# The effect of stress on internet addiction among university students: the mediating role of self-control

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**Abstract.** Earlier investigations have revealed that internet addiction among college-goers is a burgeoning issue, but there has been a dearth of inquiry into the correlation between stress, self-command, and internet addiction.In addition, some studies have neglected the tendency of females and minority college student towards Internet addiction. To bridge this research gap, the present study endeavored to examine the influence of stress on internet addiction in college students, as well as the moderating role of self-control in this connection. To attain our objective, we utilized the Stress Scale for College Students, the Self-Control Scale for College Students, and the Internet Addiction Test to conduct surveys among a sample of 316 college students. The outcomes of our study revealed that stress exhibited a positive association with internet addiction, while displaying a negative association with self-control.Additionally, our results indicated that self-control partially mediated the relationship between stress and significant internet addiction. In summary, our investigation revealed that stress can predict internet addiction both directly and indirectly, by influencing self-control.There are also shortcomings in our own study. Given the insufficient participation of minority college students, there is presently no pertinent research on the adverse association between stress and internet addiction in this population. Consequently, forthcoming research can investigate how diverse factors impact different kinds of internet addiction, in order to more effectively intervene and prevent various types of internet addiction among college students.

**Keywords:** Stress, Internet addiction, self-control, university students.

## 1. Introduction

As per the 50th Statistical Report on China's Internet Development, which was published by the China National Network Information Center (CNNIC) on June 31st, Chinese internet users are increasingly experiencing addiction to the web. The report stated that, as of June 2022, there were 1.051 billion internet users in China, with an additional 19.19 million users compared to December 2021. Based on age, internet users below 10, between 10-19, 20-29, 30-39, and 40-49 made up 4.2%, 13.5%, 17.2%, 20.3%, and 19.1% respectively, which is higher than other age categories. The proportion of internet users aged 50 and above was 25.8%. [1] Translated, this equates to approximately 180 million Internet users between the ages of 20-29. As the Internet becomes more and more popular, the tendency to become addicted to the Internet is slowly becoming one of the much talked about research topics. Due to the significant impact that internet addiction has on individual development, researchers have paid much attention to the factors that influence internet addiction. Previous research has shown that several factors such as personality, ego, interpersonal relationships, parent-child communication, psychological need satisfaction, subjective well-being and experience of use can influence internet addiction [2].

From the early articles, researchers first focused on adolescent Internet addiction, in which stress and Internet addiction become complementary: from the characteristics of life event stress, coping styles, the Internet addiction group scored higher than the normal group on learning, being punished, health, other dimensions and overall stress, indicating that Internet addicts may experience more stress; The connection between stress resulting from major life events, coping strategies, and internet

addiction reveals that fantasy coping methods, academic stress, and other forms of stress are potential precursors to internet addiction. [3].

In the circular mechanism of self-coping styles, anxiety, stress, and Internet addiction, anxiety has a complete mediating effect. It appears that stress and internet addiction are not directly linked, but rather their relationship is mediated by anxiety. In university students, stress can increase the likelihood of internet addiction by causing anxiety, while internet addiction can exacerbate stress levels by intensifying anxiety. [4] With the popularity of the Internet and people's reliance on and frequent use of electronic products, college students are slowly becoming a major group of Internet users, and some studies on the tendency of college students to become addicted to the Internet have emerged one after another: External pressure can play a crucial role in driving Internet addiction, and it is a significant risk factor for the condition. Studies have indicated that the more stress individuals experience in their daily lives or studies, the more likely they are to resort to the virtual world of the Internet to find relief. This, in turn, can increase their likelihood of developing an addiction to the Internet. Furthermore, extensive research has shown a strong correlation between stress and both substance and behavioral addictions. The higher the level of stress, the greater the likelihood of addiction, and the more challenging it becomes to treat.[6]

Self-control refers to the ability to consciously control one's behavior in order to overcome impulses, habits, or automatic responses. Coping with stress involves the control of attention, thought and emotion and requires more energy, so the energy for self-control is depleted in stressful situations, and coping with stress is itself a process of self-control depletion; individual self-control resources are limited, and control resources are temporarily depleted after the individual has exercised self-control in the previous phase; stress may further reduce self-control by reducing reduced cognitive control, and it has been found that glucose may be one of the physiological bases of self-control, and that glucose supplementation reduces self-control energy expenditure, and stress coping depletes glucose, so that stressful situations may reduce individual self-control through glucose depletion. [7] To summarize, when individuals experience stress, they require resources to manage it effectively. However, heightened levels of stress can result in reduced self-control, making it more challenging to regulate behavior and emotions.

