

Does Academic Burnout Alleviate or Exacerbate Internet Dependence in University Students with Depression and Anxiety?

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Purpose: This study aims to investigate whether academic burnout alleviates or exacerbates internet dependence among college students with depression and anxiety. Moreover, it intends to construct a moderated mediation model to examine how academic burnout moderates the relationship between depressive and anxious emotions and internet addiction and how social support mediates this relationship to determine the psychological motivations underlying addiction.

Methods: A questionnaire survey was conducted using the simple random sampling method, which yielded 757 valid responses (response rate: a 93.11% response rate). The sample included 274 males and 466 females, with an average age of 20.90 years (± 1.48). Hierarchical regression analysis was employed for data analysis.

Results: Anxiety and depressive symptoms directly affect the internet dependence of university students and indirectly affect it through the mediating role of social support. Academic burnout moderates the relationship between negative emotions and internet addiction, with high levels of academic burnout potentially decreasing the internet dependence of students experiencing negative emotions. We proposed a psychological self-regulation mechanism theory, which posits that learned helplessness may intensify the emotional symptoms of anxiety and depression, which is reflected in reduced internet use behavior.

Conclusion: High levels of academic burnout can exacerbate symptoms of depression and anxiety, significantly reducing students' interest in activities. For these students, a decrease in internet addiction may not be a positive sign; instead, it could indicate worsened depression and anxiety. This finding underscores the need for close monitoring of and intervention implementation for college students experiencing high levels of burnout and symptoms of depression or anxiety.

Keywords: academic burnout, internet addiction, depression, anxiety, social support

Introduction

Previous research indicates that students with high levels of anxiety and depression are more prone to internet addiction.¹⁻³ One of the several reasons for this phenomenon is based on the operant conditioning theory proposed by Skinner—behavioral explanation⁴—which implies that rewarding a specific behavior can reinforce it. For instance, students who surf the internet may receive various rewards, such as excitement, satisfaction, love, and physiological and psychological comfort; this could prompt them to seek refuge in the virtual world when faced with real-world pressures. This tendency might lead to frequent and pathological internet use under similar circumstances. However, interestingly, our study (Figure 1) found that high levels of academic burnout seemingly relatively reduce high internet dependence among students with anxiety and depression. Does this finding imply that high levels of academic burnout play a positive protective role to a certain extent? Or are there deeper reasons that underlie this phenomenon?

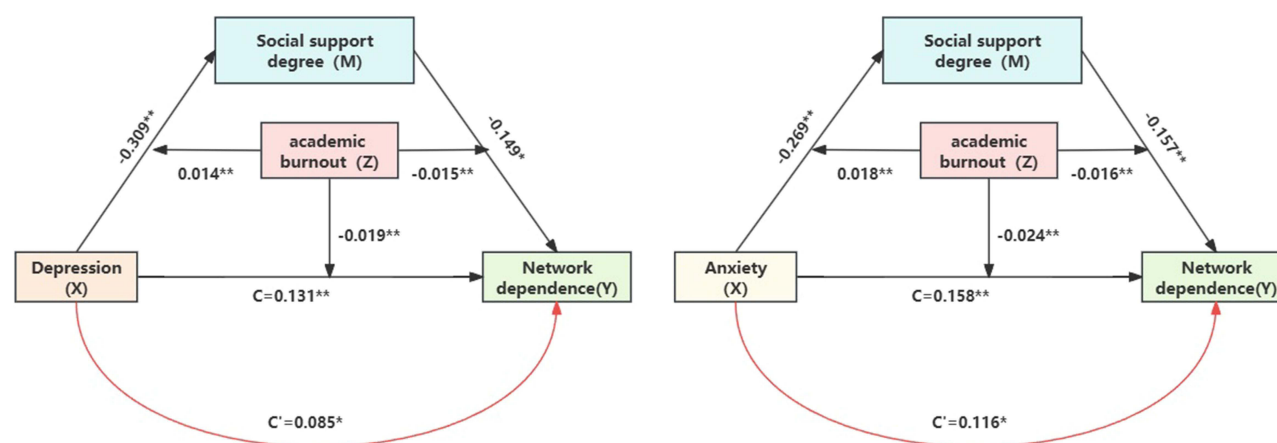


Figure 1 The moderated mediation mode. illustrates the path analysis model showing how depression and anxiety influence internet addiction through social support as a mediating factor, with academic burnout acting as a moderating variable. All path coefficients are marked with significance levels, * $p < 0.05$, ** $p < 0.01$.

