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ORIGINAL RESEARCH

Stress and Internet Addiction: Mediated by Anxiety and Moderated by Self-Control

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Background: The link between stress and Internet addiction (IA) has been confirmed. However, the mechanism underlying the correlation is poorly understood. Thus, the current study proposed a moderated mediation model to test the mediating role of anxiety and the moderating role of self-control (SC) in the link between stress and IA.

Methods: Eight hundred and sixty-one Chinese college students (M_{age} = 20.62 years; SD = 1.58; male = 47.7%) were required to complete an online questionnaire package, including a depression-anxiety-stress scale, a self-control scale, and an Internet addiction test. The PROCESS macro developed based on SPSS was used to test the moderated mediation model.

Results: When controlling for gender and age, the results revealed that anxiety partially mediated the link between stress and IA. Specifically, the more stressed college students are, the higher their anxiety level is, and the more likely they are to become addicted to the Internet. Additionally, the direct and indirect links between stress and IA were all moderated by SC. SC buffered the effect of stress on anxiety and anxiety on IA but enhanced stress on IA.

Conclusion: These findings emphasized the predictor role of stress on IA and provided insights on intervening in college students' excessive Internet use behaviors for educators, such as reducing anxiety levels and improving self-control abilities.

Keywords: stress, internet addiction, anxiety, self-control, college students

The Internet has profoundly influenced and changed people's daily lives. The growth of Internet use has received an additional powerful boost worldwide through lockdowns since the outbreak of COVID-19.[1,2] Students had to stay on campus to protect themselves against COVID-19. When the campus was on lockdown, using the Internet became one of the main ways for college students to make friends, seek entertainment, receive online education, and even learn about the world. However, without control, this everyday usage might develop into a behavioral addiction to the Internet. Internet addiction (IA) refers to excessive or poorly controlled preoccupations, urges, or behaviors regarding computer use and internet access that led to impairment or distress.[3] Substantial evidence has suggested that IA can impair individuals' physical health, mental health, and behavioral performance.[4–7] However, it is still not included in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition.[8]

By December 2022, the number of netizens in China has reached 1.067 billion, with 14.2% of them aged between 20–29.[9] College students are often within this age group. Compared with other groups, college students are more susceptible to IA.[10] Numerous empirical findings have revealed that IA is associated with insomnia,[4,11] depression and anxiety symptoms,[12] poor academic performance,[13] and aggressive behavior[14] among college students. Therefore, examining the risk factors for the addictive behavior of the Internet and its possible underlying mechanisms among college students has important realistic significance.

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Among the various influential factors that contribute to Internet addiction, stress is a crucial one.[15] Stress refers to the feelings of anxiety and threat that individuals experience when faced with psychological and physical difficulties.[16] Previous studies have confirmed the negative effect of stress on IA.[10,17,18] Young suggested that addiction to the Internet may be one of the strategies for individuals to reduce perceived stress.[19] The comfortable feeling of being immersed in the Internet can reduce the stress of participating in activities.[20] Prior research has shown that using the Internet is a common way for college students to relieve the stress caused by social life.[21] Thus, we considered that stress positively predicts IA in the present study.

The link between stress and IA has been extensively investigated and well documented.[22–24] However, the possible mediating and moderating effects underlying this relationship remain under-explored. More importantly, elucidating the mechanisms of stress on IA would be critical to promote our understanding of IA and developing effective interventions to control excessive Internet use.[25] Therefore, the present study aimed to answer two questions: First, what role does anxiety play in the relationship between stress and IA? Second, whether and how self-control (SC) moderates the direct and indirect links between stress and IA.

