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Disentangling user fatigue in WeChat use: the configurational interplay of fear of missing out and overload

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Abstract

Purpose – The purpose of this study is to examine how the interplay of stressor (e.g. fear of missing out, FoMO) and strains (e.g. perceived social overload, communication overload, information overload and system feature overload) in social networking sites (SNS) use can contribute to users' SNS fatigue from a configurational view.
Design/methodology/approach – Data were collected among 363 SNS users in China via an online survey, and fuzzy-set qualitative comparative analysis (fsQCA) was applied in this study to scrutinize the different combinations of FoMO and overload that contribute to the same outcome of SNS fatigue.
Findings – Six combinations of casual conditions were identified to underlie SNS fatigue. The results showed that FoMO, perceived information overload and system feature overload are the core conditions that contribute to SNS fatigue when combined with other types of overloads.
Originality/value – The current work supplements the research findings on SNS fatigue by identifying the configurations contributing to SNS fatigue from the joint effects of stressor (FoMO) and strain (perceived social overload, communication overload, information overload and system feature overload) and by providing explanations for SNS fatigue from the configurational perspective.

Keywords Fuzzy-set qualitative comparative analysis (fsQCA), Social networking sites, Fatigue, Overload, Fear of missing out
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1. Introduction

Social networking sites (SNS) have permeated peoples' lives and revolutionized communication. SNS users are spending an increasing amount of time on SNS platforms, which has led to some users feeling tired of SNS use or SNS fatigue (SF). Some scholars found that during the COVID-19 pandemic, SNS users experienced SNS fatigue due to the increasing use of SNS in their lives, such as for study, work, or leisure (Shockley *et al.*, 2021). It has been claimed that SNS fatigue is one of the main reasons for the decrease in the SNS user population (Lee *et al.*, 2019).

Stressors and strains have been argued to be the dominant causes for SNS fatigue. Drawing on the stressor–strain–outcome (SSO) framework (Koeske and Koeske, 1993), previous studies have examined the effects of different stressors and strains on SNS fatigue through a variance-based approach. However, the findings in the literature are not consistent. For instance, Whelan *et al.* (2020) conceptualized boredom proneness as a stressor in SNS use, which led to perceived information overload and communication overload as strains. They found that both the stressor and the strains significantly affect SNS fatigue. In the study of Shi *et al.* (2020), some stressors were found to positively affect fatigue, while others showed no significant effect.

Additionally, prior studies on SNS fatigue have mainly used the predominant variance-based approach, such as structural equation modeling (SEM) and multiple regression analysis (MRA), to examine the symmetric linear relationships between the dependent (e.g. stressors and strains) and independent variables (e.g. SNS fatigue). However, these relationships can be complex and asymmetric. The investigation of the net effects of various stressors and strains on SNS fatigue may not adequately explain the complex joint effects of various stressors and strains on SNS fatigue. In other words, different combinations of stressors and strains may contribute to the same outcome of SNS fatigue, which may not follow symmetric linear relationships. Thus, it is meaningful to investigate the effects of stressors and strains on SNS fatigue using alternative approaches to a variance-based approach, such as a configurational approach.

To explore SNS fatigue from the configurational view of both stressors and strains following the SSO, this study considers fear of missing out (FoMO) as a stressor and four different types of overloads as the strains led by FoMO. This study examines the configurational interplay of the stressor (FoMO) and strains (perceived social overload, communication overload, information overload, and system feature overload) in contributing to the same outcome of SNS fatigue. These variables were selected in this study for two reasons. First, prior studies argued that SNS fatigue can be attributed to user perceptions of different types of overload in SNS use, such as perceived social overload, communication overload, information overload, and system feature overload (Fu *et al.*, 2020; Guo *et al.*, 2020; Islam *et al.*, 2020) and FoMO has been suggested to be one of the dominant causes for various overload in SNS use (Bright and Logan, 2018; Dhir *et al.*, 2018). Second, prior literature provides inconsistent findings about the net effects of FoMO and various overloads on SNS fatigue. For instance, in the study of Teng *et al.* (2022), perceived social overload has been found to positively affect SNS fatigue, but Yu *et al.* (2018) found that perceived information overload and communication overload were predictors of SNS fatigue, while perceived social overload has no significant effect on SNS fatigue. Dhir *et al.* (2018) discovered that FoMO significantly predicted fatigue among SNS users. However, Malik *et al.* (2021) and Zhang *et al.* (2022b) found that FoMO did not significantly affect SNS fatigue.

These studies have mainly examined the net effects of FoMO and various overloads on SNS fatigue using a variance-based approach (such as MRA and SEM) and adopted the basic assumptions of the symmetric relationship between the independent and dependent variables, which might not be adequate to explain the outcome of SNS fatigue. For example, although SNS users experience system feature overload or social overload in their SNS use, they might not feel SNS fatigue yet. Although users worry about missing messages from friends on SNS and choose to check their SNS notifications frequently, if they do not experience overload, they might not feel SNS fatigue. Thus, overload and FoMO might jointly affect users' perceptions regarding SNS fatigue, and it is necessary to consider the configurational interplay of FoMO and overload in examining SNS fatigue. This raises the need to consider configurational techniques as an alternative approach toward examining SNS fatigue, such as via fuzzy-set qualitative comparative analysis (fsQCA), which assumes that the relationships between predictors and outcomes are asymmetric, and the combinations of different predictors can contribute to the same outcome (Li *et al.*, 2018; Liu *et al.*, 2017; Pappas and Woodside, 2021).

Thus, this study applies fsQCA to obtain an in-depth understanding of the different combinations of FoMO (stressor) and various overloads (strain) contributing to SNS fatigue among SNS users, with empirical data collected from WeChat users (one of the most popular SNS in China). Based on the prior literature and SSO theory, FoMO is conceptualized as a stressor, which can trigger four different overloads (i.e. perceived information overload, communication overload, social overload, and system feature overload) as strains, and these strains will contribute to SNS fatigue as an outcome. We assume that FoMO (stressor) and various overloads (strain) will interact with each other and contribute to the outcome of SNS fatigue. fsQCA is applied to scrutinize the different configurations among the stressor and strains that contribute to the same outcome of SNS fatigue. This study aims to enrich the literature on SNS fatigue by explaining SNS fatigue from the configuration perspective via employing fsQCA and by disentangling the different combinations of conditions of stressor (FoMO) and strains (different overloads) in explaining SNS fatigue.

This article proceeds as follows. First the extant literature on SNS fatigue, FoMO, and perceived overload is discussed in Section 2. Afterward, the research method in this study was described, including data collection, the steps in the fsQCA analysis, and the empirical results in Section 3. Then, the findings were discussed in Section 4. Finally, the theoretical and practical implications are elaborated in Section 5, followed by pointing out the limitations of the current study and the future research directions in Section 6.

2. Theoretical background

2.1 Social networking site fatigue

SNS fatigue is a kind of psychological fatigue, which is a subjectively negative emotion that users experience when using an SNS (Zheng and Ling, 2021). Extant research has examined the antecedents of SNS fatigue. Overload has been suggested to be the main causes for SNS fatigue (Ashiru *et al.*, 2023; Cao and Sun, 2018; Cao *et al.*, 2021; Lin *et al.*, 2020; Zhang *et al.*, 2016). For instance, some studies have applied the SSO framework to explain SNS fatigue as a consequence and have argued that the strains, such as perceived communication overload and information overload, determine SNS fatigue. Some studies have examined SNS fatigue based on the stimulus-organism-response (SOR) theory and have found that overload (e.g. perceived social overload, communication overload, information overload) can be operationalized as a stimulus that leads to SNS fatigue (organism) (Cao and Sun, 2018; Lin *et al.*, 2020). In addition, based on the overload perspective and the limited capacity model (LCM), other studies have also detected that privacy concerns can serve as fatigue triggers (Al-Jallad and Radwan, 2021; Bright *et al.*, 2015). Some studies have also studied the consequences of SNS fatigue, such as negative emotions (Dhir *et al.*, 2018) and discontinuous usage (Luqman *et al.*, 2017; Maier *et al.*, 2015). Specifically, some scholars have found that SNS users who experience fatigue are likely to feel regretful, anxious, or depressed (Cao and Sun, 2018; Dhir *et al.*, 2018). SNS fatigue has also been identified as a predictor of discontinuous usage of SNS, which has been argued to be a main concern for long-term SNS success (Ou *et al.*, 2023). A summary of the prior research on the antecedents of SNS fatigue is presented in Table 1.