Academic burnout among university students⁵ is a form of stress that develops due to prolonged competition in the academic environment. The term denotes a state of exhaustion caused by academic demands; this state is characterized by feelings of cynicism and detachment toward one's studies, as well as decreased learning efficiency and a sense of helplessness that stems from the inability to improve performance. The learned helplessness model implies that the *nonautonomous* learning mode in traditional educational systems may lead students to experience elevated stress in long-term competitive learning environments.⁶ Such stress can result in a sense of helplessness in terms of improving academic performance, which students may attribute to their perceived lack of ability.^{7,8} This negative cycle can ultimately lead to academic burnout. Individuals who experience burnout exhibit emotional symptoms such as irritability, anxiety, and helplessness. Bianchi⁹ found that depression is the most commonly associated emotional state with burnout. Evidence also suggests that¹⁰ burnout is closely related to anxiety. A 2016 study conducted in Finland demonstrated that burnout in school environments can lead to internet addiction. A subsequent longitudinal study¹¹ led by Salmela-Aro revealed the existence of cross-lagged paths between excessive internet use and school burnout. The authors noted that school burnout predicts future excessive internet use; in turn, excessive internet use predicts future school burnout. In summary, burnout can be considered a risk factor for internet addiction.¹²

Internet addiction has emerged as a significant social problem that severely threatens public health. Previous studies¹³ indicate that the global prevalence of internet addiction is approximately 5%. Students with psychological health disorders and low levels of social support are more susceptible to the development of internet addiction. The results of the World Mental Health International College Student Initiative of the World Health Organization¹⁴ indicate that among nearly 14,000 surveyed students, opinionatedly one-third experienced a mental health disorder in the first year of college. The most common disorders reported were major depressive disorder (18.5%) and generalized anxiety disorder (6.7%).¹⁵ Recent longitudinal studies demonstrated the predictive role of depression in the development of internet addiction.¹⁶ In other words, young individuals who exhibit symptoms of depression may use the internet as a maladaptive coping strategy to alleviate the negative emotions they are experiencing, such as sadness, hopelessness, apathy, and loneliness. A meta-analysis indicated that 50% of studies found an association between internet addiction and anxiety, indicating that anxiety is a strong predictor of internet addiction.¹⁷ Furthermore, mental health issues may negatively affect academic performance while increasing academic burnout and dropout rates among college students.¹⁸ At the same time, more than half of the students that with depression or anxiety experienced severe disruption in their social lives and interpersonal relationships.^{15,19} Previous research has also suggested that shared vulnerability and sensitivity within neural substrates, which primarily involve the reward system, can lead to internet addiction.²⁰ In this domain, the explanation provided by the theory of learned helplessness is more detailed. This theory posits that individuals who experience uncontrollable negative events during specific situations may generalize this sense of *helplessness* to other contexts. For example, in the case of academic burnout, the stimuli in such an environment may become associated with a lack of reward, which leads students to exhibit negative attitudes when faced

with academic challenges. When similar psychological stressors occur in different scenarios, such as episodes of depression and anxiety, this avoidant and passive behavior can spread.²¹ Under these instances, any rewards obtained through internet use can provide students with an escape from uncontrollable negative events in the real world and compensate for the lack of reward in other areas, potentially leading to internet addiction.^{22,23} If negative events continue to persist, then their long-term impact can exacerbate the progression of adverse emotions.²⁴ Given its impact on public health, further research on the psychological symptoms of depression and anxiety in relation to internet addiction is of paramount importance. However, how do negative emotions and internet addiction influence each other? Does academic burnout moderate this influence? If so, what is the mechanism of the moderation? In addition, what role does the psychology of learned helplessness play in this context?

