



Original

The influence of information and social overload on academic performance: The role of social media fatigue, cognitive depletion, and self-control

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ABSTRACT

The growing reliance on social media and unlimited access to information have raised concerns about their impact on mental health and academic performance. This study examines how information and social overload influence fatigue, cognition, and the academic performance of university students, with a particular focus on the moderating role of self-control. The sample consisted of 320 university students from China ($M = 20.51$, $SD = 1.52$), of which 73.4% were women and 26.6% were men. Through a structural model based on the stress-outcome framework and the ego depletion theory, the relationships between these variables are explored. The findings reveal that information overload significantly contributes to social media fatigue, indicating that excessive use of information leads to mental exhaustion in students. This fatigue increases cognitive depletion, reducing students' ability to concentrate and process information. As a result, this depletion negatively impacts their academic performance. Furthermore, self-control is identified as a significant moderator in the relationship between information overload and fatigue, highlighting its importance in managing the negative effects associated with intensive social media use. This study provides valuable insights into the interaction between information use, self-control, fatigue and academic performance, offering relevant implications for the well-being and academic success of university students.

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La influencia de la sobrecarga social y de información en el rendimiento académico: el rol de la fatiga provocada por las redes sociales, el agotamiento cognitivo y el autocontrol

RESUMEN

La creciente dependencia de las redes sociales y el acceso ilimitado a la información han generado preocupación sobre su impacto en la salud mental y el rendimiento académico. Este estudio analiza cómo la sobrecarga de información y la sobrecarga social influyen en la fatiga, la cognición y el rendimiento académico del alumnado universitario, incidiendo especialmente en el papel moderador del autocontrol. La muestra está compuesta por 320 estudiantes universitarios chinos ($M = 20.51$, $DT = 1.52$), de los cuales el 73.4% son mujeres y el 26.6% hombres. Mediante un modelo estructural basado en el marco del estrés-resultado y la teoría del agotamiento del ego, se exploran las relaciones entre las variables. Los hallazgos revelan que la sobrecarga de información contribuye significativamente a la fatiga provocada por las redes sociales, lo que indica que el uso excesivo de información genera un cansancio mental en el alumnado. Esta fatiga incrementa su agotamiento cognitivo, lo que reduce su capacidad para concentrarse

Palabras clave:

sobrecarga de información

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y procesar información. Como consecuencia, este agotamiento afecta de forma negativa a su rendimiento académico. Además, se identifica que el autocontrol modera de manera significativa la relación entre la sobrecarga de información y la fatiga, subrayando su importancia en la gestión de los efectos negativos asociados al uso intensivo de las redes sociales. Este estudio proporciona nuevas perspectivas sobre la relación entre el uso de la información, el autocontrol, la fatiga y el rendimiento académico, que influyen de manera relevante en el bienestar y el éxito académico del alumnado universitario.

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Introduction

In the contemporary digital era, social media has become an essential aspect of everyday life, radically transforming the dynamics of interaction, access to information, and relationship management among university students (Junco, 2012). Social media has enabled unprecedented access to vast volumes of information and have facilitated social connections on a global scale (Castro-Higueras et al., 2022). However, the intensive and ubiquitous use of social media has raised significant concerns regarding their potential repercussions on students' mental health and academic performance, especially among adolescents and young people, who are the most frequent users of social media and are particularly vulnerable to adverse effects such as stress, anxiety, and fatigue caused by social media, which can ultimately negatively impact their academic performance (Becker et al., 2013; Primack et al., 2017).

Previous studies have documented that information overload, characterized by an excess of data that users must process within a limited time, is associated with increased stress levels and a reduced capability to make efficient choices (Shi et al., 2020). This type of overload can lead to a state of mental saturation that compromises cognitive capacity, thereby decreasing efficiency and quality in academic tasks (Ning & Inan, 2023). Additionally, social overload, which involves the pressure to maintain multiple social interactions through social media, has been linked to increased anxiety and a constant need to stay connected (Maier, Laumer et al., 2015). This continuous social demand can deplete students' cognitive and emotional resources, affecting their concentration (Do et al., 2024).

Although the impact of social media has been extensively researched, there is a notable lack of studies exploring the impact of self-control as a moderator in the relationship between information and social overload and fatigue. Self-control, defined as the ability to regulate impulses and behaviors in challenging contexts, has been identified as a key factor in mitigating the negative effects of obsessive-compulsive patterns such as Internet addiction (Hinojo-Lucena et al., 2020; Tangney et al., 2004). In the context of social media, previous studies have shown that self-control and related concepts, such as self-regulation, can reduce the impact of intensive use of these platforms on overall well-being (Cao et al., 2018; Hofmann et al., 2012). However, little attention has been given to how this ability specifically moderates the relationship between information and social overload and fatigue, hindering a full understanding of its role in managing these negative effects.