As shown in Table 1, prior studies have mainly applied the prevailing statistical methods, such as SEM and MRA to investigate SNS fatigue. The prior studies applying MRA and SEM assumed a symmetric relationship between the predictors and the outcome of SNS fatigue, and the findings explained the net effect of a single predictor on SNS fatigue but paid less attention to the joint effect of the different predictors on SNS fatigue; thus, they cannot interpret the joint effects of predictors on the outcome of SNS fatigue and the interdependence of predictors in explaining SNS fatigue from the configurational view.

As shown in Table 1, FoMO and overload have been the two significant perspectives for examining SNS fatigue in the literature. On one hand, four main types of overloads–perceived social overload, communication overload, information overload, and system feature overload–can induce SNS fatigue (Fu and Li, 2022; Lee *et al.*, 2016; Yu *et al.*, 2018; Zhang *et al.*, 2016). On the other hand, FoMO is also an important precursor to various overloads in different studies (Al-Jallad and Radwan, 2021; Hattingh *et al.*, 2022; Lin *et al.*, 2020; Tugtekin *et al.*, 2020; Zhou and Tian, 2023). However, existing studies have primarily focused on the net effects of either overloads (Lee *et al.*, 2016; Xiao *et al.*, 2019; Zhang *et al.*, 2016) or FoMO (Dhir *et al.*, 2018; Koban *et al.*, 2022; Tsai *et al.*, 2019) on SNS fatigue using SEM and MRA, and have seldom considered the interplay of overload and FoMO in explaining SNS fatigue from a configurational perspective.

The SSO framework has served as a crucial theoretical basis for understanding SNS fatigue in the literature. It explains how stressors can trigger strains, which further lead to SNS fatigue (Dhir *et al.*, 2018; Whelan *et al.*, 2020). According to the SSO, FoMO can be considered as a stressor, which can induce perceived social overload, communication overload, information overload, and system feature overload as strains, and these strains can in turn lead to SNS fatigue. Following the configuration theories (Liu *et al.*, 2017), different combinations of stressor (FoMO) and these strains can contribute to the same outcome of SNS fatigue and explain the asymmetric relationships between FoMO, overloads, and SNS fatigue. Thus, it is necessary to examine how FoMO as a stressor and various overloads as strains can jointly contribute to SNS fatigue from a configurational perspective.

2.2 Fear of missing out in SNS usage

FoMO refers to "an individual's high degree of anxiety toward absence from meaningful, pleasurable, or momentous experiences enjoyed by their contemporaries" (Tandon *et al.*, 2021a, p. 783). In prior literature, FoMO has been found to affect users' behavior in various contexts, such as social media platforms (Hunt *et al.*, 2018), smartphone (Sha *et al.*, 2019), and mobile applications (Rozgonjuk *et al.*, 2019). Furthermore, FoMO has been suggested to be an important antecedent of negative emotions and problematic behaviors, such as stress (Elhai *et al.*, 2018), depression (Tsai *et al.*, 2019), and compulsive social media use (Dhir *et al.*, 2018). For example, Tsai *et al.* (2019) have found a positive relationship between FoMO and loneliness and depression among LINE users. Dhir *et al.* (2018) confirmed that FoMO acts as a trigger for compulsive social media use and makes users feel fatigued. In the context of WhatsApp, FoMO was found to be positively related to the sharing of fake news among users (Talwar *et al.*, 2019).

Prior literature has revealed that FoMO, as a stressor, is an important antecedent of the strains of different overloads–perceived social overload, communication overload, information overload, and system feature overload–in SNS use (Chai *et al.*, 2019; Hattingh *et al.*, 2022). In the context of SNS, FoMO refers to the anxiety and worry experienced by individuals due to their unwillingness to miss out on what is happening on SNS, such as information, messages, and events (Tandon *et al.*, 2021a). FoMO often drives users to stay constantly connected to SNS platforms to ensure they do not miss out on any updates or events, which contributes to user

Study	Context	Theory	Research method	Antecedents
Al-Jallad and Radwan (2021)	General SNS	CLT, SSO, and SESAT	Survey (Correlation analysis)	Privacy concerns, perceived information overload, social comparison, FoMO, perceived system-feature overload, self-disclosure, and impression management concerns
Ashiru *et al.* (2023)	Facebook, Twitter, WhatsApp, and YouTube	/	Survey (SEM)	FoMO
Bright and Logan (2018)	General SNS	/	Survey (MRA)	FoMO, social media advertising, intrusiveness, attitude toward social media advertising
Budnick *et al.* (2020)	General SNS	/	Survey (MRA)	FoMO
Cao *et al.* (2020)	Facebook and WeChat	SCT	Survey (SEM)	Perceived social overload
Cao *et al.* (2021)	Mobile social networking App	AT	Survey (SEM)	Perceived information overload, system feature overload, and social overload
Cao and Sun (2018)	General SNS	SOR	Survey (SEM)	Perceived information overload, communication overload, and social overload
Chaouali (2016)	Facebook	U&G, SRT, & PEFM	Survey (SEM)	Perceived information overload and social overload
Dhir *et al.* (2018)	Facebook	SSO	Survey (SEM)	Compulsive SNS use
Fu and Li (2022)	Facebook	SCT	Survey (SEM)	Perceived technology overload, information overload and social overload
Gao *et al.* (2018)	Weibo, WeChat, Qzone, and others	PMT & IPT	Survey (SEM)	Ubiquitous connectivity, perceived information overload
Guo *et al.* (2020)	WeChat Moments	SSO	Survey (SEM)	Information irrelevance, perceived social overload and information overload
Hattingh *et al.* (2022)	Snapchat and Instagram	TCIU, SDT, LC4MP	Survey (SEM)	Perceived information overload, perceived communication overload, and FoMO
Islam *et al.* (2020)	General SNS	/	Survey (SEM)	Perceived information overload and communication overload
Lee *et al.* (2016)	General SNS	PEFM & TTSC	Survey (SEM)	Perceived information overload, communication overload, and system feature overload
Lin *et al.* (2020)	WeChat	SOR	Survey (SEM)	FoMO, perceived communication overload, information overload, social overload, and flow experience
Lo (2019)	Facebook	SST	Survey (SEM)	Social support and perceived social overload
Maier *et al.* (2015)	Facebook	/	Experiment (SEM)	SNS-stress creators
Milyavskaya *et al.* (2018)	General SNS	/	Survey (MRA)	FoMO
Pang (2021a)	WeChat	SSO	Survey (SEM)	Perceived information overload

(*continued*)