In daily life, excessive internet use and detachment from reality can negatively affect interpersonal relationships. According to the compensation model of internet use and the social cognitive model,^{25,26} perceived stress in social relationships may lead to excessive immersion in the online world. Individuals may rely on applications to meet their needs or alleviate their negative emotions.²⁷ The risk of internet addiction increases in situations of social isolation or a lack of social support.²⁸ This study supports the theoretical connection among negative emotions, social support, and their impact on internet addiction. A recent meta-analysis of studies on university students²⁹ revealed that individuals with low levels of social support are more likely to use the internet to relieve stress and seek additional online social support when driven by negative emotions. Moreover, experimental research²⁷ demonstrates that individuals with high levels of social support can better adapt to their environment, which reduces the risk of addiction. Social support also moderates the impact of negative emotions and subsequent behaviors,³⁰ which enhances the academic engagement and reduces the academic burnout of students. Low levels of social support can lead to social withdrawal behaviors, shyness, and feelings of loneliness among university students. The theory of learned helplessness suggests that social withdrawal is a maladaptive behavior in response to social and group rejection; thus, such withdrawal behavior denotes an attempt by students to suppress excessive anxiety and depression caused by inadequate social support.

Given the close connection among learned helplessness, academic burnout, depressive and anxious emotions, social support, and internet addiction, the current study constructs a composite model. This model uses academic burnout and social support as moderating and mediating factors, respectively, to provide empirical evidence on the role of academic burnout in the relationship between negative emotions and internet addiction. Additionally, the study explores the role of learned helplessness in this context based on the survey results and theoretical foundations.

Materials and Methods

Participants

After obtaining approval from the institutional review board, this study conducted a survey in China using simple random sampling on first- to fourth-year medical students between May and August 2022. Fifth-year students were excluded due to their hospital internships and exam preparations, thus ensuring sample homogeneity and enhancing internal validity. Measurements were taken from the same participants at different time points to minimize potential systematic bias from a single information source. The survey employed a standardized group protocol with direct on-site supervision by researchers, which allowed the participants unrestricted response time to optimize data quality and response authenticity. Ultimately, a total of 813 students participated in the survey. To control for the quality of the questionnaires, we applied the following exclusion criteria:³¹ (1) questionnaires with obviously patterned responses, such as selecting the same option for 10 consecutive items or displaying regular fluctuations around a certain value; (2) incomplete questionnaires; (3) questionnaires with excessively long (>20 min) or short (<5 min) completion times. A total of 56 invalid questionnaires were excluded, resulting in 757 valid responses (93.11%).

This cross-sectional study analyzed academic burnout and internet addiction among 757 undergraduate students from 25 university departments across 68 academic disciplines. The sample comprised 466 males and 291 females, with a balanced distribution across academic years (190, 189, 189, and 189 students in the first to fourth years, respectively). Ethnic composition revealed 13 distinct groups, with Han Chinese (46.23%) and Uyghur (41.19%) students predominating.

Measures

Sociodemographic Information

Based on previous research,³² self-report techniques were used to collect common sociodemographic variables, such as age, gender, ethnicity, only-child status, and parents' marital status. The questionnaires were administered by class, and participants filled them out under the guidance of surveyors. The completed questionnaires were collected on the spot after 20 min.

Internet Addiction Test

The most widely used Internet Addiction Test (IAT) scale, which was developed by Young³³ at the University of Pittsburgh, was employed to measure internet dependence among adults. This 20-item questionnaire evaluates the characteristics and behaviors associated with compulsive internet use, including compulsiveness, escapism, and dependency. The final scores range from 20 to 100, with scores of 20–39, 40–69, and 70–100 denoting normal, frequent, and significant problematic internet use, respectively. In certain study populations, the internal consistency of the IAT was excellent (Cronbach's $\alpha = 0.834$).³⁴

Self-Rating Anxiety Scale

The Self-Rating Anxiety Scale (SAS) was used to measure the anxiety levels of university students.³⁵ This scale consists of 20 items, which are each rated from 1 to 4 based on feelings experienced over the past week. The total SAS score is obtained by summing the scores of all items; high total scores indicate high levels of anxiety. In this study, the severity classification criteria were aligned with common hospital standards and reference manuals for psychological assessment scales. Specifically, a standardized scoring algorithm was used to define anxiety symptoms: scores of 50–59, 60–69, and >69 indicated mild, moderate, and severe levels of anxiety, respectively. Standard scores of <50, >50, >60, and >70 indicated no, mild, moderate, and severe anxiety, respectively. The scale obtained a Cronbach's alpha value of 0.85.³⁶