On the other hand, fatigue is understood as a feeling of physical and/or mental exhaustion perceived by the individual—limiting both physical and cognitive function—and characterized by objective changes in performance and an emerging subjective experience (Greenhouse-Tucknott et al., 2025). From a clinical perspective, social media fatigue is characterized as an adverse emotional reaction involving feelings of tiredness, frustration, boredom, and psychological exhaustion due to the overload caused by social media interactions and content (Ravindran et al., 2014; Teng et al., 2021). Although fatigue is frequently mentioned in

studies on information and social overload, its specific effects on cognitive functions have been less explored. Some studies, such as that of Ackerman and Kanter (2009), have proposed that fatigue reduces available cognitive resources, which in turn affects individuals' ability to perform tasks that require high cognitive demand. Similarly, fatigue—especially mental fatigue—is recognized for its capacity to impair sustained attention, working memory, and processing speed (Hockey, 2013). However, from the viewpoint of the ego depletion theory, the relationship between fatigue resulting from excessive social media use and its effects on cognitive processes has not been thoroughly explored in existing research. For example, Firth et al. (2019) suggest that excessive use of the Internet and social media can lead to cognitive depletion, affecting processes such as attention and memory. Likewise, Kuss and Griffiths (2017) highlight that intensive social media use is linked to negative effects on cognitive performance, underscoring the need for further examination of these mechanisms. These findings suggest the necessity for more detailed studies that not only investigate the existence of these effects but also explore the underlying mechanisms that explain them.

This research mainly aims to employ the stress-strain-outcome framework as a fundamental basis to investigate how social and information overload influence university students' academic performance. To achieve this, the following specific objectives are proposed: (1) Examine how information and social overload affect social media fatigue and its impact on academic performance; (2) Explore how social media fatigue influences cognition, which in turn affects academic performance, based on the ego depletion theory; and, (3) Investigate the moderating effect of self-control in social media use on the relationship between overloads and social media fatigue. Thus, this study delivers important perspectives on how the interaction between social media use and academic performance influences university students' psychological well-being and academic success.

Development of the research model and hypotheses

The theoretical framework of this research is based on the stress-strain-outcome (SSO) model to analyze how information overload and social overload influence fatigue derived from social media use, and how this leads to cognitive depletion, ultimately affecting students' academic performance. Developed by Koeske and Koeske (1993), the SSO model explains how environmental stimuli (stressors) impact psychological and behavioral outcomes through strain, which acts as a mediator. This approach has proven useful in understanding how intensive technology use affects daily life, particularly in terms of psychological and behavioral repercussions (Cao et al., 2018; Luqman et al., 2021).

Stressor-strain process

The SSO model defines stressors as environmental stimuli that individuals perceive as disturbing, annoying, or overwhelming, according to Koeske and Koeske (1993). In the present study, the key identified stressors are information overload and social over-

load, which are considered the primary stress factors in social media (Chaouali, 2016; Zhang et al., 2022). Information overload happens when an individual struggles to process an excessive amount of information, highlighting a mismatch between the two (Fu et al., 2020). In the context of social media, information overload not only involves an excessive amount of data but also its complexity and diversity. As users interact with different types of content, they face an informational environment that is not only vast but also highly dynamic and fragmented. This continuous flow of information—including personal updates, global news, and more—is linked to cognitive overload theory and can create difficulties in organizing and understanding the received material. When the excess of information surpasses the brain's capacity to process it adequately, it leads to cognitive saturation (Giudice da Silva Cezar & Maçada, 2023; Schmitt et al., 2021).

One of the distinguishing characteristics of information overload is its effect on users' ability to maintain attention and concentration. Excessive information acts as a stressor that consumes cognitive and emotional resources, not only depleting the cognitive capacity needed to process and retain information but also dispersing attention, making it difficult to focus on specific tasks (Pang, 2021). This is particularly problematic in an environment like social media, where constant notifications, endless scrolling through posts, and access to multiple sources of content compete for users' attention (Jackson & Farzaneh, 2012).

Social overload refers to the cumulative pressure that social media users experience due to the need to maintain a large number of social interactions and provide continuous support to their network of contacts (Chaouali, 2016; Maier, Laumer et al., 2015). Social overload can be considered a social stressor, as it creates an imbalance between social demands and the available resources to manage them (Lin et al., 2021). On social media, constant connectivity becomes an implicit norm, making users feel obligated to be available at all times. As noted by Maier, Laumer et al. (2015), this digital environment promotes perpetual connectivity, where a lack of immediate responses to messages or a failure to provide continuous support may be perceived negatively by both the user and their social circle. This increase in the number of relationships that need to be managed can lead to a state of social saturation, where users feel overwhelmed by the sheer volume of interactions and social expectations they must fulfill.

From the SSO framework, constant exposure to these stressors can trigger psychophysiological reactions, leading to the emergence of strain and manifesting the behavioral, psychological, and physiological effects of stress in individuals, specifically a psychophysiological reaction (Luqman et al., 2021). In this context, this strain often manifests as social media fatigue, a state of mental and emotional exhaustion resulting from overexposure to digital social interactions (Qaisar et al., 2022). Social media fatigue is characterized by a significant decline in mental energy, affecting users' ability to effectively engage in cognitively demanding activities and additional social interactions (Ravindran et al., 2014). This exhaustion not only reduces attention and concentration capacity but also diminishes motivation to engage in academic or work-related tasks, generating a sense of disinterest and apathy toward activities that require mental effort (Dhir et al., 2018). Therefore, we put forward the following hypotheses: (H1) Information overload on social media has a positive correlation with social media fatigue; and (H2) Social overload on social media has a positive correlation with social media fatigue.