Table 1.
The antecedents of SNS fatigue in the literature

Study	Context	Theory	Research method	Antecedents
Sharma *et al.* (2023)	Facebook, Twitter, LinkedIn, Instagram	SOR	Surveys (SEM)	Perceived information overload
Shen *et al.* (2022)	General SNS	/	Survey (SEM)	FoMO
Sheng *et al.* (2023)	General SNS	COR	Survey (SEM)	Perceived information overload and system feature overload on SNS fatigue via emotional exhaustion
Shokouhyar *et al.* (2018)	Instagram	Overload	Surveys (SEM)	Perceived information overload, system feature overload, and social overload
Tandon *et al.* (2021b)	General SNS	TCIU, SCMT	Surveys (SEM)	FoMO
Tugtekin *et al.* (2020)	General SNS	SSO	Survey (MANOVA)	FoMO, perceived communication overload, information overload, system feature overload, system complexity, system pace of change, information equivocality, and information relevance
Whelan *et al.* (2020)	General SNS	SSO	Survey (SEM)	Perceived information overload, communication overload, and boredom proneness
Xiao *et al.* (2019)	General SNS	STA	Survey (SEM)	Social comparison, social surveillance, system complexity, system pace of change, perceived social information overload, and social interaction overload
Yu *et al.* (2018)	General SNS	SSO	Survey (SEM)	Perceived communication overload, information overload, and social overload
Zhang *et al.* (2016)	Qzone	SSO	Survey (SEM)	Perceived system feature overload, information overload, and social overload
Zhang *et al.* (2022a)	General SNS	CT	Survey (SEM)	Perceived information overload and social overload
Zhou and Tian (2023)	WeChat	/	Survey (SEM)	FoMO, perceived social overload, impression management concerns, network size, quadratic term of network size, and network heterogeneity
Zhu *et al.* (2023)	General SNS	/	Survey (SEM)	FoMO

Note(s): AT: Appraisal theory; CLT: Cognitive load theory; COR: Conservation of resources theory; CT: Cognition theory; IPT: Information processing theory; LC4MP: The limited-capacity model of motivated mediated message processing; MRA: Multiple regression analysis; PEFM: Person-environment fit model; PMT: Protection motivation theory; SCMT: Social comparison theory; SCT: Social cognitive theory; SDT: Self-determination theory; SEM: Structural equation modeling; SESAT: Selective exposure and selective avoidance theory; SOR: Stimulus-organism-response theory; SRT: Self-regulation theory; SSO: Stressor–strain–outcome theory; SST: Social support theory; STA: Socio-technical approach; TCIU: Theory of compensatory Internet use; TTSC: Transactional theory of stress and coping; U&G: The uses and gratifications theory
Source(s): Authors' own creation

Table 1.

perceptions of information overload when the volume of information becomes overwhelming for SNS users. Besides, users experiencing FOMO may feel the need to be present on multiple SNS platforms to stay updated across a wide range of communication channels. Managing communication channels on multiple platforms can contribute to communication overload. The findings of Hattingh *et al.* (2022) confirmed that FoMO can lead to perceived information overload and communication overload among SNS users.

Moreover, FoMO creates a mindset where users feel compelled to be continuously engaged in social interactions to avoid feeling left out. This continuous engagement, along with the pressure to participate in various social activities, contributes to user perceptions of social overload in SNS use. For example, Chai *et al.* (2019) found that FoMO affects perceived social overload in SNS use. Furthermore, SNS users who experience FoMO could be more likely to try various features of SNS to stay updated on a wide range of activities, which causes users to invest a lot of time and effort to comprehend and utilize each feature to its full potential, subsequently making them vulnerable to feeling overwhelmed (Chai *et al.*, 2019). Therefore, FoMO is also an important cause of perceived system feature overload.

Some studies also suggested FoMO as an important antecedent of SNS fatigue (Ashiru *et al.*, 2023; Budnick *et al.*, 2020; Hattingh *et al.*, 2022; Tandon *et al.*, 2021b). Some studies have confirmed that FoMO can exacerbate SNS fatigue, which can further lead to discontinuous usage of or dissatisfaction with the platform (Bright and Logan, 2018; Dhir *et al.*, 2018). For example, based on the SSO framework, Dhir *et al.* (2018) considered FoMO to be a significant stressor that can lead to SNS fatigue. Likewise, Bright and Logan (2018) found that FoMO positively relates to social media fatigue.

Prior research has examined the net effect of FoMO on various overloads and SNS fatigue. According to the SSO theory, FoMO could be regarded as a stressor that can trigger the strains of overloads, which in turn, lead to SNS fatigue.

2.3 Perceived overload in SNS usage

Extant literature has investigated how user perceptions of overload in SNS use affect SNS fatigue. Perceived overload describes one’s subjective evaluation and perception that one does not have enough capacity to cope with different objects or people on SNS (Ayyagari *et al.*, 2011; Zhang *et al.*, 2016). SNS are socio-technical platforms (Xiao *et al.*, 2019). Thus, social and technical factors could affect users’ perceptions and behaviors regarding SNS (Lee *et al.*, 2016). Four main dimensions of perceived overload have been suggested in SNS fatigue antecedents research—perceived social overload, communication overload, information overload, and system feature overload (Islam *et al.*, 2020; Lee *et al.*, 2016; Lo, 2019).

Perceived social overload is defined as users’ subjective perceptions that there are too many social demands to process on SNS and maintaining social relationships with the growing numbers of contacts on SNS requires too much time and effort from them (Zhang *et al.*, 2016). SNS could facilitate users in making friends and establishing social relationships. However, users have their own tolerance of social contacts on SNS, and too many social contacts on SNS might lead users to feel tired of SNS when their time and effort are spent on SNS to deal with different social demands and social interactions with no limit (West *et al.*, 2020). Perceived social overload has been demonstrated to be one of the main reasons for SNS fatigue (Fu *et al.*, 2020; Guo *et al.*, 2020; Islam *et al.*, 2020).

Perceived communication overload refers to a state in which the rate or quantity of communication demands from SNS (e.g. instant messaging and news feed) exceed users’ coping capacities (Lee *et al.*, 2016). In the context of SNS usage, users may need to handle too many different communication demands simultaneously, leading to communication overload. For example, a user may need to take a break from posting a status or some photos on WeChat due to the need to respond to friend requests, messages, or online video requests from family members. Communication overload requires users to shift their attention frequently, interrupting the current task, and making them feel fatigued (Islam *et al.*, 2020; Lee *et al.*, 2016).

Perceived information overload is defined as a state in which users receive a large amount of information on SNS that exceeds what an individual can handle (Zhang *et al.*, 2016). With the development of ICT technology and the exponential growth of the number of SNS users, the amount and speed of information generated and disseminated on SNS are growing rapidly (Lee *et al.*, 2016). Too much information on SNS may push users to their cognitive limits in processing information and overwhelm them (Karr-Wisniewski and Lu, 2010), at which point information overload occurs. In other words, the explosion of information on SNS may lead to information overload, which could lead to users' perceptions of information overload in their SNS use. Perceived information overload has also been suggested to be one of the main factors leading to SNS fatigue (Lee *et al.*, 2016; Ravindran *et al.*, 2014; Zhang *et al.*, 2016).

Perceived system feature overload reflects SNS users' perception of the technological characteristics of SNS that the technological features provided by SNS are too complex to use or exceed users' demands for SNS functions (Lee *et al.*, 2016; Zhang *et al.*, 2016). As shown in Table 1, previous studies have explored the phenomenon of fatigue in a variety of SNS contexts. Some studies focused on SNS fatigue in the context of general SNS (e.g. Al-Jallad and Radwan, 2021; Lee *et al.*, 2016; Sheng *et al.*, 2023; Tugtekin *et al.*, 2020). Meanwhile, other studies investigated various specific SNS platforms, such as Instagram (e.g. Shokouhyar *et al.*, 2018), Facebook (e.g. Fu and Li, 2022), WeChat (e.g. Zhou and Tian, 2023), and Qzone (e.g. Zhang *et al.*, 2016). The vast majority of studies have found that system feature overload is a serious problem in different SNS contexts, which can lead to user fatigue (Al-Jallad and Radwan, 2021; Cao *et al.*, 2021; Lee *et al.*, 2016; Tugtekin *et al.*, 2020). Indeed, SNS service providers keep updating or developing new technological features to improve SNS services. As a result, users can experience system feature overload, finding that SNS have many additional features that they hardly use or that they need to constantly adapt to or learn how to use new features of SNS due to the rapid change or updates of the SNS system, making them get tired of the SNS system features. System feature overload has also been found to be a predictor of SNS fatigue (Ayyagari *et al.*, 2011; Lee *et al.*, 2016).