Self-Rating Depression Scale

The Self-Rating Depression Scale (SDS) is one of the scales recommended by the US Department of Education and Health for psychopharmacological research. Originally developed by Zung (1965), this four-point scale comprises 20 items. The SDS is noted for its ease of use and ability to intuitively reflect the subjective feelings of depression in patients, as well as changes in these feelings during treatment. According to the Chinese normative data,³⁷ the cutoff score for the SDS is 53 points. Scores between 53 and 62, between 63 and 72, and above 73 indicate mild, moderate, and severe depression, respectively. The scale obtained a Cronbach's alpha value of 0.73.³⁸

Academic Burnout Scale

The Academic Burnout Scale invented by Rong et al³⁹ was used to measure academic burnout. It is considered a reliable assessment tool for academic burnout in the Chinese context. The scale consisted of three components, namely, study depression (8 items), misconduct (6 items), and low sense of achievement (6 items), for a total of 20 items. In certain study populations, the Cronbach's alpha of this measure was 0.87, which indicates that the scale has good internal consistency, reliability, and construct validity.

Social Support Scale for College Students

Social Support Scale for College Students, developed on the basis of the three-factor model of social support by Xiao Shuiyuan,⁴⁰ was utilized. This scale consists of 17 items, categorized into three dimensions, namely, subjective support, objective support, and support utilization. Each item is rated using a five-point Likert-type scale. The scale demonstrated good reliability and validity with high scores indicating better levels of social support. Furthermore, previous research reported a Cronbach's alpha coefficient of 0.957.

Data Analyses

Initially, descriptive analyses, including frequency, percentage, and mean $\pm$ standard deviation, were conducted for each variable using SPSS 24.0, followed by correlation analyses. In the second step, SPSS PROCESS macro was employed to examine the mediation and moderation effects, with parameter estimates derived through bootstrapping with a sample

size of 5000. This number of resamples was selected to ensure the stability and accuracy of the parameter estimates, ensuring a robust basis for statistical inference while balancing computational efficiency.⁴¹ Parameters with 95% confidence intervals that do not include zero were considered significant. We first employed Model 4 in PROCESS to test the mediation model; depression and anxiety were the independent variables, social support the mediating variable, and internet addiction the dependent variable. Subsequently, we used Model 59 in PROCESS to examine a moderated mediation model, with depression and anxiety as predictors, social support as the mediator, study burnout as the moderator, and internet addiction as the outcome variable.

Results

Prevalence Rates of Depression, Anxiety, and Internet Addiction Among College Students

Based on the criteria defined by Young's IAT, 517 frequent internet users were identified (68.30%) along with 19 pathological internet users (2.77%). According to the SDS, 176 students were identified as depressed, which resulted in a prevalence rate of 23.25%. Using the SAS, 17 students were identified as having anxiety with a prevalence rate of 17.44%. Additionally, according to the SDS, 176 students were identified as depressed with a prevalence rate of 23.25% (Table 1).

Analysis of Demographic Variations in the Study Variables Among Undergraduate Students

Our analysis revealed no statistically significant associations between demographic characteristics (gender and academic year) and the measured psychological variables. Gender comparisons demonstrated no significant differences ($p > 0.05$) in all measured variable scores between men and women. Specifically, the mean scores across all psychological variables remained comparable between genders, and no significant variations were observed. Similarly, analysis across academic years indicated remarkable stability in these psychological measures, with no significant differences among students from different grade levels (Table S1).

Correlation Analyses

Table 2 and Figure 2A illustrate the descriptive statistics and Pearson's correlations, respectively, for the examined variables. Social support was significantly and negatively correlated with the scores for depression, anxiety, study burnout, and internet addiction. In contrast, study burnout displayed significant positive correlations with the scores for anxiety, depression, and internet addiction.