Strain–outcome process

The strain–outcome process in the SSO model examines how the accumulation of tension, represented by social media fatigue and cognitive depletion, can lead to negative outcomes, such as

decreased academic performance. To understand this process, it is essential to consider the Ego Depletion Theory, a psychological concept that argues that self-control and other forms of conscious mental effort rely on a limited amount of mental resources, which can be depleted with continuous use. This theory, initially proposed by Baumeister et al. (1998), provides a valuable perspective on how these self-control resources become compromised when exposed to prolonged cognitive and emotional demands, a phenomenon that has been extensively researched in the domain of social psychology (Şimşir Gökalep & Haktanir, 2024; Zhang et al., 2021).

Various studies, such as those by Ackerman and Kanter (2009), suggest that within the framework of Ego Depletion Theory, social media fatigue is not merely a symptom of tiredness but an indication that an individual's mental and emotional resources have been significantly depleted. As these resources diminish, students experience a decline in their ability to process information and manage cognitive tasks, which can lead to cognitive depletion (Hagger et al., 2010). Therefore, we propose the following hypotheses: (H3) Social media fatigue is positively associated with cognitive depletion; (H4) Information overload affects cognitive exhaustion through social media fatigue; and, (H5) Social overload affects cognitive depletion through social media fatigue.

Thus, cognitive depletion could be the direct consequence of social media fatigue in this strain–outcome process. As self-control resources become depleted, students find it increasingly difficult to maintain concentration, retain information, and complete academic tasks that require significant cognitive effort. This directly impacts their academic performance, as their capacity to actively participate in academic tasks is diminished (Luqman et al., 2021). We propose the following hypotheses: (H6) Cognitive depletion is negatively associated with academic performance; (H7) Social media fatigue affects academic performance through cognitive depletion; (H8) Information overload negatively affects academic performance through social media fatigue and cognitive depletion; and, (H9) Social overload negatively affects academic performance through social media fatigue and cognitive depletion.

Self-control moderation in the relationship between overload and social media fatigue

Self-control could act as a regulator that modulates the relationship between information and social overload and social media fatigue, allowing individuals to manage these demands more effectively. In other words, when students are constantly subjected to excessive information and the pressure of maintaining multiple social interactions, they must employ self-control—the ability to pursue long-term goals despite the limitations imposed by immediate desires, automatisms, and physiological demands. This ability enables them to prioritize important tasks and inhibit distractions and external pressures (Şimşir Gökalep & Haktanir, 2024). However, as these self-control resources become depleted, their ability to effectively manage these demands diminishes, leading to increasing fatigue (Maier, Makwana et al., 2015; Park et al., 2016).

Although previous research has extensively explored the impact of self-control on emotional regulation and stress management (Dias & Cadime, 2017; Hofmann et al., 2012), its specific role in the context of social media fatigue has received less focus. Given the increasing reliance on social media and the overload it generates, it is necessary to examine how self-control can moderate these negative effects. Thus, the following hypotheses are suggested: (H10) Self-control moderates the relationship between information overload and social media fatigue, with this relationship being stronger when self-control is low; and, (H11) Self-control moderates the

Table 1
Sample demographic traits ($N = 320$)

Items	Category	Nº	%
Age	17-20	174	54.4
	21-25	146	45.6
Gender	Male	85	26.6
	Female	235	73.4
Daily social media usage time	<1 h	8	2.5
	1-2 h	33	10.3
	3-4 h	116	36.3
	More than 5 hours	163	50.9
Social media usage experience	<1 year	3	.9
	1-2 years	10	3.1
	3-4 years	56	17.5
	More than 5 years	251	78.4

relationship between social overload and social media fatigue, with this relationship being stronger when self-control is low.

Method

Participants

Data were collected through an online survey targeting students from four public universities in Beijing, Tianjin, and Langfang, China. The participants are primarily students from the Humanities and Social Sciences fields. Since, as noted by [Shao and Pan \(2019\)](#), university students are one of the most active groups on mobile social media, the survey was specifically directed at this group. To ensure the representativeness of the sample, stratified sampling was applied based on criteria such as age, gender, and educational level ($M = 20.51$, $SD = 1.52$). After removing 35 unreliable responses, such as those completed in a very short time or incomplete responses, the final sample consisted of 320 students, of which 73.4% were female and 26.6% male. Additionally, 87.2% of respondents reported spending over three hours per day on social media, and 95.9% reported having used social media for over three years. [Table 1](#) presents the demographic traits of the sample.

Instruments

Information overload

This scale has been adapted from [Qaisar et al. \(2022\)](#) and [Cao et al. \(2018\)](#). The latter version has been validated among university students in China and consists of four items (for example, "I often get distracted due to the excessive amount of information on social media"). In the present study, a Cronbach's alpha coefficient of .80 confirmed good internal consistency.