Prior research has found that SNS fatigue is attributed to the above-discussed overload (perceived social overload, communication overload, information overload, and system feature overload) and has examined the net effects of these overloads on SNS fatigue. Different overloads as strains could affect SNS fatigue jointly. For example, SNS users overusing SNS for communication will lead to perceived communication overload. Meanwhile, they might also perceive information overload since a large amount of information from SNS can be beyond their capability to handle. In addition, the stressors, such as FoMO, which lead to the strains of different overloads, might also affect SNS fatigue jointly with the strains of overloads. However, prior research has paid little attention to the joint effects of FoMO and overloads on SNS fatigue from a configuration perspective. Given the complex factors contributing to SNS fatigue from the SSO perspective, it becomes necessary to examine SNS fatigue in a configurational manner. This approach helps in understanding how stressors (such as FoMO) and strains (such as different overloads) can jointly contribute to SNS fatigue. Therefore, this study considers these four dimensions of perceived overload in SNS usage as the strains in SNS usage and explores the joint effects of stressor (FoMO) and these strains in explaining SNS fatigue from a configurational perspective.

3. Methodology

3.1 Research design and measurement

This study selected WeChat users as the research subjects. WeChat is an SNS platform with the most active users in China. As of September 30, 2023, WeChat had more than 1.3 billion active users worldwide (Tencent, 2023). WeChat provides users with various functions for communication, social interaction, information sharing, and public services. It has become the primary SNS for both work and life in China. WeChat allows users to communicate in various ways, such as video chat, voice chat, and text message chat. It also enables users to follow official/individual accounts for news, updates, and promotional information. Users can share, comment, like, follow, and interact with their friends' updates. WeChat frequently updates its system features to provide users with good services.

Furthermore, Kantar China Social Media Impact Report recently stated that WeChat's positive impact on users has seen a decline, with the positivity index falling from 83.5 in 2017 to 80.6 (Kantar, 2018). Previous studies have found that WeChat users have perceived FoMO as well as social overload, communication overload, information overload, system feature overload when using WeChat, which lead to their SNS fatigue (Guo *et al.*, 2020; Lin *et al.*, 2020; Teng *et al.*, 2022). The popularity of WeChat in China and the decline in its positive impact on users motivate us to choose WeChat as the research object in this study.

An online survey was conducted to collect empirical data. The measurement instruments in this study were developed based on the literature, and the measurement items for constructs of perceived social overload, information overload, system feature overload, and SNS fatigue were adapted from the study of Zhang *et al.* (2016). Moreover, perceived communication overload was adopted from Lee *et al.* (2016) and FoMO was measured with the items taken from Przybylski *et al.* (2013). The measurement items were modified appropriately to fit the context of this study. Back-translation processes (from English to Chinese and Chinese to English) were performed to ensure that the original meaning from the measurement instrument remained unchanged in the final survey instrument. Construct items included in the current study were measured with a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). A pilot study was conducted among 10 WeChat users to ensure an understanding of the measurement instrument. Following the feedback from the research participants in the pilot study, we made some modification of the developed research instrument. The construct items of the six constructs in the current study are listed in Table A in Appendix.

3.2 Data collection

The empirical data were collected among WeChat users in China via an online survey. The online questionnaire was posted on Wenjuxing (https://www.wjx.cn/), which is a crowdsourcing platform mainly used for research participant recruitment. In this study, WeChat links for the questionnaire were distributed using the snowball sampling technique. We initially recruited some active WeChat users as subjects in the context of the research and research group and then asked them to send the questionnaire link to their active WeChat friends. We also asked their friends to disseminate the link. The survey ran from April 16 to April 28, 2022. A total of 440 questionnaires were collected, 77 of which were removed from the database because the respondents were underage or had the same answers to all questions, and 363 valid responses were eventually included in the analysis. Table 2 shows the basic profiles of the research participants. The most active and dominant WeChat user group in China consists of users aged 18–30 years old (Pang, 2021a, b). Most of the research participants in this study also fell within this age range (See Table 2). Among these participants, 45.7% were male users, and 54.3% were female users. The distribution aligns with the gender and age structure of WeChat users reported by AppGrowing (2022).

In addition, this study conducted a nonresponse bias analysis to check for significant differences between the early and late respondents following the procedure suggested by

Measure		Frequency	Percent (%)
Gender	Male	166	45.7
	Female	197	54.3
Age	18~25	179	49.3
	26~30	122	33.6
	31~35	25	6.9
	36~40	16	4.4
	41~45	9	2.5
	46~50	5	1.4
	51~59	7	1.9
Use experience (years)	<1	3	0.8
	1~3	18	5.0
	3~5	57	15.7
	5~7	123	33.9
	7~10	107	29.5
	>10	55	15.2
Number of friends	1~50	11	3.0
	51~100	28	7.7
	101~150	33	9.1
	151~250	82	22.6
	251~500	142	39.1
	501~800	30	8.3
	>800	37	10.2

Source(s): Authors' own creation

Table 2. Demographics

Armstrong and Overton (1977). We compared the age and gender variables of the initial 25% research participants to those of the final 25% participants. A Chi-square test was conducted to compare these variables between the early and late participants. The test results indicate that there is no significant difference ($p > 0.05$) in either age or gender, suggesting there is no serious issue of nonresponse bias in this study.

3.3 Reliability and validity analysis

Although fsQCA does not evaluate the reliability and validity of constructs, it is necessary to test the reliability and validity of measurements and report the corresponding results before conducting configuration analysis (Pappas and Woodside, 2021). In this study, the partial least squares (PLS) algorithm was used to test the measurement model to assess the reliability, convergent validity, and discriminant validity of the items. During the preliminary analysis, the factor loadings for a couple of construct items were lower than the recommended threshold value of 0.7 (Fornell and Larcker, 1981). Thus, these construct items were excluded in further data analysis in this study. The excluded construct items can be found in Table A1 in Appendix.

Table 3 illustrates the factor loadings, Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE) from all constructs in the model. The results indicate that the CA and CR of each construct were higher than the recommended threshold value of 0.7 (the lowest CA value was 0.858, the lowest CR score was 0.899), and the factor loadings of all the measurement items exceeded the recommended threshold value of 0.7 (Fornell and Larcker, 1981), indicating the reliability was supported (Chin *et al.*, 2003). As shown in Table 3, the AVE of all the constructs was above 0.5 (the lowest AVE value was 0.641), indicating good convergent validity (Chin *et al.*, 2003; Wixom and Watson, 2001).