The study revealed that the relationship between stress and Internet addiction was partially mediated by both mindfulness and self-control. While stress had a direct effect on Internet addiction, the presence of mindfulness and self-control helped to mitigate this effect. In particular, mindfulness was found to have a dual mediating effect by enhancing self-control and reducing the risk of Internet addiction.

Some foreign studies have shown that individuals who are oriented towards the present often experience challenges with self-regulation, which may manifest as procrastination or internet addiction. On the other hand, people with a future focus tend to exhibit greater self-control and are less susceptible to these issues.

Previous studies have revealed that Chinese university students tend to struggle with self-discipline, which can be influenced by factors such as temptation, self-confidence, and stress. Insufficient self-control has been linked to a range of behavioral issues, including internet addiction, as evidenced by several empirical studies showing a strong negative correlation between self-control and excessive internet use. These findings suggest that pressure may impact internet addiction by impairing self-control.

In contrast, dual processing theory suggests that behaviour is determined by the interaction of automatic and control processing. A conflict arises when a college student's automatic preference for the gratification of the Internet drives the tendency to become addicted to the Internet, while the external standards of behaviour he holds restrict this behaviour. The ability to exercise self-restraint plays a crucial regulatory function in this conflict. Several studies have demonstrated that the capacity for self-control is significantly and inversely associated with excessive Internet usage and predicts a reduced propensity to develop Internet addiction.[9]. Confronted with the openness, anonymity, virtuality, and convenience of the online world, university students with high levels of self-discipline

can regulate their online behavior and avoid succumbing to excessive Internet use. Conversely, those with low self-control are more prone to seeking short-term gratification online, particularly when facing negative stressors and inadequate emotional regulation, which can lead them to use the Internet as a means of escapism. The Internet can serve as a means of evasion from reality.

While prior research has investigated the connection between stress and online gaming, the association between self-control and online game addiction, and the relationship between stress and self-control, no study has yet examined the interplay between all three factors within an integrated theoretical framework. At the same time, most of the current studies choose males as the investigation subjects, and the differences between minority college students and Han college students are not considered. This research examined the connection between stress, self-control, and Internet addiction among female and minority college students using psychometric and mathematical statistics. The findings suggest that reducing stress and enhancing self-control may help alleviate Internet addiction in this population. To achieve this, it is essential to comprehend the students' current status and explore the correlations among these variables. The study proposes recommendations to support college students in decreasing stress, strengthening self-control, and ultimately reducing their dependency on the Internet.

## 2. Research Subjects and Methods

### 2.1. Research Subjects

In this research, a questionnaire was used to investigate the relationship between stress, self-control, and internet addiction of university students. A total of 327 questionnaires were collected, leaving 316 questionnaires after eliminating invalid ones, with an efficiency rate of 96.6%, including 128 male students and 188 female students; 277 Han Chinese and 39 minority students; 186 urban students and 130 rural students.

### 2.2. Research methods

(1) Psychometric method

① College Stress Scale: The College Stress Scale (CSS) compiled by Li Hong and Mei Jinrong [10] consists of 30 items, including 3 subscales: personal stress (16 items, 1-16 questions), academic stress (10 items, 17-26 questions) and negative life events (4 items, 27-30 questions). The internal consistency alpha coefficient for the total scale was 0.91 and for the three subscales was 0.88, 0.84 and 0.83 respectively. The scale was rated on a Likert 4-point scale (1=no stress, 4=very stressful) with a theoretical score range of 30-120, with higher scores indicating greater stress. In this study, the internal consistency reliability of the total scale was 0.804.