Social overload

Social overload was measured using four items from Zhang et al.'s (2022) Chinese validation. For example, one of the items includes the statement, "I pay too much attention to my friends' posts on social media" (Cronbach's $\alpha = .87$).

Social media fatigue

Social media fatigue was assessed using three adapted statements from [Zhang et al. \(2016\)](#), validated in the Chinese population. These items are: "I feel tired when using social media these days," "I feel emotionally drained after using social media these days," and "I get bored when using social media these days." The Cronbach's alpha value is .93.

Cognitive depletion

Cognitive depletion was measured using a fifteen-item scale ([Luqman et al., 2021](#)), validated in its full version for Chinese university students by [Zhou et al. \(2016\)](#). The scale includes questions

related to minor errors such as perceptions, distractions, memory, and motor functions. A sample item is: "Do you sometimes suddenly find yourself wondering if you have used a word correctly?" (Cronbach's $\alpha = .94$).

Academic performance

We used the Chinese validation of the four items developed by [Yu et al. \(2010\)](#) to capture university students' academic performance, reflecting their ability to complete tasks and solve problems. These items include statements such as "I have learned how to complete my academic work efficiently" (Cronbach's $\alpha = .91$).

Self-control

Self-control was assessed as a trait using the brief version of the four-item Self-Control Scale ([Tangney et al., 2004](#)), validated for Chinese university students by [Tan and Guo \(2008\)](#). Specifically, respondents rated their agreement or disagreement with statements like "I am good at resisting temptation" (Cronbach's $\alpha = .76$).

Control variables

As previous research has reported that demographic characteristics of individuals, such as gender, age, daily social media usage experience, and usage frequency, can impact academic performance ([Cao et al., 2018](#); [Homaïd, 2022](#); [Shi et al., 2020](#)), they are included as control variables in this study.

Procedure

First, to verify the instrument's reliability and validity, a pilot test was conducted with 20 students experienced in using social media, who were not included in the final analysis. The results of the pilot test allowed for adjustments to be made to the questionnaire before its final distribution. Next, students were encouraged to take part in the survey through a convenience sampling procedure, requesting their informed consent to take part in the study. They were provided with detailed information about the study's objectives and the confidentiality guarantees regarding their responses, ensuring that their data would be handled with the utmost privacy and in compliance with current data protection regulations.

Data analysis

The data analysis is carried out in two main steps. First, descriptive statistics are calculated, and Pearson correlation tests are conducted to explore the relationships between the main variables. For these analyses, SPSS software (version 27) is used to obtain the means, standard deviations, and bivariate correlations among all variables. Secondly, the structural model analysis is conducted using SmartPLS 4.0, a software that employs the partial least

Table 2
Psychometric features of the instruments (N = 320)

Constructs	Items	Mean	Standard deviation	Loadings	Cronbach's alpha	Composite reliability (CR)	Average variance extracted (AVE)
Information overload	IO1	3.49	.979	.783	.804	.871	.629
	IO2	2.91	.967	.885			
	IO3	3.59	.887	.703			
	IO4	2.78	.972	.791			
Social overload	SO1	2.82	.888	.877	.874	.914	.726
	SO2	2.89	.962	.836			
	SO3	2.75	.959	.875			
	SO4	2.86	.990	.818			
Social media fatigue	F1	2.83	1.002	.940	.932	.956	.880
	F2	2.73	.987	.950			
	F3	2.70	1.015	.923			
Cognitive depletion	CD1	2.73	.900	.736	.938	.945	.536
	CD2	2.68	.759	.713			
	CD3	2.79	.803	.760			
	CD4	2.76	.786	.787			
	CD5	2.48	.755	.740			
	CD6	2.82	.833	.717			
	CD7	2.43	.777	.727			
	CD8	2.69	.796	.778			
	CD9	2.52	.796	.721			
	CD10	2.55	.794	.742			
	CD11	2.63	.784	.654			
	CD12	2.49	.788	.735			
	CD13	3.01	.836	.703			
	CD14	2.62	.786	.749			
	CD15	2.50	.930	.704			
Academic performance	AP1	3.12	.841	.889	.913	.939	.793
	AP2	3.29	.852	.896			
	AP3	3.14	.852	.904			
	AP4	3.04	.891	.872			
Self-control	SC2	2.70	.906	.828	.759	.842	.573
	SC4	2.18	.959	.719			
	SC5	2.41	1.010	.739			
	SC6	2.39	1.103	.735			

Table 3
Correlations of the study variables, along with the square root of AVE in bold (N = 320)

Construct	Mean (SD)	1	2	3	4	5	6
1. Information overload	3.19 (.76)	.793					
2. Social overload	2.83 (.81)	.419**	.852				
3. Self-control	2.42 (.76)	.351**	.253**	.757			
4. Social media fatigue	2.76 (.94)	.529**	.284**	.200**	.938		
5. Cognitive depletion	2.65 (.59)	.391**	.194**	.446**	.316**	.732	
6. Academic performance	3.15 (.76)	-.123*	-.114*	-.223**	-.142*	-.472**	.890

Note. The square roots of AVE are shown on the diagonal and in bold.