Table 1 Detection Rates of Various Variables

Name	Options	Frequency	Percentage (%)
Social Support	Low Social Support	5	0.66
	Medium Social Support	305	40.29
	High Social Support	447	59.05
Depression	Non-depressed Group	581	76.75
	Depressed Group	176	23.25
Anxiety	Non-anxious Group	739	97.75
	Anxious Group	17	2.25
Internet Addiction	Normal Internet User	219	28.93
	Users With Frequent Use	517	68.30
	Significant Problems	19	2.77
Total		757	100.0

Table 2 Mean, Standard Deviation, and Correlation Analysis of Variables

Variable	Mean	Standard Deviation	Depression	Anxiety	Social Support	Internet Addiction	Academic Burnout
Depression	42.898	12.779	1				
Anxiety	40.246	10.040	0.652**	1			
Social support	71.102	12.159	-0.323**	-0.212**	1		
Internet addiction	45.506	12.433	0.166**	0.163**	-0.183**	1	
Academic burnout	53.771	10.150	0.272**	0.249**	-0.071*	0.109**	1

Notes: Significance Levels: * $p < 0.05$, ** $p < 0.01$. * $p < 0.05$ ** $p < 0.01$.

Mediation Analyses

The results (Table 3) indicate that depression ($\beta = 0.131$, $p < 0.001$) and anxiety ($\beta = 0.158$, $p < 0.001$) exert significant total effects on internet addiction. Depression is negatively correlated with social support ($\beta = -0.309$, $p < 0.001$), and social support negatively predicts internet addiction ($\beta = -0.149$, $p < 0.05$). Similarly, anxiety is