② Self-Control Scale for College Students: The Self-Control Scale (SCS) developed by Tam Shuhua and Guo Yongyu [11] was used. The scale consists of 19 items, including five dimensions: resisting temptation, healthy habits, abstaining from recreation, impulse control and work focus, among which the resisting temptation dimension corresponds to items 1, 5, 11 and 15, the healthy habits dimension corresponds to items 2, 3 and 6, the abstaining from recreation dimension corresponds to items 4, 8 and 19, the impulse control dimension corresponds to items 7, 9, 10, 16, 17 and 18, and the work focus dimension corresponds to items 12, 13 and 14. The scale is scored on a 5-point Likert scale (1 " totally incompatible " to 5 "fully"), with entries 1, 5, 11 and 14 being positive scoring questions and all other entries being reverse scoring questions. The mean score of the 19 items was calculated after the reverse scoring of the reverse scoring questions, with higher scores indicating better self-control. The internal consistency coefficient of the scale was 0.862, and the alpha coefficients of the five dimensions were 0.761; 0.670; 0.648; 0.606; and 0.607. In this study, the internal consistency reliability of the scale was 0.807.

③ The Internet Addiction Test (lAT) was developed by the American scholar Young [12]. The scale consists of 20 questions, each with five levels of evaluation, and is a five-level scale: 1=Nearly

Never,2=Occasionally,3=Sometimes, 4=Frequently, 5=Uncertain Total score ranges from 20 to 100, and the total score is based on the total score The value of the total score is used to measure whether the participant is addicted to online games. A total score of ≥60 is considered an internet addiction and a total score of <40 is considered a normal control group. The reliability of the test was 0.905 and the coefficient between the items and the scale ranged from 0.27 to 0.67, which has very high reliability and validity. The internal consistency reliability of the total scale was 0.933.

(2) Mathematical and statistical method

Excel was used for simple data processing, SPSS 26.0 was used for descriptive statistics, Pearson correlation analysis and common method deviation test, and process v4.0 plug-in was used for mediating effect analysis.

## 3. Results

### 3.1. Common method bias of stress, self-control, and Internet addiction.

Harman's One-factor Test was used to conduct a common method bias test in this study. Factors with eigenvalues higher than one were extracted resulting in a total of nine factors. The results of this study revealed that the variance explained by the first factor was 24.44%, which was less than the critical value of 40%. It can be seen there is no significant common method bias in this study.

**Table 1.** General Characteristics of College Students' Tendency to Stress, Self-Control, and Internet Addiction

| | M | SD |
|---|---|---|
| Pressure | 64.53 | 16.320 |
| Personal stress | 33.33 | 9.474 |
| Academic pressure | 22.40 | 6.182 |
| Negative life events | 8.80 | 3.174 |
| Self-control | 54.94 | 9.630 |
| Resist temptation | 12.13 | 2.463 |
| Healthy habits | 7.93 | 2.607 |
| Moderation of entertainment | 8.56 | 2.623 |
| Impulse control | 17.73 | 4.880 |
| Focus on work | 8.59 | 2.066 |
| Internet addiction | 63.04 | 16.325 |

To gain a comprehensive understanding of university students' stress, self-control, and internet addiction tendencies, this study conducted a descriptive analysis of the sub-dimensions of each construct using the College Student Stress Scale (a Likert 4-point scale), the Self-Control Scale (a 5-point scale), and the Internet Addiction Scale (a 5-point scale) as shown in Table 1. The dimensions of stress were slightly lower than the theoretical average (personal stress: 40, academic stress: 25, negative life events: 10), indicating that the overall stress level of college students was moderate to low. Furthermore, self-control was rated at a moderate to low level, while the mean value of internet addiction was above 60, indicating that college students have a predisposition towards internet addiction. In conclusion, this study provides valuable information on the psychological characteristics of university students, which can guide the development of targeted interventions aimed at improving self-control and preventing internet addiction.

### 3.2. Correlation analysis of stress, self-control, and Internet addiction.

**Table 2.** Correlation of stress, self-control, and tendency to Internet addiction among university students

| | Self-control | Pressure | Internet addiction |
|---|---|---|---|
| Self-control | 1 | | |
| Pressure | -0.368** | 1 | |
| Internet addiction | -0.436** | 0.386** | 1 |

Note：*p<0.05,**p<0.01

It is clearly evident from Table 3 that self-control is significantly and negatively related to both stress and internet addiction, with correlation coefficient values of -0.368 and -0.436, respectively. This indicates a negative relationship between these variables. Stress was significantly and positively correlated with internet addiction with a correlation coefficient value of 0.386.