* $p < .05$.

** $p < .01$.

squares (PLS) method. This analysis allows for the estimation of both the measurement model and the structural model, assessing the relationships between latent variables, including moderation effects. Additionally, reliability and validity indices of the constructs are evaluated, such as factor loadings, composite reliability, Cronbach's alpha, and the average variance extracted (AVE), which provide information on the internal consistency and validity of the constructs within the model. Furthermore, potential common method bias (CMB) is analyzed using Harman's single-factor test.

To assess the model fit, two key indices are used: the coefficient of determination R^2 , which reflects the proportion of variance in the dependent variables explained by the independent variables, and the predictive ability Q^2 , which evaluates the model's capability to accurately predict the dependent variables using the Cross-Validated Redundancy technique. The mediation analysis is conducted using the bootstrapping method with 2,000 samples to generate 95% confidence intervals, following the recommendation of Hair et al. (2012). Sociodemographic variables such as gender, age, experience, and time are controlled to assess their potential effects on the results.

Results

Measurement model

Table 2 displays the descriptive statistics along with factor loadings, composite reliability, Cronbach's alpha, and the average variance extracted (AVE) for the model's constructs. The scale's reliability has been evaluated using both composite reliability (CR) and Cronbach's alpha. As per Sarstedt et al. (2017), composite reliability and Cronbach's alpha values between .70 and .95 are considered adequate. The composite reliability values for the constructs in this study range from .842 to .956. Additionally, Cronbach's alpha for all constructs exceeds .70, indicating good internal consistency and acceptable reliability.

According to Hair Jr. et al. (2016), convergent validity is considered adequate when item loadings surpass 0.70, AVE exceeds 0.50, and CR reaches at least 0.70. Table 2 reveals that, except for item CD11, whose loading was below .70 (but above .60), the loadings of the other items exceed .70. The minimum AVE value is .536, indicating that the AVE values meet the suggested criteria. Additionally,

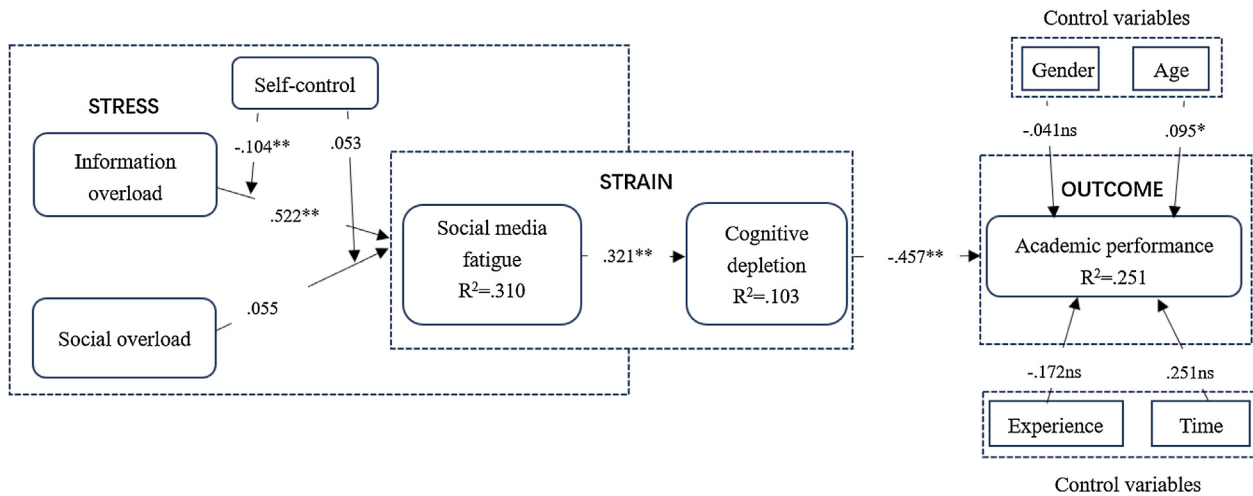


Figure 1. Results of the research model.

* $p < .05$. ** $p < .01$.

all CR values are above .70. Therefore, convergent validity has been established based on these three criteria.

The square roots of AVE and the correlations have been used to assess discriminant validity (Fornell & Larcker, 1981). As presented in Table 3, the square root of the AVE for each construct, located on the main diagonal, exceeds the magnitude of the correlations in the respective rows and columns for that construct. This provides conclusive evidence of discriminant validity.

In order to assess the potential presence of common method bias (CMB), given that the data were self-reported and collected from the same respondents, an analysis was conducted using Harman's single-factor test (Liang et al., 2007). According to this method, CMB is considered present if a single factor explains more than 50% of the variance. However, the results indicated that the most influential factor explains only 32% of the variance, suggesting that the threat of common method bias can be ruled out.