Table 3.
Reliability and convergent validity

Constructs	Items	Loadings	CA	CR	AVE
Social overload (SO)	SO1	0.896	0.903	0.932	0.775
	SO2	0.889			
	SO3	0.894			
	SO4	0.841			
Communication overload (CO)	CO1	0.777	0.860	0.899	0.641
	CO2	0.819			
	CO3	0.729			
	CO4	0.845			
	CO5	0.829			
Information overload (IO)	IO1	0.889	0.873	0.922	0.798
	IO2	0.916			
	IO3	0.874			
System feature overload (SFO)	SFO1	0.778	0.858	0.904	0.703
	SFO2	0.866			
	SFO3	0.846			
	SFO4	0.860			
Fear of missing out (FoMO)	FoMO1	0.923	0.918	0.942	0.803
	FoMO2	0.933			
	FoMO3	0.876			
	FoMO4	0.850			
Social networking SNS fatigue (SF)	SF1	0.877	0.910	0.937	0.788
	SF2	0.847			
	SF3	0.898			
	SF4	0.928			

Source(s): Authors' own creation

We also assessed the discriminant validity by comparing the square root of the AVE of each construct and its correlation with other constructs, as well as by testing the heterotrait–monotrait ratio (HTMT). As shown in Table 4, the square root of the AVEs (shown as the bold numbers in the diagonal) for each construct was greater than the correlations between the latent variable and other latent variables (Fornell and Larcker, 1981). As shown in Table 5, the values of HTMT were below the threshold of 0.85, the value recommended by Henseler *et al.* (2016). These test results provided sufficient evidence of the discriminant validity of the constructs in this study.

Since this study collected self-reported data through questionnaires, there may be common method bias (CMB) (Podsakoff *et al.*, 2003). In this research, the Harmon one-factor test (Jia *et al.*, 2022; Podsakoff and Organ, 1986) was used for post-testing to avoid and detect

Table 4.
Discriminant validity: Fornell–Larcker criterion

Constructs	SO	CO	IO	SFO	FoMO	SF
SO	*0.880*					
CO	0.599	*0.801*				
IO	0.503	0.671	*0.893*			
SFO	0.359	0.461	0.519	*0.838*		
FoMO	0.380	0.375	0.374	0.352	*0.896*	
SF	0.455	0.556	0.661	0.622	0.391	*0.888*

Note(s): (1) The italic fonts in the leading diagonals are the square root of AVEs; (2) Off-diagonal elements are correlations among latent constructs
Source(s): Authors' own creation

possible CMB. The test results showed that the variance explained by the first factor was only 42.54%, which did not exceed the 50% threshold (Podsakoff *et al.*, 2003). Therefore, we contend that CMB may not be a serious problem in this study.

3.4 Calibration

Qualitative comparative analysis (QCA) allows conditions to be represented as sets, irrespective of the type of data (Ragin, 2008). Therefore, the first stage of the analysis involves transforming the model's variables into sets. In fsQCA, this procedure is referred to as data calibration (Liu *et al.*, 2017). Before employing fsQCA, the raw values of variables need to be calibrated to fuzzy membership values ranging from 0 to 1, which indicates to what extent a case belongs to a fuzzy-set (Ragin, 2008). Generally, data can be calibrated via using 1, 0.5, and 0 as breakpoints. Here, 1 indicates full-set membership, 0.5 indicates intermediate state (where a case would be both a full-set member of the fuzzy-set and a full-set non-member), and 0 indicates full-set non-membership (Li *et al.*, 2018; Liu *et al.*, 2017; Pappas and Woodside, 2021). However, the values will undergo a logarithmic transformation when calibrated using fsQCA software. The log-odds transformation cannot produce memberships that are equal to 0 or 1; therefore, 0.05 and 0.95 have been applied in data calibration as the breakpoints for full-set non-membership and full-set membership, respectively, rather than 0 and 1.

There are two acceptable data calibration methods-direct calibration and indirect calibration. When there are specific theoretical bases and/or available criteria for the assessment of the variable of interest to the researchers, the indirect method should be considered, which argues that the measurements need to be rescaled based on the existing evaluation criteria (Pappas and Woodside, 2021). In other cases, the researchers can apply direct calibration, which mandates that the researcher must choose three different breakpoints that will be applied to define the level of membership in the fuzzy-set for each case, including fully in, intermediate, and fully out (Pappas and Woodside, 2021). Considering the replicability and rigor of the study and the lack of indirect standards, following the recommendations and practices of Pappas *et al.* (2020) and Pappas and Woodside (2021), the direct method was used to calibrate the variables as fuzzy-sets in this study.

When the raw data were collected from the Likert scale, it is necessary to identify three raw values to correspond with the breakpoints during the calibration phase. Following the approaches used in prior studies for calibrating seven-point Likert scale data (e.g. Jacqueminet and Durand, 2020; Pappas *et al.*, 2016, 2020; Pappas and Woodside, 2021), we set the original values of 2, 4, and 6 in the survey data to correspond, respectively, to the three anchors 0.05 (full non-membership), 0.5 (cross-over point), and 0.95 (full membership) in fsQCA 3.0. This was done to align the fuzzy-set calibration with the seven-point Likert scale applied in the survey data collection. The four left values in the survey data, such as 7, 5, 3, and 1, were calibrated via employing the default function fit into the four membership values of the variables included in this study.

Constructs	SO	CO	IO	SFO	FoMO	SF
SO						
CO	0.679					
IO	0.567	0.766				
SFO	0.403	0.533	0.594			
FoMO	0.415	0.414	0.417	0.393		
SF	0.497	0.620	0.738	0.699	0.423	

Source(s): Authors' own creation

Table 5. Discriminant validity: Heterotrait–monotrait ratio (HTMT)

3.5 Necessary condition analysis

We then used QCA to check the necessary conditions for SNS fatigue. This analysis can determine whether any of the conditions are consistently present (or absent) in every situation where SNS fatigue is observed (Ragin, 2008). The test results shown that the consistency of a single conditional necessity for both high and low conditions is lower than the consistency threshold of 0.90 for a necessary condition (See Table 6) (Schneider and Wagemann, 2010). Therefore, none of the low or high conditions of perceived social overload, communication overload, information overload, system feature overload, or FoMO are necessary for SNS fatigue (Fiss, 2011).

3.6 Results of the fsQCA analysis

After calibrating the variables and the necessary condition analysis, a truth table was constructed with a list of all possible combinations or configurations of conditions for the same outcome of SNS fatigue. If the number of conditions is k, there will be 2^k configurations. As there were five causal conditions in our research, the truth table consisted of 32 possible combinations (see Table 7). In a truth table, each row represents a unique combination, and the number represents the frequency of observations for that combination. A higher frequency means that more cases in the sample are explained by that specific combination (Pappas and Woodside, 2021).

A number-of-cases (frequency) needs to be set to fine-tune the initial truth table and isolate relevant configurations since the sample cases in a study might not cover all configurations in the initial truth table (Li *et al.*, 2018). Combinations with a frequency less than the threshold number of cases will be removed from further analysis. Fiss (2011) and Ragin (2008) suggested that if the data sample size exceeds 150, the case frequency threshold could be set at 3 or higher, whereas for sample size smaller than 150, the frequency threshold could be set at 2. In this study the sample case size is 363. Thus, we set the case frequency threshold at 3. The combinations with frequencies smaller than 3 were not included in further analysis.