Stress, Anxiety, and IA

Anxiety is a subjective unpleasant emotional experience characterized by fearfulness, unwanted, and accompanied by physiological arousals such as increased heart rate and sweating.[26] A large number of studies have confirmed the link between anxiety and IA[13,23,27,28] and indicated that anxiety was one of the main predictors of IA in adults.[29] For instance, using a longitudinal study, Xie and Cheng found that the level of anxiety in moment T2 effectively predicted the severity of IA in moment T3 (3 months later) among Chinese college students.[23] Besides, empirical studies also revealed that individuals who addictive to the Internet are more likely to manifest depression and anxiety symptoms.[24,30] In addition, studies consistently supported the positive association between stress and negative emotions such as depression and anxiety.[31–33] Considering the links between stress and anxiety, as well as anxiety and IA, we proposed that anxiety may be the bridge between stress and IA.

More importantly, the general strain theory provides a theoretical framework for the possible mediation effect. The general strain theory was originally developed to explain criminal behaviors, and now it has been applied to explain addictive behaviors, such as smartphone addiction and IA.[34,35] According to the general strain theory, problematic behaviors primarily result from negative experiences or emotions caused by various strains or stress.[18,36] Agnew argued that all kinds of stress, such as life events and negative social relationships, could cause negative emotions and subsequently lead to deviant behavior or addiction to something.[36] Guided by the general strain theory, a study conducted by Korean researchers found that depression mediated the relationship between academic stress and delinquent behaviors.[37] Thus, it's reasonable to assume that anxiety is a mediating variable between stress and IA. Although a study found that social anxiety partially mediated the effects of stress on Internet addiction among Chinese adolescents.[38] However, the above-mentioned mediating role of anxiety played remain unexplored directly among Chinese college students in the framework of general strain theory. Combined with the previous findings and theoretical basis above, we hypothesized that:

Hypothesis 1: Anxiety mediates the link between stress and IA. In other words, the more stressed college students are, the higher their anxiety level is, and the more likely they are to become addicted to the Internet.

The Moderating Role of SC

Although the link between stress and IA can be mediated via anxiety, the link may not be equally strong for all individuals. That is to say, the patterns of correlation among stress, anxiety, and IA could vary by SC. SC refers to the effortful capacity of the individual to regulate one's emotions, thoughts, impulses, or other well-learned or automatic behavioral responses.[39] Previous studies mostly explored the mediating role of self-control in the link between stress and behavioral addiction.[17,34,40] Few studies have examined the role of self-control as a moderator in the direct and indirect links between stress and Internet addiction. In the present study, we will examine whether and how SC moderates the direct and indirect links between stress and IA.

Previous studies revealed that low SC is characterized by impulsiveness, risk-taking, and preoccupation with immediate temptations.[41,42] Individuals with low levels of SC are primarily governed by immediate gratification and short-term goals, which leads them to exhibit more impulsive behaviors and disregard the potential negative consequences of their actions. In contrast, a high level of SC is characterized by considering long-term results rather than immediate temptations.[43] Thus, individuals with high levels of SC may adopt more positive coping styles to manage stress, producing fewer negative emotions and less likely to addictive to the Internet. Studies have revealed that individuals with high levels of SC are less susceptible to being affected by stressful events,[44,45] manifest higher emotional stability[46] and fewer impulse control problems, such as aggressive behaviors and substance abuse problems.[41,47] In one study with a sample of Chinese adolescents, researchers found that coping style moderated the effects of stressful life events on Internet addiction.[48] In addition, Peng et al found that SC buffered the effect of perceived stress on rumination (dwelling on negative events or emotions) among Chinese college students during the 2019 coronavirus disease.[49] Thus, it is acceptable to infer that self-control may moderate the first half of the mediation effect and the direct effect of stress on Internet addiction.

Moreover, based on the strength model of self-control, one's self-control resources are limited.[50] Once the self-control resources of a person are depleted by negative emotions, the depleted state will lead to failure in tasks that need self-control. Prior research has found that negative emotion can weak one's capacity of SC.[51] In addition, the neuroimaging study also found that negative emotions can impair the brain areas involved in self-control, such as the prefrontal cortex, and increase the severity of substance addiction.[52] Thus, it is reasonable to assume that self-control may moderate the second half of the mediation effect. More specifically, people with low levels of SC may be more susceptible to negative emotions and consequently become addicted to the Internet. Based on the above empirical findings and theory, we hypothesized that:

Hypothesis 2: SC moderates the direct and indirect links between stress and IA. Specifically, SC buffered the effect of stress on anxiety, anxiety on IA, and stress on IA.