Structural model

To evaluate the model, the coefficient of determination (R^2) was used, representing the amount of variance explained in a dependent variable by the independent variables. The model adequately explained the variance in the endogenous constructs, with an R^2 of .181 for *social media fatigue*, .103 for *cognitive depletion*, and .251 for *academic performance*, all exceeding the recommended threshold of .100 (Chin, 1998). An additional verification of the predictive capability (Q^2) of the research model was conducted using the blindfolding method (Shmueli et al., 2019). The results indicate that the Q^2 values for *social media fatigue* (.262), *cognitive depletion* (.053), and *academic performance* (.190) are positive, suggesting that the model has an adequate predictive capacity (Hair et al., 2016; Shmueli et al., 2019). In summary, the evaluation of predictive power using PLS demonstrates that the research model possesses strong predictive capability.

Figure 1 presents the results of the structural model, highlighting the relevance of various hypotheses exploring the determinants of university students' *academic performance*. The structural model results reveal that *information overload* has a significant positive impact on *social media fatigue* ($\beta = .522$, $p < .001$), indicating that a higher perception of *information overload* correlates with higher levels of *social media fatigue*. In contrast, the perception of *information overload* did not show a significant relationship with *social media fatigue* ($\beta = .055$, $p = .398$), suggesting that this factor does not significantly affect *social media fatigue*.

Table 4
Test of the mediating effect

Path	Effect	Lower	Upper
Indirect path			
Fatigue → Depletion → Performance	-.147	-.221	-.073
Information → Fatigue → Depletion	.168	.085	.256
Information → Fatigue → Depletion → Performance	-.077	-.128	-.036

On the other hand, *social media fatigue* has a significant positive effect on *cognitive depletion* ($\beta = .321$, $p < .001$), suggesting that higher levels of *social media fatigue* are associated with greater *cognitive depletion*. Furthermore, *cognitive depletion* shows a significant negative effect on *academic performance* ($\beta = -.457$, $p < .001$), indicating that higher *cognitive depletion* is associated with lower *academic performance*.

The results of the structural model reveal a significant and positive relationship between *age* and *academic performance*, suggesting that older students may achieve better *academic performance* compared to their younger peers. On the other hand, since the control variables—daily time spent on social media ($\beta = .251$, $p > .05$), participants' prior experience with social media before the study ($\beta = -.172$, $p > .05$), and gender ($\beta = -.041$, $p > .05$)—do not show significant associations with *academic performance* in this study, they are excluded from further analyses (Table 4).

The SSO framework emphasizes the critical role of strain as a mediator in the link between stressors and outcomes, as highlighted by Um and Harrison (1998). Bias-corrected bootstrap tests with 2,000 resamples were conducted at a 95% confidence interval (CI) to assess mediation effects, which are deemed significant if zero is not included. The results indicate that the indirect effect of *social media fatigue* on *academic performance* through *cognitive depletion* is significant (effect = $-.147$, 95% CI = $[-.221, -.073]$). Similarly, the indirect effect of *information overload* on *cognitive depletion*, mediated by *social media fatigue*, is also significant (effect = $.168$, 95% CI = $[.085, .256]$). Furthermore, the indirect effect of *information overload* on *academic performance*, mediated by *social media fatigue* and *cognitive depletion*, is significant as well (effect = $-.077$, 95% CI = $[-.128, -.036]$).

Furthermore, it has been observed that the interaction between *self-control* and *information overload* significantly affects *social media fatigue*. Specifically, the $SC \times IO$ interaction shows a significant negative effect ($\beta = -.104$, $p = .047$), indicating that the impact of *information overload* on *social media fatigue* varies depending on the individual's level of *self-control*.

