, and emotional exhaustion [80], which may further decrease individuals' performance. Finally, from an economic perspective, people might also get frustrated and bored when new features added to a software package reach a certain point, where the marginal utility of new features proves to be negative [35]. Hence, we hypothesize as follows:

H4a: System feature overload is positively related to social network fatigue.

The negative outcome of feature overload is that the increased complexity of features requires more effort and time to learn and decrease users' perception of usability or ease of use, which in turn leads to dissatisfaction. Studies from the marketing field on product features reveal a positive relationship between product feature overload and dissatisfaction. For instance, Thompson et al. [80] found that consumers preferred products with many features at first, but when using them, they tended to get upset by the number of product features, and experienced decreased satisfaction. Stock [77] also proposed an inverted U-shaped relationship between the innovativeness of the offered goods and customer satisfaction. For digital products, such as information technology,

Ragu-Nathan et al. [68] revealed that the complexity of information and communication technology used by employees decreases their job satisfaction. In SNSs, new features and updates are rolled out frequently to attract and retain users. But when the benefits of new features are outweighed by the costs, in terms of learning efforts or complexity of use, it is expected that they will feel dissatisfied with the SNSs. Hence, we hypothesize the following:

H4b: System feature overload is positively related to dissatisfaction toward the SNS.

With the development of information technology, individuals have more channels to access a massive amount of information than ever before; however, the negative outcomes caused by excessive information have also drawn attention from researchers. According to Miller's Law [59], the maximum number of chunks of information that the human brain can remember in a short time is seven. Given this limitation, individuals experience "information anxiety" in the digital age as declared by Wurman [88]. Wurman [88] points out that the typical signs accompanying the occurrence of information overload include mental and emotional fatigue, and feelings of stress, anxiety, and helplessness. Lewis [50] proposed the concept of information fatigue syndrome to describe mental anguish or even physical illness caused by confronting excessive information. Misra and Stokols [61] found that higher levels of perceived cyber-based information overload significantly predicted self-reports of greater stress. In the context of SNSs, Ravindran et al. [70] and Bright et al. [14] also attributed information overload as being one of the major antecedents of social network fatigue. Recently, Lee et al. [49] provided empirical evidence of the positive relationship between information overload and social network fatigue. Hence, we hypothesize as follows:

H5a: Information overload is positively related to social network fatigue.

The relationship between information overload and decision performance has been examined widely. For consumers who make purchase choices, studies have revealed that confronting too much information might decrease decision quality [39] and decision effectiveness [42], leading to greater dissatisfaction with the choice [13,23,37]. All these studies imply that when individuals' limited information processing capacity is challenged by heavy information, they tend to have the feeling of losing control and are more likely to get confused and regret their decision. Thus, it is expected that when individuals are overloaded with the information presented by an information system, they will have a lower evaluation of the system's usefulness and this negative disconfirmation will further lead to dissatisfaction toward the system. For instance, the information overload in electronic knowledge repositories (EKR) in organizations decreases users' perceived usefulness and satisfaction toward the EKRs [12]. For SNS users, dealing with a great amount of information every day will also increase the feeling of frustration, especially when this information is redundant or not relevant to their interest. Koroleva et al. [44] and Laumer et al. [48] investigated information overload on Facebook and found that it led to dissatisfaction and further reduced activity on Facebook. Hence, we hypothesize as follows:

H5b: Information overload is positively related to dissatisfaction toward the SNS.

Research from sociology has already found that social overload related to a large amount of unwanted social demands will induce psychological distress [26,31]. We extend the same to the SNS context. According to Dunbar [24], there is a cognitive limit to the number of individuals with whom one can maintain stable social relationships, which is about 150, also called Dunbar's number. However, studies on Facebook reveal that the number of friends for many users greatly exceed Dunbar's number [85], and beyond a certain number, additional friends are associated with decreasing

well-being [43]. This might be explained in terms of several aspects. First, excessive communication demands may interrupt and distract individuals' attention from their daily work and evoke feelings of disturbance and frustration [41]. Second, as perceived social overload is partially caused by the social norm pressure that one should provide social support to one's social network friends [54], users might get tired of conforming with the social norm and change their response decision when confronting too many social support requests [38]. Finally, the perception of social overload usually involves deficient self-reaction to social demands, or compulsive use of SNSs, which is found to contribute to negative affect and stress indirectly [46]. Recently, a series of studies revealed that social overload is a factor contributing to social exhaustion, which is defined as tiredness with SNS-related activities [49,54,55]. Hence, we hypothesize the following:

H6a: Social overload is positively related to social network fatigue.