The remaining combinations are the potential fuzzy rules, which provides a set of conditions for the defined outcome to present or not (Liu *et al.*, 2017). Consistency was applied in QCA to verify these potential rules are true (Liu *et al.*, 2017), including raw consistency and Proportional Reduction in Inconsistency (PRI) consistency. In fsQCA, raw consistency can be applied to measure the extent to which a given combination is a sufficient condition for the defined outcome. The recommendation threshold for raw consistency is 0.8 (Ragin, 2008), but the threshold can be adjusted as the problem context dictates (Liu *et al.*, 2017). The raw consistency threshold can be adjusted based on the identified natural breaking point referring to the minimum recommended PRI value (Pappas and Woodside, 2021). PRI consistency, relevant to fuzzy-sets, is an alternate measure of the consistency of subset

Causal conditions	Consistency	Coverage
SO	0.656825	0.832814
~SO	0.553723	0.575202
CO	0.730401	0.831676
~CO	0.505524	0.578991
IO	0.711971	0.901852
~IO	0.513196	0.533531
SFO	0.855262	0.809563
~SFO	0.392483	0.564813
FoMO	0.525788	0.875693
~FoMO	0.680610	0.591365

Note(s): "~" represents non-set
Source(s): Authors' own creation

Table 6.
Single-condition necessity analysis using QCA

SO	CO	IO	SFO	FoMO	Frequency	Raw consistency	PRI consistency	Symmetric consistency
0	0	0	0	0	56	0.558141	0.150874	0.153846
1	1	1	1	1	37	0.988873	0.978684	0.978684
1	1	1	1	0	28	0.972238	0.937539	0.939044
0	0	0	1	0	25	0.781744	0.459221	0.471043
0	1	1	1	0	13	0.93573	0.804739	0.824274
1	0	0	1	0	10	0.879095	0.561086	0.56437
0	1	0	1	0	10	0.852767	0.541773	0.541774
0	1	0	0	0	9	0.800691	0.31756	0.31756
1	1	0	1	1	8	0.944834	0.777778	0.809918
0	0	0	1	1	8	0.929031	0.700181	0.705936
1	0	0	0	0	8	0.820275	0.28096	0.28493
0	0	1	1	0	7	0.926449	0.736011	0.742857
1	1	1	0	0	7	0.934916	0.722674	0.730592
1	1	0	1	0	6	0.909987	0.678198	0.682206
0	0	0	0	1	5	0.89709	0.425363	0.4375
0	1	1	1	1	4	0.981011	0.932422	0.932422
0	0	1	1	1	3	0.973958	0.882854	0.882855
1	1	1	0	1	3	0.979713	0.876238	0.876237
1	0	0	1	1	3	0.967641	0.835966	0.835966
1	0	1	1	0	3	0.941272	0.770635	0.770634
0	1	1	0	0	3	0.926242	0.623421	0.623421
0	0	1	0	0	3	0.925196	0.603324	0.603325
1	0	1	1	1	2	0.968136	0.862461	0.883475
1	1	0	0	1	2	0.960421	0.717946	0.717947
0	1	0	1	1	2	0.942656	0.71395	0.713951
1	1	0	0	0	2	0.882756	0.449247	0.449246
0	1	0	0	1	2	0.911928	0.418846	0.418847
0	0	1	0	1	1	0.94271	0.541284	0.541285
1	0	1	0	0	0	–	–	–
1	0	0	0	1	0	–	–	–
1	0	1	0	1	0	–	–	–
0	1	1	0	1	0	–	–	–

Source(s): Authors' own creation

Table 7. Truth table for SNS fatigue

relations (Pappas and Woodside, 2021). PRI consistency can be applied to avoid the situation that the subset relations of configurations are in both the presence and the absence (i.e. negation) of the defined outcome simultaneously. Pappas and Woodside (2021) recommended the minimum recommended PRI value as 0.70.

We sorted the truth table with PRI consistency, and we found that the raw consistency value matching the minimum PRI consistency value (0.7) was approximately equal to 0.92. Therefore, we set the raw consistency threshold at 0.92, which was higher than the suggested minimum raw consistency threshold of 0.80, resulting in more reliable and sufficient conditions (Ragin, 2008). To sum up, the raw consistency threshold, the PRI consistency, and the case frequency threshold were set to 0.92, 0.70, and 3 in this study, respectively, to reduce the truth table and identify sufficient conditions for SNS fatigue.

The constructed truth table was standardized and analyzed to obtain three kinds of solutions (i.e. complex, parsimonious, and intermediate solutions), and the core and peripheral conditions were identified by comparing the intermediate and parsimonious solutions. As shown in Table 8, six configurations that led to SNS fatigue were obtained, with an overall consistency of 0.945 and an overall coverage of 0.545. Both the overall consistency and the consistency of each solution exceeded the minimum threshold of 0.75 (Fiss, 2011;

Conditions	Configurations					
	S1				S2	
	S1a	S1b	S1c	S1d	S2a	S2b
SO	⊗		⊗	•	•	
CO	●			•		⊗
IO	●	●	●	●	⊗	⊗
SFO		•	•		●	●
FoMO	⊗	⊗			●	●
Raw coverage	0.322	0.448	0.354	0.512	0.226	0.240
Unique coverage	0.016	0.021	0.024	0.145	0.010	0.021
Consistency	0.906	0.935	0.928	0.955	0.940	0.936
Over solution coverage	0.731					
Over solution consistency	0.909					

Note(s): Big ● and ⊗ represent the presence and absence of core conditions, respectively, and small • and ⊗ represent the presence and absence of peripheral conditions, respectively. Blank cells indicate the condition of being either present or absent
Source(s): Authors' own creation

Table 8. Configurations leading to SNS fatigue with fsQCA

Pappas and Woodside, 2021). The overall solution coverage is 0.731, which indicated that many results were explained by the six solutions.

Additionally, fsQCA determines the empirical relevance of each solution through the computation of raw and unique coverage. Raw coverage quantifies the extent to which a specific alternative solution accounts for the outcome, while unique coverage delineates the proportion of the outcome that is solely attributable to a certain alternative solution. The solutions presented in Table 8 elucidate a substantial portion of users' fatigue during the use of WeChat, encompassing a range from 22.6% to 51.2% of the cases linked to this outcome.

In light of the principle of equifinality, which encompasses diverse core conditions, it becomes evident that configurations can manifest both first- and second-order solutions, as expounded by Fiss (2011). Two first-order equifinality of solutions were identified in this study, alongside a couple of second-order equifinality of solutions specific to the same category within a particular configuration (see Table 8).

As shown in Table 8 in Solution 1 (S1), perceived information overload is the core condition for the presence of SNS fatigue when combined with four other core or peripheral conditions. First, perceived social overload and FoMO are the core conditions for absence (see S1a). Second, perceived system feature overload is noted as a peripheral condition for presence, while FoMO acts as a core condition for absence (see S1b). Third, perceived system feature overload serves as a peripheral condition for presence, while perceived social overload as a core condition for absence (see S1c). Fourth, perceived social overload and communication overload are mentioned as peripheral conditions for presence (see S1d). These four solutions explain users' SNS fatigue at 32.2%, 44.8%, 35.4%, and 51.2%, respectively.

Solution 2 (S2) indicates that perceived system feature overload and FoMO are the two core conditions for the presence of SNS fatigue when combined with two other core or peripheral conditions. First, perceived social overload is a peripheral condition for presence, while perceived information overload is a core condition for absence (see S2a). Second, perceived communication overload and information overload are core conditions for absence (see S2b). These two solutions explain SNS fatigue at 22.6% and 24.0%, respectively.

3.7 Robustness tests

In this study, the results of the necessary condition analysis and the configuration analysis in fsQCA were tested for robustness. We used the R package of NCA (necessary condition analysis) to analyze the necessary conditions and compared the results with the necessary conditions of QCA (Dul, 2016; Du and Kim, 2021). In NCA, one condition can be necessary if the effect size (d) is more than 0.1 and is significant (Dul, 2016; Dul *et al.*, 2020). The results of the NCA method for the analysis of the calibrated data are shown in Table 9. None of the conditions had an effect size (d) greater than 0.1, so there was no necessary condition, which was consistent with the results of the fsQCA analysis.

We then used two methods to test the results of the configuration analysis. First, we reran the fsQCA by setting the PRI threshold to 0.75, which was different from the 0.70 used in the formal analysis and obtained the same solution. Second, we calibrated and analyzed the raw data with the new calibration points (7, 4, 1) and obtained the same solutions as a result. In summary, the results of the analysis in this study have validity.