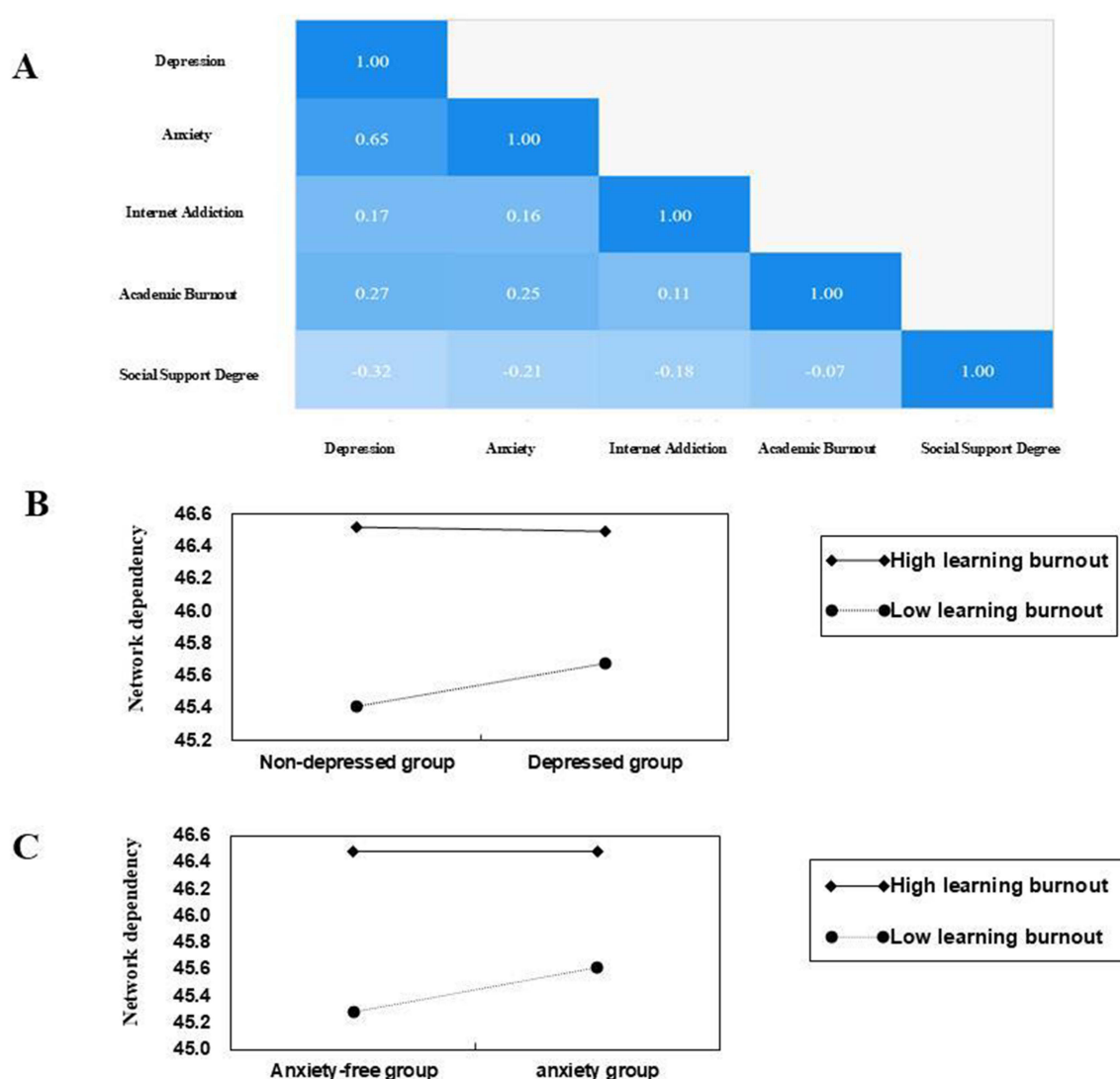


Figure 2 The interaction effect among depression, anxiety, and internet addiction. (A) presents a correlation matrix heatmap, which displays the correlation coefficients among five variables. The color intensity within each cell indicates the magnitude of the correlation coefficient, with darker colors representing stronger correlations. (B and C) use line graphs to depict the impact of depression and anxiety on internet addiction at different levels of academic burnout, highlighting that higher academic burnout moderates the relationships between both depression and anxiety with internet addiction.

Table 3 Mediation Analysis Results of Various Variables (n=757)

Independent Variable		Model 1 (Internet Addiction)			Model 2 (Social Support)			Model 3 (Internet Addiction)		
		B	SE	t	B	SE	t	B	SE	t
A	Depression	0.131***	0.035	3.723	−0.309***	0.033	−9.422	0.085**	0.037	2.299
	Social Support							−0.149*	0.039	−3.869
	R ²	0.018			0.105			0.037		
	F Value	13.863***			88.777***			14.545***		
B	Anxiety	0.158***	0.045	3.530	−0.269***	0.043	−6.250	0.116*	0.045	2.550
	Social Support							−0.157***	0.037	−4.196
	R ²	0.016			0.049			0.039		
	F Value	12.464***			39.066***			15.170***		

Notes: Significance Levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. "A" indicates the model where the independent variable is depression. "B" indicates the model where the independent variable is anxiety.

negatively correlated with social support ($\beta = -0.269$, $p < 0.001$), while social support negatively predicts internet addiction ($\beta = -0.157$, $p < 0.05$). The bootstrap results exhibit significant indirect effects. Specifically, social support mediates the relationship between depression and internet addiction (effect = 0.046, BootSE = 0.013) and between anxiety and internet addiction (effect = 0.042, BootSE = 0.01). Moreover, the mediating effect of social support accounts for 35.309% and 26.740% of the total effects in the depression and anxiety models, respectively.

Moderated Mediation Analyses

The interaction between depression and study burnout significantly predicts internet addiction ($\beta = -0.019$, $p < 0.001$) and social support ($\beta = 0.014$, $p < 0.001$). Similarly, the interaction between study burnout and social support significantly predicts internet addiction ($\beta = -0.015$, $p < 0.001$). In contrast, the interaction between anxiety and study burnout significantly negatively predicts internet addiction ($\beta = -0.024$, $p < 0.001$) and social support ($\beta = -0.015$, $p < 0.001$). The interaction between study burnout and social support also significantly predicts internet addiction ($\beta = -0.016$, $p < 0.001$; Table 4). Additionally, the moderated mediation index analysis (Table 5) indicates that in the depression and anxiety models, with social support as the mediator, the Boot LLCI and Boot ULCI did not include zero. This finding implies that study burnout moderates the mediation effect.

To further analyze the moderating role of study burnout on the effects of depression/anxiety on internet addiction, we conducted simple slope tests (Figure 2B and C). At low levels of study burnout, depression ($\beta_{\text{simple}} = 0.267$, $p < 0.001$) and anxiety ($\beta_{\text{simple}} = -0.333$, $p < 0.001$) exert significant positive predictive effects on internet addiction, with effect values of

Table 4 Moderated Mediation Analysis Results

Independent Variable		Internet Addiction			Social Support		
		β	SE	F Value	β	SE	F Value
I	Depression	1.128***	0.188	5.986	−1.051***	0.152	−6.926
	Academic Burnout	1.975***	0.363	5.445	−0.527***	0.124	−4.238
	Depression*Academic Burnout	−0.019**	0.003	−5.690	0.014***	0.003	4.944
	Social Support	0.693**	0.204	3.402			
	Social Support*Academic Burnout	−0.015***	0.004	−4.078			
	R ²	0.082			0.135		
	F Value	13.469***			39.190***		

(Continued)

Table 4 (Continued).