Sociological studies report that social overload has a negative effect on residential satisfaction. McCarthy and Saegert [56] indicate that high-density residents are more likely to report social overload and crowding along with low satisfaction through a comparative experiment. [60] found that high-density settings characterized by social overload easily led to low residential satisfaction and social withdrawal derived from failure to cope with psychological stress from crowding. With individuals' expanding social network, SNS users face more social requirements from their friends, and when the requirements exceed their capacity (e.g., too many people to deal with, or the complexity of privacy management on SNSs), it is expected that they will have a lower level of satisfaction toward SNSs. Maier et al. [54] analyzed psychological responses to social overload on SNSs, and pointed out that when individuals encounter negative stimuli from too many virtual requests on SNSs, they express low satisfaction. Hence, we hypothesize the following:

H6b: Social overload is positively related to dissatisfaction toward the SNS.

Ravindran et al. [70] suggest that the effects of demographic factors such as gender and age on social network fatigue need more investigation. For example, gender has been found to play an important role in information technology acceptance and post-adoption studies [3,84]. Research on technostress also reveals that the level of technostress varies across gender and age [68,78]. Therefore, we include gender and age as the control variables in the research model.

4. Methodology

4.1. Questionnaire and data collection

To ensure validity, we adapted the measures from previous studies to the context of this research. Items for discontinuous usage intention were adapted from Maier et al. [54] and Ravindran et al. [70]. Items for dissatisfaction were adapted from [18]. Items for system feature overload were adapted from Karr-Wisniewski and Lu [41]. Items for information overload were adapted from Karr-Wisniewski and Lu [41] and Chen et al. [20]. Items for social overload were adapted from Maier et al. [54]. Six items of the scale to measure work-related fatigue of Åhsberg [2] were adapted to measure social network fatigue. All items were measured on a seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7).

As the original items were in English, a back-translation method was used to convert these items into Chinese. We also distributed the questionnaire to 11 researchers and Qzone users to evaluate content validity and assess the suitability, readability, and ambiguity of the scales through personal interviews. The questionnaire was modified based on the feedback received from

the interviews. Moreover, we conducted a pilot test of 50 subjects before the formal large-scale survey to ensure the reliability and validity of the scale. The final English and Chinese scales are presented in Appendices A and B, respectively.

Users of Qzone were recruited as the subjects of this study. Qzone, launched in April 2005, is the third largest SNS in the world after Facebook and YouTube, and is owned by Tencent. With its development over the past few years, Qzone has become a platform with rich feature sets for online interaction. However, it faced a decrease in market share and loss in user base since 2013. Therefore, it is appropriate to study the discontinuous behavior of Qzone. We recruited Wenjuanxing (<http://www.sojump.com/>), a professional survey distribution platform with 260 million registered users in China, to distribute our questionnaires online. Respondents who completed and submitted the questionnaire successfully received a monetary reward of \$5 RMB. The data collection process lasted for 2 weeks. We removed invalid responses, including those with the same answers to all questions, and we were finally left with 525 valid responses. Non-response bias was examined by comparing the means of all variables and demographics for early and late respondents. No significant differences were found from the *t*-test results. Table 1 shows the sample demographics. About 52.4% of the respondents were male. Most of the respondents aged between 18 and 30 years and had associate or bachelor degrees.

4.2. Analysis of reliability and validity

We first conducted principal component factor analysis to test the factorial validity of the scales, which indicated six factors with eigenvalues > 1. These factors were extracted with 73.348% of the total variance explained. There were no major cross-loadings (i.e., instances in which an item loaded more highly on another factor rather than the expected factor) and all item loadings on the expected factors were >0.5, indicating good convergent and discriminant validity. All Cronbach's alpha values were above the 0.70 threshold, indicating that the scales had high reliability. We then conducted confirmatory factor analysis (Table 2).

Table 1
Demographic Characteristics of the Respondents.