4. Discussion

Based on SSO theory, this study sought to uncover the joint effects of stressor (e.g. FoMO) and strains (e.g. perceived social overload, communication overload, information overload, and system feature overload) on SNS fatigue from a configurational perspective. Six combinations of casual conditions were identified to underlie SNS fatigue. Based on the equifinality of different core conditions (Fiss, 2011), this study further identified two first-order equifinality solutions (i.e. S1 and S2) and their second-order solutions (i.e. S1a, S1b, S1c, S1d, S2a, and S2b). The results revealed that the interplay of stressor (i.e. FoMO) and strains (i.e. various overloads) jointly contribute to the outcome of SNS fatigue. We proposed several theoretical configurational propositions for SNS fatigue based on the findings.

Perceived information overload is a core condition (S1) for SNS fatigue, playing a critical role in driving SNS fatigue, as indicated in the prior extant literature (Lee *et al.*, 2016; Ravindran *et al.*, 2014; Zhang *et al.*, 2016). S1 showed that perceived information overload was a sufficient condition for SNS fatigue only when combined with other different conditions (see S1a, S1b, S1c, and S1d in Table 8). Specifically, when users perceived high information overload in their SNS use, even if they did not perceive high social overload and FoMO, they could feel SNS fatigue regardless of the perceived communication overload and system feature overload in their SNS use (S1a). In other cases, when users perceived high system feature overload and information overload during their SNS usage, even if they did not suffer from any FoMO, they did feel SNS fatigue regardless of perceived social overload and

Fuzzy-set conditions	Method	C-accuracy (%)	Ceiling zone	Scope	Effect Size(d)	*p*-value
SO	CR	100	0	0.96	0	1
	CE	100	0	0.96	0	1
CO	CR	98.6	0.009	0.96	0.01	0
	CE	100	0.012	0.96	0.012	0
IO	CR	99.7	0.002	0.96	0.002	0.05
	CE	100	0.003	0.96	0.003	0.037
SFO	CR	99.4	0.039	0.96	0.041	0
	CE	100	0.024	0.96	0.025	0.001
FoMO	CR	100	0	0.96	0	1
	CE	100	0	0.96	0	1

Note(s): (1) The effect size analysis uses data calibrated as membership scores. (2) $0.0 \leq d < 0.1$, indicating a "small size"; $0.1 \leq d < 0.3$, indicating a "medium size"; $0.3 \leq d < 0.5$, indicating a "high size". (3) NCA analysis with the permutation test (resampling = 10,000)
Source(s): Authors' own creation

Table 9.
Necessary condition analysis (NCA) results

communication overload (Solution S1b). However, even if they did not suffer from any perceptions of social overload, they felt SNS fatigue, regardless of perceived communication overload and FoMO (S1c). In other cases, when users perceived high social overload, communication overload, and information overload in their SNS use, they felt SNS fatigue regardless of their perceived system feature overload or FoMO (S1d).

Nowadays, SNS have become the main channel for individuals to get information. This means that once users surf on SNS, they might be exposed to large amounts of information from SNS. According to the LCM (Lang, 2000), people have a limited ability to comprehend information. Excessive amounts of information on SNS could overwhelm users by pushing them to their cognitive breaking points, leading to perceived information overload. For those SNS users who mainly used SNS as an information source, perceived information overload led them to feel fatigued, even if they had perceived low social overload and FoMO and no matter they perceived any system feature overload and communication overload in their SNS use or not (S1a).

In addition, SNS also serves as an important channel for communication and socialization for SNS users (Chen *et al.*, 2014). It is possible that some SNS users perceived information overload in SNS and used the communication and socialization functions of SNS excessively in their lives. Thus, they could perceive also social and communication overload and feel SNS fatigue (S1d). Furthermore, SNS continuously update their system features. Those who were not good at technologies easily felt SNS fatigue as they could not comprehend the information from SNS and when the system feature updating exceeded their demands for SNS functions no matter whether they perceived FoMO or social and communication overload or not (S1b and S1c). These four specific configurations for S1 offer evidence that perceived information overload is a core casual condition for SNS fatigue, and perceived social overload, communication overload, and system feature overload jointly explained SNS fatigue as peripheral conditions together with the core condition of perceived information overload.

Based on the discussion above and the configurations S1, we propose that:

Proposition 1. When SNS users experience the strain of perceive information overload in their SNS use, they could feel SNS fatigue if they also experience the strains of perceive social overload and communication overload or perceive system feature overload irrespective of the stressor of FoMO in their SNS use.

As shown in S2, FoMO is a core condition for SNS fatigue and must be present simultaneously with perceived system feature overload as another core condition and combined with other factors to contribute to SNS fatigue. That is, if SNS users are afraid of missing any messages or friends' updates on SNS with complex and continuous updating features, they will get exhausted when using the SNS if they also perceive social overload but not information overload regardless of whether they experience communication overload or not (S2a) or if they do not perceive any communication overload and information overload regardless of whether they experience social overload or not (S2b). These results indicate that perceived system feature overload and FoMO are two core conditions for SNS fatigue together with perceived social overload, communication overload, and information overload as peripheral conditions. The existing literature has confirmed that FoMO and perceived overload are important contributors to SNS fatigue (e.g. Bright and Logan, 2018; Dhir *et al.*, 2018; Ye *et al.*, 2023). These findings on the interplay of FoMO and different overloads not only support the findings of the existing studies, but also explain how they interplay and contribute to the outcome of SNS fatigue from a configurational view.

Based on the discussion above and the configurations S2, we propose that:

Proposition 2. When SNS users experience the stressor of FoMO and the strain of perceived system feature overload in their SNS use, they could feel SNS fatigue without the strain of perceived information overload irrespective of the strains of perceived social overload and communication overload or not.

Furthermore, we conducted post hoc analysis on the raw uncalibrated survey data using SEM. The evaluation of the reliability and validity of each construct are accepted. The collinearity is not a serious issue in this study since the maximum VIF value is 6.686, which is less than the recommended threshold of 10 (Hair, 1992). The test results show that FoMO is positively associated with perceived information overload ($\beta = 0.376$, $p = 0.000$), perceived system feature overload ($\beta = 0.352$, $p = 0.000$), perceived social overload ($\beta = 0.382$, $p = 0.000$), and perceived communication overload ($\beta = 0.379$, $p = 0.000$). Perceived information overload ($\beta = 0.362$, $p = 0.000$) and system feature overload ($\beta = 0.343$, $p = 0.000$) are positively associated with SNS fatigue. However, the positive relationships between perceived social overload ($\beta = 0.070$, $p = 0.174$), perceived communication overload ($\beta = 0.084$, $p = 0.223$), FoMO ($\beta = 0.076$, $p = 0.098$), and SNS fatigue are not significant.

The test findings via configurational analysis in this study provide explanations for the insignificant relationships between perceived social overload, perceived communication overload, FoMO, and SNS fatigue. The configurational analysis revealed the asymmetric relationships of stressor (FoMO), strains (perceived information overload, communication overload, social overload, and system feature overload), and SNS fatigue. These findings also explain the roles of perceived social overload, perceived communication overload, and FoMO in contributing to the outcome of SNS fatigue when interacting with other factors, such as perceived social overload is a peripheral condition in S1d and S2a, perceived communication overload is a peripheral condition in S1d, and FoMO is a core condition in both S2a and S2b.

5. Implications

5.1 Theoretical implications

This study makes theoretical contributions to the SNS fatigue literature. First, the current work supplements the research findings on SNS fatigue by identifying the configurations contributing to SNS fatigue from the joint effects of stressor (FoMO) and strains (perceived social overload, communication overload, information overload, and system feature overload) and from a configurational perspective. Specifically, this study enriches the existing literature that mainly focused on examining the net effect of discrete factors, such as stressors and strains, inducing SNS fatigue. Unlike the traditional SEM approach that investigates the net effect of variables on SNS fatigue (Dhir *et al.*, 2018, 2019; Lee *et al.*, 2016; Xiao *et al.*, 2019), this study applied the fsQCA method to explore the combinations of causal conditions that contribute to SNS fatigue by taking advantage of fsQCA in exploring the joint effect of both stressor and strain on the same outcome, which is more in line with the complex reality of SNS fatigue (Fiss, 2011; Woodside, 2013). The results of this study's configurational analysis showed six combinations of FoMO (stressor) and various overloads (strains) that contribute to SNS fatigue. The findings provide additional insights into the field of SNS fatigue from a configuration perspective, which supplement the variance-based view of the net effects of stressors and strains on SNS fatigue.