Independent Variable		Internet Addiction			Social Support		
		β	SE	F Value	β	SE	F Value
2	Anxiety	1.451***	0.227	6.381	-1.261***	0.189	-6.672
	Academic Burnout	2.206***	0.376	5.862	-0.727***	0.143	-5.082
	Anxiety*Academic Burnout	-0.024***	0.004	-6.004	0.018***	0.003	5.384
	Social Support	0.745***	0.204	3.659			
	Social Support*Academic Burnout	-0.016***	0.004	-4.348			
R^2		0.089			0.084		
F Value		14.629***			14.629***		

Notes: Significance Levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. "1" indicates the model where the independent variable is depression. "2" indicates the model where the independent variable is anxiety.

Table 5 Index of Moderated Mediation

Model	Moderating Variable	Mediating Variable	Index	BootSE	BootLLCI	BootULCI
Depression	Academic Burnout	Social Support	0.025	0.011	0.003	0.045
Anxiety	Academic Burnout	Social Support	0.034	0.014	0.005	0.058

Table 6 Simple Slope Analysis

Independent Variable	Level of Moderating Variable	Regression Coefficient	Standard Error	t	p	95% CI	
Depression	High Level (+1SD)	-0.021	0.046	-0.454	0.650	-0.111	0.069
	Low Level (-1SD)	0.267	0.047	5.685	0.000	0.175	0.359
Anxiety	High Level (+1SD)	-0.037	0.057	-0.645	0.519	-0.149	0.075
	Low Level (-1SD)	0.333	0.058	5.735	0.000	0.219	0.447

0.301 and 0.399, respectively. However, at high levels of study burnout, depression ($\beta_{\text{simple}} = -0.021$, $p > 0.05$) and anxiety ($\beta_{\text{simple}} = -0.037$, $p > 0.05$) no longer significantly predict internet addiction (Table 6). This finding indicates that the moderating variable (learning burnout) exhibits significantly different impacts at different levels, implying its moderating effect on the direct pathway.

Discussion

Technological advancements have accelerated the rapid development of internet technology, making it more attractive than originally anticipated. While these technologies have evidently made our lives more convenient, they have not enabled the experience of the essence of life in an effective manner. Instead, they have themselves become the essence of life, pushing other less responsive aspects out of our view. In the current study, the detection rate of problematic internet use among college students was 71.07%. According to the 2023 China Internet Industry Development Analysis Report, the number of internet users in China has reached 1.092 billion, which is an increase of 24.8 million compared with that in 2022, with an internet penetration rate of 77.5%. College students, as the most active youth group in society, are evidently influenced by these trends.⁴² Consistent with previous studies,^{43–45} the current study established a positive correlation between depressive and anxious emotions and internet addiction, supporting the notion that mood disorders are precursors to internet addiction. Although a recent review⁴⁶ suggests that online gaming benefits individuals with depression and anxiety, and excessive internet use may exacerbate initial emotional problems by reinforcing avoidance as a coping strategy, resulting in a downward spiral. Therefore, the gaming behavior of individuals dependent on the internet

is frequently considered a secondary symptom of anxiety and depression. Specifically, internet-dependent individuals with more anxiety and depression symptoms excessively play games to compensate for deficiencies in the real world that trigger feelings of anxiety and depression (eg, lack of acceptance and recognition by peers). Moreover, they aim to escape and mitigate the impact of negative experiences and feelings associated with pre-existing depression and anxiety.⁴⁷ Immersion in the virtual world of the internet can leave individuals addicted to internet use feeling a sense of disappointment and numbness when they return to the real world, which makes disengaging from the online environment difficult for them,⁴⁸ thus resulting in a vicious cycle that exacerbates mood disorders. Therefore, depression and anxiety are evidently mutually reinforcing with internet addiction.^{49,50}