Measure	Item	Count	%
Gender	Male	275	52.4
	Female	250	47.6
Age	<18	24	4.6
	>18 and ≤24	270	51.4
	>24 and ≤30	164	31.2
	>30 and ≤35	52	9.9
	>35	15	2.9
Education	High school or below	62	11.8
	Associate or bachelor degree	388	73.9
	Master's degree or higher	75	14.3
Occupation	Student	220	41.9
	Working	270	51.4
	Unemployed	12	2.3
	Others	23	4.4
Length of use	<1 year	17	3.2
	>1 and ≤3	49	9.3
	>3 and ≤6	200	38.1
	>6 and ≤9	181	34.5
	>9 years	78	14.9

Table 2
Confirmatory Factor Analysis through PLS.

Factor	Item	Std. Loading	t-values	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
System feature fatigue	SFO1	0.776	32.588	0.817	0.88	0.648
	SFO2	0.852	60.030			
	SFO3	0.818	54.891			
	SFO4	0.771	29.636			
Information overload	IO1	0.865	72.969	0.862	0.906	0.708
	IO2	0.886	81.253			
	IO3	0.781	38.209			
	IO4	0.830	53.968			
Social overload	SO1	0.893	80.777	0.914	0.94	0.797
	SO2	0.918	119.892			
	SO3	0.918	124.171			
	SO4	0.839	50.706			
Social network fatigue	SNF1	0.872	93.660	0.921	0.938	0.717
	SNF2	0.867	91.970			
	SNF3	0.863	81.835			
	SNF4	0.86	76.918			
	SNF5	0.828	48.733			
	SNF6	0.787	35.386			
Dissatisfaction	DIS1	0.871	65.601	0.883	0.919	0.74
	DIS2	0.867	70.988			
	DIS3	0.860	57.360			
	DIS4	0.842	59.383			
Discontinuous usage intention	DUI1	0.899	115.897	0.873	0.914	0.726
	DUI2	0.823	45.047			
	DUI3	0.837	49.500			
	DUI4	0.849	66.558			

Table 3
Correlation Coefficient Matrix.

	SFO	IO	SO	SNF	DIS	DUI
System feature fatigue	0.805					
Information overload	0.648	0.842				
Social overload	0.525	0.532	0.893			
Social network fatigue	0.557	0.546	0.596	0.847		
Dissatisfaction	0.515	0.461	0.456	0.623	0.860	
Discontinuous usage intention	0.524	0.506	0.525	0.726	0.675	0.852

Legend: SFO=System feature fatigue; IO=Information overload; SO=Social overload; SNF=Social network fatigue; DIS=Dissatisfaction; DUI=Discontinuous usage intention.

Table 2 reveals that the standardized loading of items are significant and above 0.7. The average variance extracted (AVE) for each construct is > 0.5, indicating that the scales demonstrate good convergent validity [6]. The composite reliabilities (CRs) are all > 0.7, indicating that the scales had good reliability [62]. Table 3 shows the correlations among the latent constructs.

The diagonal elements in Table 3 represent square root of the AVE of the respective construct. The diagonal elements are all greater than their corresponding correlation coefficients with other constructs. This suggests that the scales have good discriminant validity. As the data were self-reported and collected from a single source, common method bias may exist. We used Harman's one-factor test [A3] to check for this bias. More than one factor were extracted and they explained 73.348% of the variance. The first factor only accounted for 16.017% of the total variance, which implied that no single factor accounted for most of the variance and, therefore, that common method bias was unlikely to be a major threat to the study.

4.3. Hypothesis testing

The results of hypothesis test are shown in Fig. 2. Social network fatigue and dissatisfaction together explained 60.8% of the variance of users' discontinuous usage intention. Thus, H1 and H2 were supported. The three types of perceived overload on SNSs (system feature overload, information overload, and social overload)

exerted significant effects on social network fatigue and jointly explained 45.8% of the variance. Thus, H4a, H5a, and H6a were supported. Only system feature overload was found to be significantly related to dissatisfaction, thus supporting H4b. H5b and H6b were not supported. The relationship between social network fatigue and dissatisfaction was also significant, thus supporting H3. The total variance of dissatisfaction explained by perceived overload and social network fatigue is 43.3%.¹

In light of the different effects that perceived overload factors exert on social network fatigue and dissatisfaction, we examined the mediating effects of social network fatigue on the relationships between perceived overload factors and dissatisfaction following Baron and Kenny's [7] procedure. Table 4 shows the mediating effect testing results. As shown, social network fatigue partially mediated the relationships between the three types of overload on SNSs and users' dissatisfaction toward SNSs.