### 3.3. A test of the mediating effect of self-control between stress and Internet addiction.

**Table 3.** A test of the mediation of self-control between stress and Internet addiction

| | Internet addiction | Self-control | Internet addiction |
|---|---|---|---|
| Constants | 38.110**<br>-10.996 | 68.968**<br>-33.468 | 77.844**<br>-11.168 |
| Pressure | 0.386**<br>-7.418 | -0.217**<br>(-7.019) | 0.261**<br>-4.953 |
| Self-control | | | -0.576**<br>(-6.450) |
| Sample size | 316 | 316 | 316 |
| R2 | 0.149 | 0.136 | 0.249 |
| Adjusting R2 | 0.146 | 0.133 | 0.244 |
| F | F (1,314)<br>=55.027,<br>p=0.000 | F (1,314)<br>=49.273,<br>p=0.000 | F (2,313)<br>=51.876,<br>p=0.000 |

Note: * p<0.05 ** p<0.01 inside the parentheses are t-values

From Table 4, we can see that the analysis of mediating effects involves three models, as follows: Internet addiction=38.110+0.386*stress; self-control=68.968-0.217*stress; Internet addiction=77.844+0.261*stress-0.576*self-control.

**Table 4.** Intermediary role test

| Stress => Self-control => Internet addiction | |
|---|---|
| c Total effect | 0.386** |
| a | -0.217** |
| b | -0.576** |
| a*b Intermediary Effect Value | 0.125 |
| a*b (Boot SE) | 0.026 |
| a*b (z ) | 4.776 |
| a*b (p ) | 0 |
| a*b (95% BootCI) | 0.078 ~ 0.180 |
| c’ Direct Effect | 0.261** |

* p<0.05 ** p<0.01

**Table 5.** Mediation effect volume

| Stress => Self-control => Internet addiction | |
|---|---|
| Test conclusion | Some agents |
| c Total effect | 0.386 |
| a*b Intermediary effect | 0.125 |
| c' Direct effect | 0.261 |
| Effectiveness ratio calculation formula | a * b /c |
| Effectiveness ratio | 32.41% |

To further verify the mediating role of self-control in the relationship between stress and internet addiction, the Bootstrap method was applied with a confidence interval (CI) of 95% and 5000 replicate samples with the 95% CI not including 0. As shown in Tables 5 and 6, the mediating effect value was 0.125, the total effect value was 1 going to 0.386, and the direct effect value was 0.261 with a 95% CI [0.078, 0.180]. The effect share was 32.41%, leading to the conclusion that self-control acts as a partially mediating agent in the relationship between stress and internet addiction. In summary, this research provides important insights into the complex interaction between stress, self-control, and internet addiction among university students. Such findings can inform the development of effective interventions aimed at promoting self-control and preventing and reducing internet addiction.

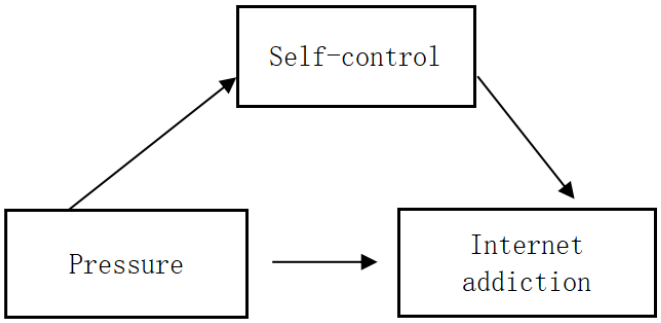


**Figure1.** Intermediary Model

## 4. Discussion and Analysis

### 4.1. The effect of stress on the propensity to Internet addiction

According to our research, stress is positively associated with internet addiction among college students, which is consistent with earlier studies [13][14]. Previous research has also noted a positive relationship between stress and other addictive behaviors, such as alcohol and tobacco addiction [15]. From the perspective of stress-coping theory, individuals who adopt an avoidance-based coping style may be more likely to abuse substances as a means of escaping the negative emotions associated with stress [16]. Physiologically, stress can impair executive function and increase susceptibility to substance abuse, as shown in a study by Constantinou [17]. Therefore, our findings underscore the importance of developing effective stress management strategies to prevent and treat internet addiction.