The Present Study

The present study examined the possible mediating and moderating factors in the link between stress and IA among college students. We constructed a moderated mediation model to test our two hypotheses and to answer the two questions posed previously: Hypotheses 1, anxiety mediates the link between stress and IA; Hypotheses 2, the direct and indirect (through anxiety) links between stress and IA are moderated by SC. The hypothetical model is shown in Figure 1.

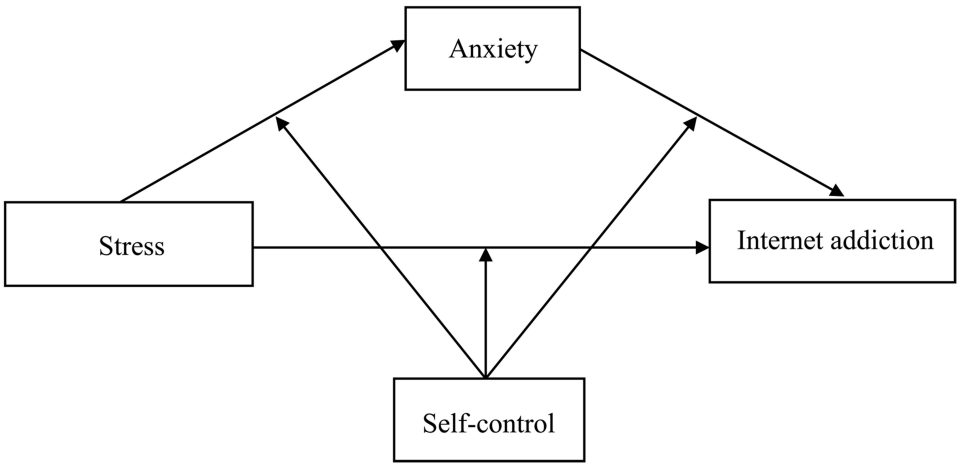

Figure 1 Hypothetical model.

Methods

Participants and Procedure

Eight hundred and seventy undergraduate students from a university in Ningbo, a city on the eastern coast of China, were selected randomly. After excluding invalid questionnaires (nine questionnaires with the same responses to all questions), the final valid sample size was 861. We calculated the minimum sample size and found that the minimum sample size was about 462 (margin of error = 0.03; Alpha value = 0.01), indicating that the sample size in our study fully met the requirement.[53] In all subjects, the mean age was 20.62 years (SD = 1.58; ranged from 18 to 26 years), of which 411 (47.7%) were males.

The program was implemented between September and October 2022. The investigation procedures were under the Declaration of Helsinki and approved by the Human Research Ethics Committee of Ningbo University. Before the study, all subjects were presented with informed consent through a tablet. Only the subjects who read and signed the agreement could enter the next stage of the study. Researchers told all participants about the principles of confidentiality. All subjects volunteered to participate in the study, and be informed that they could quit any time they wanted.

Measures

Self-Control Scale (SCS)

The Chinese version of the Self-Control Scale,[46] revised by Tan and Guo,[54] was used to measure the extent of SC. The SCS consists of 19 items in five dimensions, including resisting temptation, healthy habits, impulse control, dedication, and moderation in entertainment. Subjects were asked to rate on a scale of 1 - "strongly disagree" to 5 - "strongly agree". All items are reverse-scored except for item 1 ("I can resist temptation effectively"), item 5 ("People believed that I could sustain a plan of action"), item 11 ("People said that my self-control ability is as hard as steel"), and item 14 ("I can work efficiently for a long-term target"). Responses across these 19 items were summed up, with a higher score indicating stronger self-control.[54] The Cronbach's α for SCS in the current study was 0.877.