Finally, we examined the effects of the control variables. First, we analyzed the effect of gender by comparing the path coefficients between male and female groups. According to Table 5, we found that compared with women, men were more likely to feel fatigue due to system feature overload and social overload, and they tended to become dissatisfied with the SNSs and discontinue using them. Next, we examined the effect of age by conducting regressions through SPSS. We found that age significantly moderated the effects of system feature overload ($t=2.427$, $p < 0.05$) and social overload ($t=2.691$, $p < 0.01$) on social network fatigue.

5. Discussion

Based on the stressor–strain–outcome framework, this study investigated how perceived overload on SNSs induces users'

¹ PLS was used to test the model for its ease of use. We also conducted an analysis using AMOS to ensure robustness of the results. All of the model fit indices are within acceptable ranges and we obtained qualitatively similar results.

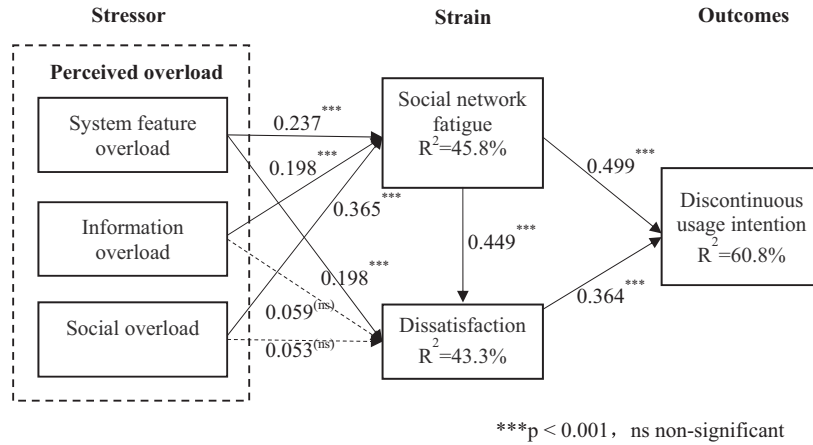


Fig. 2. Results of Hypothesis Testing.

feeling of strain in terms of social network fatigue and dissatisfaction, and how it further influences users' discontinuous behavior intention. Three types of overload on SNSs were examined, namely system feature overload, information overload, and social overload. As expected, three types of overload on SNSs exert positive influences on social network fatigue, which confirms the findings from recent studies on social network fatigue that sources of social network fatigue involve not only technological and informational aspects but also social aspects [14,49].

Our study finds that social overload has the greatest impact on social network fatigue, followed by system feature overload and information overload. This is different from the finding of Lee et al. [49] that system feature overload, information overload, and communication overload exert almost equal effects on SNS fatigue. This might be because social overload in our study has a wider range of meaning than communication overload, which only focuses on excessive instant and respondent-specified communication requests. However, it also highlights the importance of social overload as a major source of SNS exhaustion, which is found to be explained 37.9% by social overload [54]. The finding that fatigue experience could be stimulated by system feature overload and information overload provides empirical evidence of the occurrence of "feature fatigue" [80] and "information fatigue" [50], which have not been adequately examined.

Only system feature overload is found to be positively related to dissatisfaction toward SNSs. This confirms, from the opposite side, that in the stage of postadoption of information technology, perceived usefulness is a vital criterion adopted by users to evaluate the system and determine whether they feel satisfied with it [11]. Thus, there is also no doubt that system feature overload is found to be negatively related to worker productivity [41]. Information overload and social overload have insignificant

influences on dissatisfaction. This might be because in the context of SNSs, users actually have the autonomy to reduce the information and social requests they receive every day, for example, by using the filtering function, or changing the visibility settings on friends' postings. Thus, SNS users might feel that these two overloads are due to their inability to manage the information and social requests, rather than the inefficiency of system functions. However, further mediating analysis reveals that information overload and social overload may still exert indirect effects on dissatisfaction through social network fatigue.

Both social network fatigue and dissatisfaction are positively related to discontinuous usage intention. This is consistent with the conclusion of previous research on information system post adoption that satisfaction is a vital determinant of continuous use [11]. Moreover, it also empirically confirms the finding of Ravindran et al. [70] from interviews with Facebook users that users will alter their behaviors to avoid social network fatigue.