Additionally, the casual configurations based on the casual conditions of perceived social overload, perceived communication overload, perceived information overload, perceived system feature overload, and FoMO uncover the asymmetric relationships between the stressor, strain, and SNS fatigue. Our findings also help explain the discrepancies in prior findings about the impact of FoMO as a stressor and different overloads as strains on SNS fatigue. For example, Cao and Sun (2018) found no significant influence of perceived communication overload on SNS fatigue, while Lee *et al.* (2016) suggested a positive relationship between perceived communication overload and SNS fatigue. Likewise, Zhang *et al.* (2016) found a positive association between perceived social overload and SNS fatigue, while Shokouhyar *et al.* (2018) demonstrated that the positive impact of perceived social overload on SNS fatigue was not supported. The research findings in this study indicate that perceived social and communication overload alone are not sufficient to the outcome of SNS fatigue. Only when combined with other core conditions (e.g. perceived information overload, perceived system feature overload, FoMO) can perceived communication and social overload contribute to SNS fatigue. These findings provide knowledge about the joint effects of FoMO (stressor) and different overloads (strains) in explaining SNS fatigue and deepen our understanding of the complex interplay of stressor (FoMO) and strains (various overload) in contributing to SNS fatigue.

Furthermore, this research offers new insights into the mechanisms underlying SNS fatigue by identifying the core and peripheral conditions for casual configurations driving SNS from a joint view of stressor (FoMO) and strains (various overload). Unlike prior studies examining the net effects of stressors and strains on SNS fatigue (e.g. Guo *et al.*, 2020; Lee *et al.*, 2016; Zhang *et al.*, 2016; Lin *et al.*, 2020; Qaisar *et al.*, 2022), this study investigated the interplay of stressor (FoMO) and strains (various overload) in explaining SNS fatigue from the configuration perspective. Specifically, we identified perceived information overload, perceived system feature overload, and FoMO as core conditions and the bundling effect of perceived system feature overload and FoMO in SNS fatigue as peripheral conditions. Our findings showed that perceived information overload existed in four out of six configurations and acted as a core factor, suggesting that information overload plays a key role in exacerbating SNS user fatigue. We also found that FoMO cannot affect SNS fatigue alone; only when it is combined with system feature overload can it cause SNS fatigue. These findings also provide evidence that understanding the relevance of different overloads as strains in comprehending SNS fatigue requires consideration of the joint effects with SNS users' perception of FoMO as a stressor.

5.2 Practical implications

The study also provides some practical guidance for SNS operators in dealing with users' SNS fatigue, which could lead to users' quitting or reducing the use of SNS. The current findings on the joint effect of overloads and FoMO on users' SNS fatigue suggest that SNS operators should be aware of the combined effect of different overloads and FoMO in contributing to SNS fatigue and develop strategies for the different aspects related to overload. Changing one aspect alone may not be enough to reduce SNS fatigue. Specifically, our findings suggest that information overload is a key cause of users' SNS fatigue when combined with other overloads and FoMO. Thus, SNS operators should provide SNS users guidelines on how to provide or share information with good quality on SNS, how to avoid some information that might not be useful to them, and how to set a limitation to their information consumption on SNS. For example, they can provide SNS users' messages to remind them to block some functions of SNS with instructions; thus, SNS users can decide on when and what information they would like to receive from whom in SNS type, which could keep users from SNS fatigue when the sufficient condition of information overload is not present.

Our findings also revealed that the presence of both FoMO and system feature overload leads to SNS fatigue when combined with other types of overloads. Thus, SNS operators should also pay attention to the rational design of SNS features and reduce unnecessary SNS features if needed. When SNS users do not feel system feature overload in their SNS use, they will not feel SNS fatigue because when the sufficient condition of system feature overload for SNS fatigue is absent, SNS users will not perceive SNS fatigue yet. Thus, they will be highly likely to continue their SNS use.

6. Limitations and future research directions

The current study has several limitations that need to be acknowledged. First, in this study only FoMO as a stressor and four different overloads (social overload, communication overload, information overload, and system feature overload) as strains are set as the casual conditions for SNS fatigue to explore the casual configurations for SNS fatigue following the SSO theory. Other relevant factors identified in prior literature, such as the size of friends, privacy concerns, social comparison, SNS addiction, were not considered in this study. Thus, future studies could examine SNS fatigue from a configurational perspective by considering other casual conditions from various theoretical views. Second, self-reported survey data were applied in this study. Future studies could use other sources of data to examine SNS fatigue from the configurational view, such as qualitative data. Third, empirical data were collected among the SNS users of one major SNS in China. Thus, caution should be taken when generalizing the findings of this study to other SNS platforms or SNS users with different cultural backgrounds. Future research could consider replicating this study on other SNS platforms or among SNS users with other cultural backgrounds to increase the generality of the findings in this study.

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Appendix

Constructs	Items	Source
Perceived social overload (SO)	SO1: I take too much care of my friends' well-being on WeChat SO2: I deal too much with my friends' problems on WeChat SO3: I am too often caring for my friends on WeChat SO4: I pay too much attention to my friends' posts on WeChat	Zhang *et al.* (2016)
Perceived communication overload (CO)	CO1: I receive too many messages from friends (or acquaintances) through WeChat CO2: I feel like I have to send many more messages to friends through WeChat than I would want to send CO3: I feel that I generally get too many notifications of new postings, push messages, news feeds, etc., from WeChat while performing other tasks CO4: I often feel overloaded with communication from WeChat CO5: I receive more communication messages and news from friends on WeChat than I can process	Lee *et al.* (2016)
Perceived information overload (IO)	IO1: I am often distracted by the excessive amount of information available to me on WeChat IO2: I find that I am overwhelmed by the amount of information I have to process on a daily basis on WeChat IO3: There is too much information about my friends on WeChat, so I find it a burden to handle *IO4: I find that only a small part of the information on WeChat is relevant to my needs	Zhang *et al.* (2016)
Perceived system feature overload (SFO)	SFO1: I am often distracted by features that are included in WeChat but are not related to my main purpose in using WeChat SFO2: I find that most features of WeChat contain too many poor sub-features instead of too few excellent sub-features SFO3: WeChat tends to try to be too helpful by adding features, which makes social performance even harder SFO4: The features of WeChat that I use are often more complex than the tasks I have to complete using these features	Zhang *et al.* (2016)
Fear of missing out (FoMO)	FoMO1: I fear others have more rewarding experiences than me FoMO2: I fear that my friends have more rewarding experiences than me FoMO3: I get worried when I find out my friends are having fun without me FoMO4: I get anxious when I do not know what my friends are up to	Przybylski *et al.* (2013)
SNS fatigue (SF)	SF1: Sometimes I feel tired when using WeChat SF2: Sometimes I feel bored when using WeChat SF3: Sometimes, I feel drained from using WeChat SF4: Sometimes, I feel worn out from using WeChat *SF5: I feel disinterested in whether new things are happening on WeChat *SF6: I feel indifferent about reminders or alerts of new things from WeChat	Zhang *et al.* (2016)

Note(s): "*" Indicates that the item was excluded in further data analysis in this study
Source(s): Authors' own creation

Table A1.
Measurement items