Depression-Anxiety-Stress Scale (DASS-21)

The Chinese version of the Depression-Anxiety-Stress Scale-21 was used to measure the stress and anxiety.[55] The DASS-21 consists of three subscales (depression subscale, anxiety subscale, and stress subscale), each with 7 items, for a total of 21 items. Subjects were asked to rate on a scale of 0 - "Did not apply to me at all" to 4 - "Applied to me very much, or most of the time". The current study only included the anxiety and stress subscales (both were 7 items). Examples of the items include, "I was worried about situations in which I might panic and make a fool of myself" (Anxiety) and "I found it hard to wind down" (Stress).[56] Higher scores on the subscale indicate higher levels of stress or anxiety. This scale has demonstrated good validity and reliability in Chinese samples.[57] The Cronbach's α for the two subscales were 0.836 (Stress) and 0.812 (Anxiety) separately.

Internet Addiction Test (IAT)

The IA was measured using Young's Internet Addiction Test.[58] Young's IAT includes 20 items in total. It is widely used to measure the severity of people's dependence on the Internet. Subjects were asked to rate all items from 1 - "rarely" to 5 - "always". The total score which obtained from the accumulation of scores on 20 items, ranging from 20 to 100. A higher score indicated a greater tendency to be addicted to the Internet. This test has been translated into multiple languages and showed good reliability and construct validity in Chinese samples.[59,60] The Cronbach's α for IAT in the current study was 0.903.

Statistical Analyses

The statistical analysis was performed by SPSS 23.0 and PROCESS macro 3.4. First, we used Harman's one-factor test to identify the common method bias.[61] Principal component analysis showed that 10 factors produced a characteristic root value that was greater than 1, and only 28.89% of the variance could be explained by the first factor, which is less than the critical standard of 40%. [61] Second, descriptive statistics (M, SD) and bivariate correlation coefficients between the variables were calculated. It should be noted that gender was coded as 0 for females and 1 for males. Third, the

mediation model of anxiety was examined using Hayes's PROCESS macro (Model 4).[62] Fourth, the moderated mediation model was examined using Hayes's PROCESS macro (Model 59).[62] To better understand the moderating effect of SC, we used simple slope tests for interactions at both high (M + 1SD) and low (M - 1SD) levels of SC. We standardized all continuous variables to allow for future comparisons across studies. In the mediation and moderation analysis, the bootstrapping method had a sample of 5000 and a confidence interval of 95%. This method does not impose the assumption of normality of the sampling distribution and the confidence intervals that do not contain zero indicate the effects are significant.[63] In addition, age and gender were included as control variables in the present study, for previous research revealed that there are gender differences in IA and stress as well as age differences in stress.[64,65]

Results

Preliminary Analyses

The independent-samples *t*-test showed no gender differences in stress ($t = 1.114$, $p > 0.05$, Cohen's d = 0.07) and anxiety ($t = 0.095$, $p > 0.05$, Cohen's d = 0.007) but showed significant gender differences in SC and IA, with males ($M = 65.33$, SD=11.84) reported higher SC scores than females ($M = 62.74$, SD=11.40), $t = -3.272$, $p = 0.001$, Cohen's d = 0.22, and females (M =40.86, SD=11.19) reported higher IA scores than males ($M = 38.91$, SD=12.06), $t = 2.466$, $p < 0.05$, Cohen's d = 0.17. The *M, SD*, and correlation matrix were showed in Table 1. Stress ($r = 0.63$, $p < 0.001$) and anxiety ($r = 0.67$, $p < 0.001$) were positively associated with IA separately. Besides, stress was significantly associated with anxiety (r = 0.75, $p < 0.001$). For the SC variable, results showed that SC was negatively associated with IA ($r = -0.61$, $p < 0.001$), stress ($r = -0.58$, $p < 0.001$), and anxiety ($r = -0.54$, $p < 0.001$).