Finally, our study finds that gender and age have significant moderating effects. Men seem to be more likely to have the feeling of social network fatigue because of overload and feel greater impact from social network fatigue as compared with women, which is consistent with the finding of previous research on technostress that men usually have a higher level of technostress compared with women [68,78]. This might be because women invest more effort and show greater intimacy in their social relationships, and they also have more SNS friends and engage more in SNS activities as compared with men [54]. Previous studies find that technostress decreases as age increases [68,78], while our study reveals that when age increases, system feature overload and social overload exert greater effects on social network fatigue. The possible explanation is that younger people are more interested in socializing on SNSs, and thus less likely to be influenced by overload on SNSs.

6. Implications, limitations, and future research

The results of this study should be interpreted in light of its limitations. First, though behavioral intention is usually regarded as an effective predictor of actual behavior, in-depth investigation should be conducted in the future considering the actual discontinuous behavior. Second, the variance of social network fatigue explained by perceived overload is 45.8%, indicating that future research can address other contributing factors. In addition, though the results of Harman's one-factor test suggest that common method bias is unlikely to be a major threat in our study,

Table 4
Mediating Effects of Social Network Fatigue.

IV	M	DV	IV → DV	IV → M	IV + M → DV	
					IV	M
SFO	SNF	DIS	0.507***	0.556***	0.234***	0.491***
IO	SNF	DIS	0.458***	0.545***	0.170***	0.528***
SO	SNF	DIS	0.454***	0.594***	0.132**	0.543***

*p < 0.05, **p < 0.01, ***p < 0.001.

Legend: SFO = System feature fatigue; IO = Information overload; SO = Social overload; SNF = Social network fatigue; DIS = Dissatisfaction.

Table 5
Moderating effect of gender.

Hypotheses	Male (n = 275)	Female (n = 250)	Statistical comparison of paths (t-value)
H1a: SFO → SNF	0.271 ^{***}	0.211 ^{***}	15.477 ^{***}
H1b: SFO → DIS	0.119 [*]	0.283 ^{***}	−36.219 ^{***}
H2a: IO → SNF	0.153 ^{***}	0.227 ^{***}	−20.124 ^{***}
H2b: IO → DIS	−0.035 ^(ns)	0.078 ^(ns)	−
H3a: SO → SNF	0.448 ^{***}	0.378 ^{***}	16.931 ^{***}
H3b: SO → DIS	0.064 ^(ns)	−0.014 ^(ns)	−
H4: SNF → DIS	0.527 ^{***}	0.432 ^{***}	23.392 ^{***}
H5: SNF → DUI	0.555 ^{***}	0.527 ^{***}	9.141 ^{***}
H6: DIS → DUI	0.329 ^{***}	0.338 ^{***}	−2.690 ^{**}

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

statistical methods alone could not solve method bias. In future work, programmatic work with other methods would be needed to minimize method bias in advance and ensure that our results are not limited to the particular methods used in this study [15]. Moreover, as fatigue is a psychological state that could arise and disappear suddenly, more studies need to be conducted on the inhibitors of social network fatigue. In the long run, whether there is a regular pattern in the occurrence of social network fatigue and discontinuous use and what factors will motivate users who have experienced social network fatigue to stop suspending and reuse SNSs are questions that provide potential directions for future research. Finally, although Qzone is a widely used SNS in China, it represents only one type of SNS. More studies are needed to generalize our findings to other types of SNS, such as microblogs or WeChat, which is another prevalent SNS with a huge user base in China, or SNSs in other countries.

This research has a few interesting theoretical contributions. First, instead of focusing on the positive side of SNSs, our study extends the research on the negative effects of using SNSs, which has mostly been ignored [10]. We examined the stressor antecedents of strain on SNSs and used outcomes to describe users' behavioral response strategy to stressful situations. It complements previous studies that stop at the strain stage [5,49] and contributes to a clearer and more comprehensive understanding of the dark side of SNS usage.

Second, we also contribute to the understanding of discontinuous usage of SNSs and the factors that induce such behavior. We considered different manifestations of discontinuous usage intention, such as intention to control activities, suspend behavior, or switch to other alternative SNSs. This complements previous studies that only consider switching behavior or suspension behavior in SNSs [55]. We find that in the context of SNSs, discontinuous usage is adopted by users to get away from a stressful situation as an adaptation response strategy, and it is not only determined by dissatisfaction. More psychological factors, such as social network fatigue, should be taken into consideration in future research.