Currently, researchers have primarily examined the moderating role of personality traits in the relationship between stress and internet addiction. Studies have identified the moderating effects of effortful control, shyness, and time management tendencies [18]. However, most studies have only examined the general likelihood of internet addiction among subjects and have not distinguished between different types of internet addiction. Moreover, there is a lack of research examining moderating variables between stress and internet addiction, in contrast to studies on mediating effects. Studies suggest that students can easily fall into a vicious cycle of "academic stress - internet

dependence - poorer academic performance - academic stress - excessive internet dependence." Interestingly, some moderately to severely internet-dependent students have low levels of academic stress, suggesting that these students may have become numb to academic achievement and are not concerned with academic performance. Their complete addiction to the internet should, therefore, be a red flag. Regarding gender differences, some studies have neglected female internet addiction-prone users. Our current study aims to fill this gap. Additionally, due to the scarcity of subjects from ethnic minority university students, there is no relevant research on the relationship between negative stress and internet addiction among ethnic minority university students so far. Future studies can examine the influence of various factors on different types of internet addiction to develop better interventions for reducing and preventing internet addiction among college students [19]. In summary, stress is a universal factor in addiction, and it not only leads to substance addiction but also has a positive predictive effect on internet addiction. Therefore, considering stress from the previous theoretical framework of general addiction can be a valuable avenue for future research.

### 4.2. Stress and college students' online game addiction: a test of mediating effects

This study focuses on the mediating mechanisms between stress and online addiction, and it was found that self-control partially mediates the relationship between stress and internet addiction. Baumeister's strength model of self-control proposes that self-control requires the consumption of psychological resources, which are domain general and stored in a resource pool of limited capacity. The amount of available energy determines the success or failure of self-control [20]. Tan et al. suggest that after a period of activity requiring self-control resources, the ego's capacity for self-control becomes depleted, resulting in a state known as 'ego depletion'. Various factors, including subjective perceptions, emotions, personality traits, and intimate relationships, can influence ego depletion, and its after-effects are negative [21].

Research has shown that coping with stress involves the control of attention, thoughts, and emotions, which requires more energy, depleting the energy needed for self-control in stressful situations. Moreover, inadequate self-control can lead to various problems. The dual processing theory suggests that the interaction between automatic and controlled processing determines behavior. A college student's automatic preference for the gratification provided by the internet can contribute to internet addiction, while external behavioral standards can limit this behavior. Therefore, when stress depletes self-control, the risk of internet addiction significantly increases. To summarize, this study highlights the importance of self-control as a mediator in the relationship between stress and internet addiction. Further research can examine other potential mediating mechanisms and develop interventions to improve self-control and prevent internet addiction among college students. Moreover, the dual-system model of self-control posits that low self-control leads to an imbalance between the impulse and control systems. Individuals with low self-control may struggle with impulse control, while the seductive content on the internet can make them more likely to seek instant gratification, thereby increasing their chances of developing internet addiction [22]. To summarize, this study concludes that stress depletes self-control, and a lack of self-control ultimately increases the risk of internet addiction. Future research can expand on the dual-system model of self-control and investigate the interaction between stress, self-control, and other factors that may contribute to the development of internet addiction. Developing effective interventions focused on improving self-control and coping with stress can be crucial in preventing and treating internet addiction among college students.

## 5. Conclusion

The following conclusions were drawn from this study: (1) Stress had a significant negative relationship with self-control and a significant positive relationship with internet addiction, while self-control had a significant negative relationship with internet addiction. (2) Self-control played a partially mediating role between stress and internet addiction among university students. Therefore,

stress not only directly affects internet addiction but also indirectly affects internet addiction through the mediating role of self-control. In summary, this study highlights the crucial role of self-control in mediating the relationship between stress and internet addiction. It provides valuable insights into the factors contributing to internet addiction among college students and can inform the development of effective interventions aimed at reducing and preventing internet addiction.

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