Mediation Model Testing

The results (Table 2) showed that gender was negatively associated with IA in the mediation model, $\beta = -0.14$, 95% CI [−0.24, −0.05], and the total model, $\beta = -0.12$, 95% CI [−0.22, −0.02]. Additionally, stress was positively associated with anxiety, $\beta = 0.74$, 95% CI [0.70, 0.79]. After controlling for stress, anxiety was positively associated with IA, $\beta = 0.47$, 95% CI [0.40, 0.54]. Moreover, when we included anxiety as a mediating variable, the direct effect, $\beta = 0.27$, 95% CI [0.20, 0.34], and the indirect effect $ab = 0.35$, 95% CI [0.29, 0.41] of stress on IA, were both significant. That is to say, anxiety partially mediated the influence of stress on IA. The indirect effect was explained as 56.10% of the total effect.

Moderated Mediation Model Testing

We used the PROCESS macro (Model 59) developed by Hayes to test the moderated mediation (Table 3).[62] In the model for predicting anxiety, after controlling gender and age, stress was positively associated with anxiety, $\beta = 0.61$, 95% CI [0.55, 0.67]. In addition, stress × SC was negatively associated with anxiety, $\beta = -0.09$, 95% CI [−0.12, −0.05], suggested SC moderated the association between stress and anxiety. To better understand the moderating effect of SC, we examined the interaction using a simple slope test at two levels of SC (see Figure 2, high level of SC = M +1SD, low level of SC = M −1SD). The results revealed that the positive effect of stress on anxiety was weakened by SC (low level of SC: $\beta_{simple} = 0.70$, 95% CI [0.64, 0.75]; high level of SC: $\beta_{simple} = 0.53$, 95% CI [0.45, 0.60]).

Table 1 M, SD, and Bivariate Correlation Coefficients of the Primary Variables

Variables	*M*	*SD*	1	2	3	4	5
1. Age	20.62	1.58	–				
2. Stress	11.81	3.62	−0.10**	–			
3. IA	39.93	11.65	−0.09**	0.63***	–		
4. SC	63.97	11.68	0.12***	−0.58***	−0.61***	–	
5. Anxiety	9.99	3.01	−0.13***	0.75***	0.67***	−0.54***	–

Notes: N = 861. **p < 0.01, ***p <. 001.
Abbreviations: IA, Internet addiction; SC, self-control.

Table 2 The Mediated Model of Anxiety

Dependent Variables	Independent Variables	*β*	SE	*t*	*p*
IA	Constant	0.06	0.04	1.56	0.119
	Gender	−0.12	0.05	−2.26	0.024
	Age	−0.03	0.03	−1.09	0.274
	Stress	0.62	0.03	23.19	< 0.001
Anxiety	Constant	−0.02	0.03	−0.78	0.437
	Gender	0.05	0.05	1.13	0.261
	Age	−0.05	0.02	−2.28	0.023
	Stress	0.74	0.02	32.57	< 0.001
IA	Constant	0.07	0.03	2.04	0.042
	Gender	−0.14	0.05	−2.95	0.003
	Age	−0.01	0.03	−0.20	0.843
	Stress	0.27	0.04	7.42	< 0.001
	Anxiety	0.47	0.04	12.75	< 0.001

Note: N = 816.
Abbreviations: SE, standard errors; IA, Internet addiction.

Table 3 The Stress-IA Moderated Mediation Model

Model/Effect	*β*	SE	*t*	*p*
Model for predicting anxiety				
Constant	−0.08	0.03	−2.59	0.010
Gender	0.07	0.04	1.63	0.103
Age	−0.05	0.02	−2.20	0.028
Stress	0.61	0.03	21.34	< 0.001
SC	−0.18	0.03	−6.51	< 0.001
Stress × SC	−0.09	0.02	−4.40	< 0.001
Model for predicting IA				
Constant	0.02	0.03	0.63	0.527
Gender	−0.08	0.05	−1.77	0.078
Age	−0.01	0.02	0.33	0.740
Stress	0.18	0.04	4.73	< 0.001
SC	−0.31	0.03	−10.67	< 0.001
Stress × SC	0.07	0.03	2.11	0.035
Anxiety	0.34	0.04	8.17	< 0.001
Anxiety × SC	−0.11	0.04	−2.83	0.005
Conditional effect analysis (direct)	*β*	SE	LLCI	ULCI
M - 1 SD	0.11*	0.04	0.03	0.19
M + 1 SD	0.25***	0.06	0.14	0.37
Conditional effect analysis (indirect)	*β*	SE	LLCI	ULCI
M - 1 SD	0.31***	0.04	0.24	0.39
M + 1 SD	0.12**	0.04	0.04	0.20