Third, our study contributes to the research on technostress by providing a more comprehensive classification of SNS stressors in terms of perceived cognitive conflicts related to technological, informational, and social aspects of SNSs. Our research extends those studies addressing technostress in the workplace or in a more general context [68,78], and highlights the importance of the SNS-specific stressor social overload, which exerts a great negative influence on psychological responses [54].

The results of our study also have some practical implications for SNS providers. First, our study might indicate a regular pattern of SNS usage, that is, no matter how attractive one SNS is to users at the beginning, they will confront social network fatigue with time when various overloads emerge. On the one hand, people always have socializing requirements; on the other hand, they will get tired of accumulating social relationships and rich features of SNSs.

This is why users will seek new SNSs with simpler platforms and private virtual space even though they already have fancy and high-capacity SNSs. The destiny of SNS users suffering various kinds of overload and social network fatigue seems pessimistic for existing SNS providers. However, due to the restorative nature of fatigue, users might return to pre-fatigue level use after a transient decline in activities.

Second, though previous research on continuous use of SNSs might suggest that more astonishing features or enhanced interaction among users should be added to maintain the appeal of SNSs, our study suggests that “*more is better*” might not always hold true as SNS users could have negative emotional and behavioral responses to an excessive amount of good things. Therefore, service providers should consider this carefully before implementing such strategies, and our study provides some suggestions to balance the simplification and abundance of the platform to postpone the occurrence of social network fatigue. As social overload exerts the greatest influence on social network fatigue, we suggest that SNS providers could offer better SNS management or filtering tools to reduce social network complexity and help users manage social relationships and requests. For example, SNS providers could design a more sophisticated recommendation function for friends to reduce social network complexity. Tools used to manage different groups in social networks would be helpful, but SNS providers should also try to avoid making such tools too complex in light of the negative effects of feature overload. Retaining necessary and useful features for users would be the optimal choice for providers to avoid tiredness and dissatisfaction with excessive features. SNS providers could also provide options for users to disable those functions that they are not interested in any more, which may delay the occurrence of “*feature fatigue*.” Moreover, service providers should not ignore the negative effects of information overload, considering the doctrine of “*Content is King*” in social media is especially pervasive. Content management functions, such as showing a summary of posts, or categorizing the content according to the level of interest of users, might provide them with a better experience in dealing with information on SNSs.

Finally, given the moderating effects of gender and age, we suggest that SNS providers could provide customized functions for those different groups. For example, as men tend to have a higher level of social network fatigue because of system feature overload and social overload, service providers could reduce the frequency of recommending new features or friends on their home pages. Meanwhile, for the older users, simpler versions of SNSs would be preferred because they are more likely to be impacted by overload, which may induce them to reduce or stop their SNS activities.

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Appendix A. The survey instrument

Construct	Items
System feature overload [41]	SFO1 I am often distracted by features that are included in Qzone but are not related to my main purpose in using Qzone.
	SFO2 I find that most features of Qzone contain too many poor subfeatures instead of too few very good subfeatures.
	SFO3 Qzone tends to try to be too helpful by adding features, which makes social performance even harder.
	SFO4 The features of Qzone I use are often more complex than the tasks I have to complete using these features.
Information overload [20,41]	IO1 I am often distracted by the excessive amount of information available to me on Qzone.
	IO2 I find that I am overwhelmed by the amount of information I have to process on a daily basis on Qzone.
	IO3 There is too much information about my friends on Qzone so I find it a burden to handle.
	IO4 I find that only a small part of the information on Qzone is relevant to my needs.
Social overload [54]	SO1 I take too much care of my friends' well-being on Qzone.
	SO2 I deal too much with my friends' problems on Qzone.
	SO3 I am too often caring for my friends on Qzone.
	SO4 I pay too much attention to my friends' posts on Qzone.
Social network fatigue [1,2]	SNF1 Sometimes I feel tired when using Qzone.
	SNF2 Sometimes I feel bored when using Qzone.
	SNF3 Sometimes I feel drained from using Qzone.
	SNF4 Sometimes I feel worn out from using Qzone.
	SNF5 I feel disinterested in whether there are new things happening on Qzone.
Dissatisfaction [18]	SNF6 I feel indifferent about the reminders or alerts of new things from Qzone.
	DIS1 I feel dissatisfied about my overall experience using Qzone.
	DIS2 I feel displeased about my overall experience using Qzone.
	DIS3 I feel discontented about my overall experience using Qzone.
Discontinuous usage intention [54,70]	DIS4 I am not delighted about my overall experience using Qzone.
	DUI1 In the future, I will use Qzone far less than today.
	DUI2 In the future, I will use another social network service.
	DUI3 I will sometimes take a short break from Qzone and return later.
	DUI4 If I could, I would discontinue the use of Qzone.