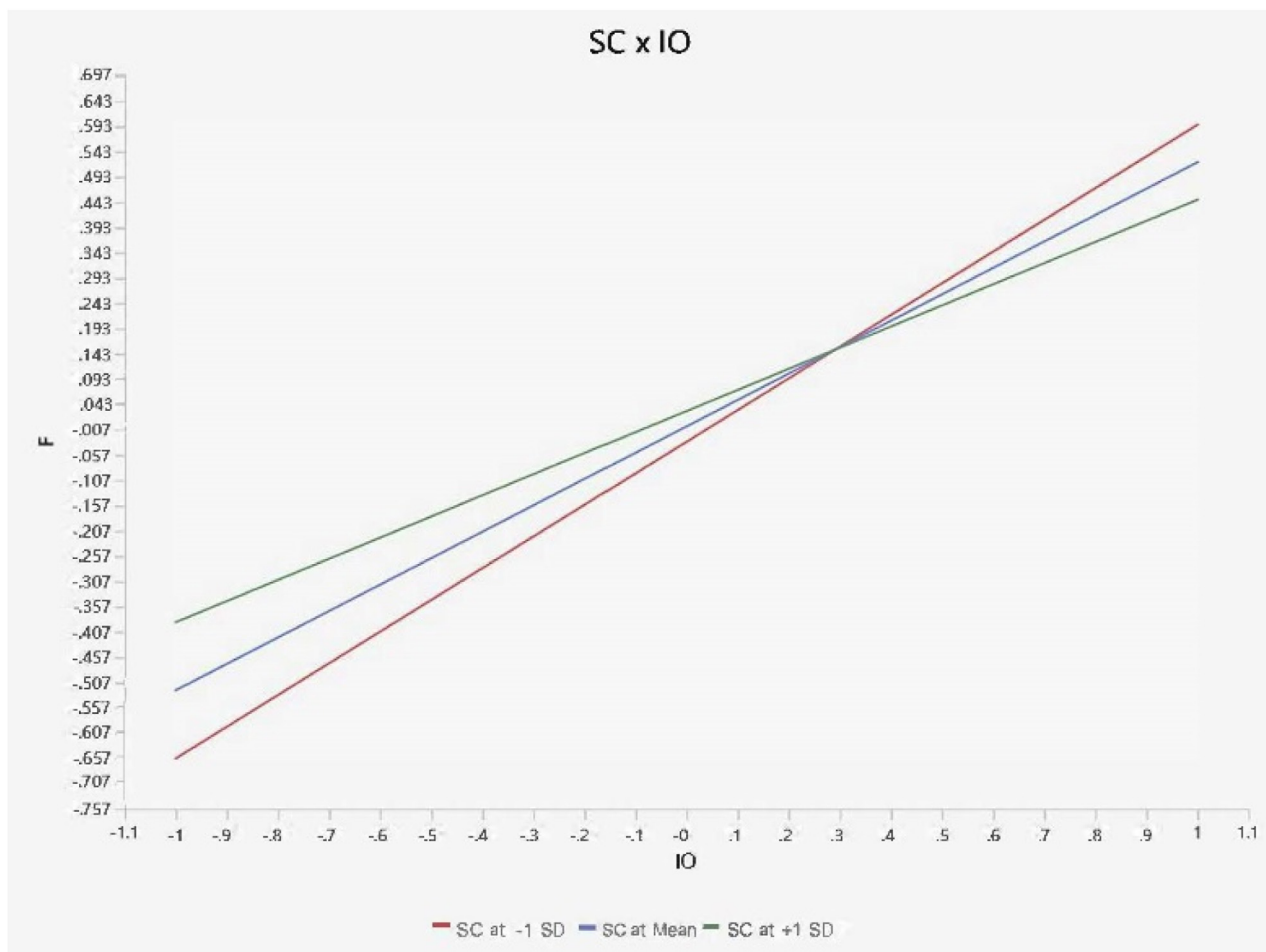


Figure 2. The influence of self-control as a moderator in the link between information overload and social media fatigue.

Figure 2 illustrates the moderating effect of *self-control* (SC) on the relationship between *information overload* (IO) and *social media fatigue* (F). The findings suggest that the effect of *information overload* on *social media fatigue* differs significantly depending on the level of *self-control*. For individuals with low *self-control* (-1 SD), *information overload* has a more pronounced effect on *social media fatigue*. In contrast, those with high *self-control* (+1 SD) exhibit lower sensitivity to *information overload*, suggesting that *self-control* moderates this relationship by mitigating the effect of *information overload* on *social media fatigue*.

Discussion

This study reinforces the notion that *information overload* plays a crucial role in causing *social media fatigue* and *cognitive depletion*, negatively affecting students' academic performance. *Self-control* emerges as an important moderator in this process, highlighting the need to develop self-regulation skills to mitigate the negative effects of excessive social media use. However, *social overload* appears to have a more limited impact, which calls for further research to explore in greater depth the factors that could explain this discrepancy.

Firstly, it has been confirmed that students who face an overabundance of information on social media experience greater social media fatigue (H1). This result is consistent with previous research emphasizing the link between *information overload* and fatigue (Giudice da Silva Cezar & Maçada, 2023; Zhang et al., 2022). Unexpectedly, *social overload* does not correlate with social media

fatigue and is not a significant predictor among young people, leading to the rejection of Hypothesis 2. This finding contradicts previous studies that suggest *social overload* significantly contributes to *social media fatigue* (Fu et al., 2020; Zhang et al., 2016). One possible explanation is that students, having greater control over their use of social media, can filter out unnecessary social requests or restrict interactions to a limited circle of contacts, thereby reducing fatigue. This phenomenon is also noted by Shi et al. (2020), who found that *social overload* does not have a significant impact on fatigue since social interaction on social media may require fewer cognitive resources than *information management*, allowing users to conserve mental energy by ignoring or delaying certain requests.

Regarding the relationship between *social media fatigue* and *cognitive depletion*, the results have confirmed that fatigue is positively associated with *cognitive depletion* (H3). This means that the fatigue experienced by students on social media negatively affects their ability to concentrate and process information. In this regard, research has demonstrated that *information overload* influences *cognitive depletion* through *social media fatigue* (H4). The fatigue generated by *information overload* appears to be an important mediator in the relationship between the amount of *information processed* and *cognitive depletion*, highlighting the importance of managing excessive information to avoid negative effects on *cognitive well-being*. However, *social overload* has not shown a significant impact on *cognitive depletion* through *social media fatigue*, leading to the rejection of Hypothesis 5. This result suggests that although students experience social interactions on social media,

these social factors do not seem to be as influential on cognitive depletion as information overload.