Notes: N = 861. *p < 0.05, **p < 0.01, ***p < 0.001.
Abbreviations: SE, standard errors; SC, self-control; IA, Internet addiction; LL, low limit; UL, upper limit; CI, confidence interval.

In the model for predicting IA (Table 3). When gender and age were controlled, a positive association was found between stress and IA, $\beta = 0.18$, 95% CI [0.11, 0.26]. In addition, stress × SC was positively associated with IA, $\beta = 0.07$, 95% CI [0.01, 0.14], suggested SC played a moderating role in the relationship between stress and IA. To better understand the moderating effect of SC, we examined the interaction using a simple slope test at two levels of SC (see Figure 3). Specifically, SC

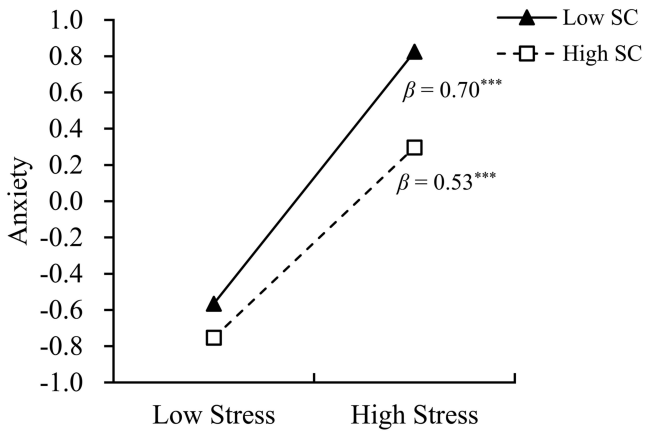

Figure 2 Moderating role of SC on Stress-Anxiety relationship.
Note: ***p < 0.001.
Abbreviation: SC, self-control.

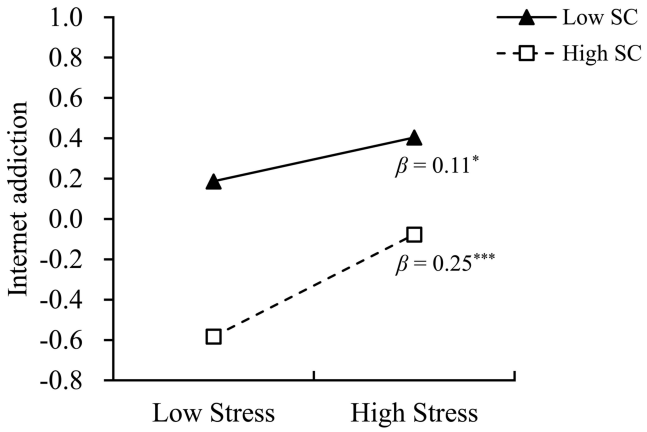

Figure 3 Moderating role of SC on Stress-IA relationship.
Notes: *p < 0.05, ***p < 0.001.
Abbreviations: SC, self-control; IA, Internet addiction.

enhanced the positive effect of stress on IA (low level of SC: β_{simple} = 0.11, 95% CI [0.03, 0.19]; high level of SC: β_{simple} = 0.25, 95% CI [0.14, 0.37]).