Appendix B. Chinese survey

Construct	Items
系统功能过载 [41]	SFO1 QQ 空间上与我主要使用目的无关的功能常常让我感到心烦
	SFO2 我发现 QQ 空间上好的功能不多, 反而有很多不怎么样的功能
	SFO3 虽然 QQ 空间努力通过增加新功能来帮助用户使用, 但其实这些新功能效果并不好
	SFO4 QQ 空间提供的功能往往比我需要完成的任务还复杂
信息过载 [20,41]	IO1 QQ 空间上过多的信息常常会让我感到心烦
	IO2 每天 QQ 空间上会有很多要处理的信息, 我有一种被淹没在其中的感觉
	IO3 QQ 空间上有很多关于朋友的信息, 让我觉得处理这些信息是一种负担
	IO4 我发现 QQ 空间上只有很少一部分信息是我所需要的
社交过载 [54]	SO1 关心 QQ 空间上朋友的状况耗费了我过多精力
	SO2 处理 QQ 空间上朋友的问题耗费了我过多精力
	SO3 关照 QQ 空间上的朋友耗费了我过多精力
	SO4 浏览 QQ 空间朋友发表的帖子耗费了我很多注意力
社交网络疲劳 [1,2]	SNF1 有时使用 QQ 空间会让我感到厌烦
	SNF2 有时使用 QQ 空间会让我感到无趣
	SNF3 有时使用 QQ 空间后会让我感到筋疲力尽
	SNF4 有时使用 QQ 空间后会让我感到疲惫
不满意度 [18]	SNF5 我对 QQ 空间上是否有新的事情发生并不是很感兴趣
	SNF6 我对 QQ 空间上的动态提醒并不非常关心
	DIS1 对于 QQ 空间的整体使用, 我感到并不满意
	DIS1 对于 QQ 空间的整体使用, 我感到并不愉悦
不持续使用意向 [54,70]	DIS1 对于 QQ 空间的整体使用, 我感到并不满足
	DIS4 对于 QQ 空间的整体使用, 我感到并不欣喜
	DUI1 以后我会更少使用 QQ 空间
	DUI2 以后我会使用其他的社交网站
	DUI3 有时我会短暂停止使用 QQ 空间一段时间后重新使用
	DUI4 如果可以的话, 我会停止使用 QQ 空间

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Shuwei Zhang is a master student of Information Management at School of Management, Huazhong University of Science and Technology, China. Her research focuses on negative effects of social media use.

Ling Zhao is an Associate Professor of Information Management at School of Management, Huazhong University of Science and Technology, China. Her research focuses on social commerce, privacy issues in e-commerce and information security behavior. Her research has appeared in journals such as *Information & Management*, *Decision Support Systems*, *Electronic Commerce Research and Applications*, *Computers and Education*, *International Journal of Electronic Commerce and Computers in Human Behavior*.

Yaobin Lu is a Professor at School of Management, Huazhong University of Science and Technology. He received his PH.D from the University in 1997. He was also a visiting scholar at the MISRC, University of Minnesota. His research interests include technology implementation, individual adoption, customer trust, electronic commerce, and related topics. He has published in *Journal of Management Information Systems*, *Journal of Information Technology*, *Information Systems Journal*, *Decision Support Systems*, *Information & Management* and several other journals.

Jun Yang of Information Management at School of Management, Huazhong University of Science and Technology, China. Her research focuses on OM/Marketing Interface; Information asymmetry and incentive problems in operations management; Network Optimization and applications. Her research has appeared in journals such as *Management Science*, *International Journal of Production Economics*, *Computers & Operations Research* and so on.