The research has also revealed that cognitive depletion is negatively related to academic performance (H6), reinforcing the hypothesis that mental exhaustion impairs the cognitive abilities necessary for completing demanding academic tasks. This finding highlights the importance of managing fatigue caused by social media to preserve academic performance. Additionally, social media fatigue also influences academic performance through cognitive depletion (H7), which aligns with previous studies demonstrating how exhaustion and other effects on psychological well-being impair cognitive capacity and reduce performance in demanding tasks (Ayyagari et al., 2011; Homaid, 2022).

Regarding information overload, the results have confirmed that it negatively affects academic performance through social media fatigue and cognitive depletion (H8). This effect is particularly concerning in educational settings, where students must process large volumes of information to succeed. While social media can be useful for connecting and sharing information, it is also a source of fatigue that directly impacts students' ability to concentrate and perform well in their studies. In this regard, the study provides additional evidence of the dangers of excessive social media use in academic contexts. On the other hand, the results have not provided sufficient evidence to demonstrate that social overload impacts academic performance through fatigue and cognitive depletion (H9). This suggests that although students engage in social interactions on social media, their primary goal is information acquisition or learning, making social overload less influential on academic performance compared to information overload.

Another crucial finding is the role of self-control as a moderator in the relationship between information overload and social media fatigue (H10). This result reinforces Baumeister et al.'s (1998) ego depletion theory, which suggests that individuals with higher self-control can better resist the negative effects of informational stress. Students with high levels of self-control are able to manage information more effectively, reducing their levels of fatigue. However, it is important to note that self-control is a limited resource, implying that its ability to mitigate fatigue may diminish as students face prolonged stress (Maier, Makwana et al., 2015; Şimşir Gökalep & Haktanir, 2024). On the other hand, self-control did not significantly moderate the relationship between social overload and social media fatigue (H11). This finding can be explained by the fact that, as previously demonstrated, social overload does not have a significant impact on social media fatigue, making self-control an irrelevant moderator in this relationship.

The structural model results show a significant positive correlation between age and academic performance. This connection might stem from the fact that older students tend to have a better ability to adapt to academic demands, a contrast that could influence differences in academic performance.

Theoretical implications

From the perspective of fatigue, this study shows that the depletion experienced by students is the result not only of prolonged exposure to information but also of the accumulation of fatigue over time. Social media fatigue gradually reduces cognitive capacity, leading to cognitive depletion—a phase in which the mind can no longer process information efficiently. Malik et al. (2021) link fatigue to low academic performance, and this study further explores that connection by revealing a more complex mechanism: fatigue leads to cognitive depletion, which in turn impacts performance. This study also expands the SSO model theory by adding self-control as a crucial moderating factor in the link between information overload and social media fatigue. By demonstrating that self-control can mitigate the negative effects of information over-

load, it confirms the idea that individual differences play a crucial role in how digital stressors impact psychological well-being and academic performance. Furthermore, this adds a new dimension to Baumeister et al.'s (1998) ego depletion theory, emphasizing that self-control is not only a limited resource but also a key tool in regulating fatigue over the long term.

Practical implications

From an educational perspective, universities should implement digital well-being programs focused on developing self-control skills and managing information overload. Promoting healthy digital habits, such as limiting social media use during study hours, could help reduce stress and enhance students' self-control, thereby mitigating the negative effects of excessive social media use (Li et al., 2023). Additionally, these programs can incorporate intervention strategies such as mindfulness practices, which have been shown to improve cognitive control and emotional regulation (Meynadier et al., 2024). Additionally, social media platforms should consider integrating technologies that enable users to better manage information overload. For instance, the use of personalized algorithms that filter and prioritize relevant content could help students reduce exposure to unnecessary data, thereby minimizing social media fatigue (Wang & Guo, 2023). Likewise, by collaborating with educational institutions, platforms can also design interfaces that promote more mindful technology use, adapting to educational needs and fostering a more efficient and less exhausting user experience.

Limitations and future research

The study presents some limitations. The sample consists solely of university students, which may restrict the broader applicability of the results. Future studies should consider different educational contexts, such as secondary school students or online learning environments, to verify whether the findings can be replicated. Additionally, the cross-sectional design limits the understanding of long-term causality. Longitudinal research could provide a more detailed insight into how information overload and self-control interact over time, allowing for the identification of whether self-control remains a consistent protective resource. Finally, future research should explore additional factors that may moderate the relationship between information overload and fatigue. Cultural differences, the type of content consumed on social media, or the specific academic context could influence how students manage information overload.

In conclusion, this research provides significant evidence of how information overload affects social media fatigue and the academic performance of university students. The findings reveal that information overload from social media not only increases fatigue but also deteriorates cognitive capacity, negatively affecting academic performance. Additionally, the study emphasizes the moderating role of self-control, as it effectively mitigates the negative effects of information overload. These results offer a new perspective on managing the challenges associated with information overload, suggesting that strengthening self-control skills could be a key intervention to optimize well-being and academic success in the context of social media.

CrediT authorship contribution statement

Xin Wang: conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, resources, software, supervision, validation, writing – original draft. Xuanzhu Zhao: conceptualization, data curation, investigation, resources.

Changsheng Yu: formal analysis, resources, writing – review and editing.

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