Additionally, the association between anxiety and IA was significant, β = 0.34, 95% CI [0.26, 0.42]. The association between anxiety × SC and IA was also significant, β = −0.11, 95% CI [−0.19, −0.03]. To be specific, the positive effect of the anxiety on IA was also weakened by SC (see Figure 4, low level of SC: β_{simple} = 0.45, 95% CI [0.37, 0.52]; high level of SC: β_{simple} = 0.23, 95% CI [0.09, 0.36]).

Finally, the bootstrap method further indicated that SC moderated the indirect effect of stress on IA via anxiety (Table 3). For college students with a low level of SC (M-1SD), the indirect effect was 0.31 (SE = 0.04, 95% CI [0.24, 0.39]). For college students with a high level of SC (M+1SD), the indirect effect was 0.12 (SE = 0.04, 95% CI [0.04, 0.20]).

Discussion

In the present study, we constructed a moderated mediating model to examine the mechanisms of the effect of stress on IA among Chinese college students. The current findings supported the hypothesized moderated mediating model. Specifically, anxiety partially mediated the link between stress and IA, and SC moderated the direct and indirect links between stress and IA.

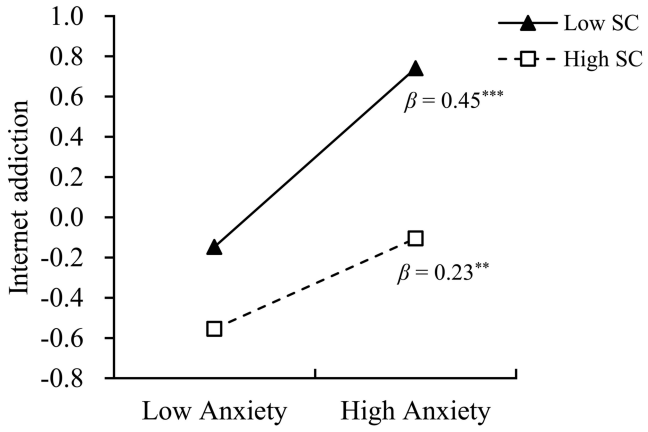

Figure 4 Moderating role of SC on Anxiety-IA relationship.
Notes: **$p < 0.01$, ***$p < 0.001$.
Abbreviations: SC, self-control; IA, Internet addiction.

The Mediating Role of Anxiety

As anticipated, stress predicted anxiety and IA, and anxiety predicted IA. These results are consistent with previous findings that stress positively correlated with anxiety,[31–33] stress positively associated with IA[10,17,18] and anxiety positively correlated with IA.[22,27] The present findings further confirmed the correlations among stress, anxiety, and IA, suggesting that stress and anxiety were all risk factors for IA.

The present study also revealed that anxiety partially mediated the link between stress and IA. Consistent with previous studies, our findings highlight the role of negative emotions in the relationship between stress and IA.[18,37] For example, Kim et al revealed that depression mediated the link between academic stress and delinquent behaviors among Korean adolescents.[37] In addition, Jun and Choi found that negative emotion fully mediated the association between academic stress and IA.[18] Moreover, the present findings also support the general strain theory. According to general strain theory, problem behaviors, such as IA, could be the consequence of reliving negative emotions (anxiety) caused by stress.[10,17,18] Indeed, the compensatory Internet use model also reported that individuals may immerse themselves in the Internet to help them escape or relieve negative emotional experiences.[66] In a word, the results highlighted the critical role of anxiety in the influence of stress on IA.

The Moderating Role of SC

More importantly, different from the previous studies which took SC as a mediator variable in the link between stress and behavioral addiction.[17,34,40] The present study indicated that SC moderated the two stages of the mediation effects. To be specific, SC buffered the effect of stress on anxiety, as well as the effect of anxiety on IA.

The current study revealed that SC moderated the indirect link between stress and IA through anxiety. Specifically, SC moderated the first stage of the mediation effects. From Figure 2, we know that the predictive effect of stress on anxiety was weaker among college students with high level of SC than those with low ones. For individuals with low level of SC, a high level of stress means a high level of anxiety. A previous study revealed that individuals with low levels of SC could not control their self-deprecating ruminations, which is characterized by constant repetitive thinking about negative situations and dwelling on negative emotions,[67] thus leading to worrisome about potential threats, such as anxiety.[68] On the contrary, individuals with high levels of SC are less likely to be affected by stressful events than those with low levels of SC.[44–46] Therefore, when facing high stress, individuals with high SC could view stress as more controllable and might adopt positive coping strategies, thus being able to reduce their anxiety.[69,70]

In addition, SC moderated the second stage of the mediation effects. As shown in Figure 4, the positive link between anxiety and IA was weaker among students with high levels of SC than those with low ones. This finding suggested that negative emotions, such as anxiety, could drive individuals to use the Internet for emotion regulation. Individuals with

a low level of SC are more likely to use the Internet inappropriately as well as to be addicted to it to escape negative emotional experiences. In contrast, for individuals with high levels of SC, the positive link between anxiety and IA was weaker. This might be explained by the fact that individuals with high levels of SC might adopt positive coping strategies to regulate negative emotional experiences. Previous findings confirmed that compared to individuals with low SC, those with higher SC are more emotionally stable and better at coping with emotional distress.[46,71,72]

Finally, the direct link between stress and IA was also moderated by SC. Interestingly, the link between stress and IA was greater among students with high SC than in those with low ones (Figure 3). One possible explanation is that there are additional variables that mediate this effect, and SC moderate the influence of stress on these additional variables. Nevertheless, the present findings enlightened us that multiple factors should be considered in future studies to further explore the mechanisms underlying the impact of stress on IA.

Limitations and Implications

Several limitations cannot be ignored. First, the research design is not sufficient to make causal inferences. Stress and anxiety may be risk factors for IA, but IA can also backfire and induce stress or anxiety symptoms in individuals. Consequently, designs for causal inference (eg, longitudinal or experimental design) are needed. Second, the lack of control variables. Only age and gender were included in the present hypothetical model. As we know, many factors could influence the link between stress and IA. More control variables should be included to further test the model, such as the individual's family economic status, emotional regulation ability, and fear of the Covid-19 pandemic. Third, other behavioral addictions (smartphone addiction) share many behavioral and emotional manifestations with IA. Based on the general strain theory, stress induces negative emotions and further leads to problematic behaviors.[18,36] More investigations are needed to explore how the mediating variable (anxiety) and moderating variable (SC) affect the relationship between stress and other addictive behaviors. Last, all subjects recruited were university students from the east coast of China. This makes these generalized conclusions need to be taken very seriously when promoting. The conceptual model is required to validate among diverse populations. Because different demographics and age groups (the elderly and teenagers) may have different psychological and behavioral characteristics when over-using the Internet.[73]

Despite the limitations, some practical implications are worth being discussed. First, since anxiety partially mediated the link between stress and IA, decreasing anxiety may be one of the effective ways to lower Internet overuse. Previous studies have shown that mindfulness training is an effective way of reducing stress and anxiety, such as Mindfulness-Based Stress Reduction and Mindfulness-Based Cognitive Therapy.[74–76] Therefore, offering courses about mindfulness training at universities may be one of the impactful ways to mitigate the influence of stress on IA. Second, since SC could buffer the indirect link between stress and IA through anxiety, improving individuals' SC ability would keep them from being addicted to the Internet. According to the strength model of SC, SC can be strengthened by regular practice.[50,77] Long-term moderate regulation, such as physical exercise may help increase SC.[50]

Conclusions

In summary, the present study explored the mediating role of anxiety and the moderating role of SC in the stress-IA link and found that anxiety partially mediated the stress-IA link and that SC moderated the direct and indirect links between stress and IA. The current findings increase our understanding of the relationships between stress, anxiety, SC, and IA and suggest that educators can intervene in college students' IA by reducing anxiety and improving self-control.

Data Sharing Statement

The data can be obtained by contacting the corresponding author for reasonable requests.

Disclosure

The authors declare that they have no conflicts of interest in this work.

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