Additionally, the current study identified a psychological mediator within the model, which elucidates the indirect effect of depression and anxiety on the levels of social support for college students, which, in turn, leads to internet addiction. Insights from the existing literature suggest that many college students are drawn to internet addiction, because other activities that could provide a sense of satisfaction are less responsive. Therefore, the core objective of interventions that intend to address internet addiction should be to find better ways for individuals to experience the essence of life and obtain a sense of social support.⁵¹ We should strive to ensure that individuals who lack social support feel respected, supported, and understood within society. When seeking social support, it is essential to also respond to others' needs with empathy and understanding. By genuinely considering the well-being of others, we can create a responsive and interdependent social environment, which can thereby significantly reduce internet addiction driven by emotional disorders. Based on this mediating pathway, the current study reveals the moderating role of academic burnout in the relationship of depressive and anxious emotions to internet addiction. Using a simple slope graph (Figure 1C), we found that low levels of academic burnout positively moderated the internet dependence of students with depression and anxiety. However, under high levels of academic burnout, this upward trend is inhibited. Does this finding imply that high levels of academic burnout can alleviate poor internet usage among students with anxiety and depression? The current researchers propose that this result does not necessarily indicate that high levels of academic burnout is a positive protective factor. Instead, it should be viewed as a concomitant symptom of progressively worsening anxiety and depression, that is, the loss of interest that weakens fascination with the internet. We hypothesize that this phenomenon reveals an intrinsic psychological adaptation mechanism: learned helplessness.

American psychologist Martin Seligman⁵² proposed the concept of learned helplessness, which refers to a state in which individuals accept their powerlessness and attempt to avoid or escape the aversive stimuli after enduring repeated aversive stimuli beyond their control. Furthermore, if this experience is prolonged, intensified, or became a long-term condition, it can lead to anxiety and depression. Intense anxiety or depressive emotions exert a wide-ranging impact on behavior. An interesting phenomenon is observed in the social model of learned helplessness. A number of studies have found that subjects who have experienced uncontrollable events report a series of persistent negative emotions in response to these events. Initially, anxiety is the predominant emotion, but this feeling ultimately gives way to depression with the increase in the severity of uncontrollable events. Wortman and Brehm⁵³ mentioned that this behavior can be explained by the reactance–helplessness integration model. When individuals first encounter uncontrollable negative events, they typically intensify their efforts to solve the problem, thus experiencing reactance. However, as these events persist, the motivation for reacting diminishes, which leads to feelings of helplessness and a decline in problem-solving abilities. Carol Dweck, the earliest researcher to apply the theory of learned helplessness to academic achievement, demonstrated that students who attribute academic failure to a lack of ability tend to address other problems passively, thus adopting ineffective measures in a negative manner.⁵⁴ Based on this premise, understanding why college students with high levels of learning burnout exhibit significantly reduced interest in online activities is not difficult. College students with high levels of learning burnout tend to exhibit avoidance behaviors toward learning and display an indifferent attitude toward all things due to the prolonged dual impact of depression and anxiety. This tendency toward diminished interest and avoidance typically extends to social interactions. Students who experience helplessness may develop cognitive biases and may therefore underestimate the understanding and support available from others. Consequently, they may reduce social interactions, restricting the actual support they can receive. This pattern of withdrawal is also evident online environments, where their engagement in virtual interactions is decreased. As social support diminishes and isolation increases, their participation in academic and daily activities may further decline,

creating a cycle in which negative cognition and behavior reinforce each other.^{55,56} Therefore, a decrease in internet addiction does not necessarily indicate a positive development. Instead, it might suggest a worsening trend in the depression and anxiety of students. The loss of interest in activities to which individuals are typically addicted warrants increased attention and concern for their psychological well-being, as well as timely intervention to prevent irreversible consequences.

The reactance–helplessness integration theory can offer a number of insights for intervention strategies. However, the boundary between reactance and helplessness remains unclear. Previous studies suggest that individuals are likely to feel helplessness when they do not perceive certain events as important.^{57–59} Therefore, a potential reason that students who experience academic burnout are more prone to feelings of helplessness is the perceived loss of value in their studies. For example, when students view obtaining scholarships, securing postgraduate recommendations, and securing better jobs as the main purpose of learning, the instrumental value of education becomes its sole value, which transforms students into *learning machines*. Although an instrumental sense of learning may lead to short-term positive outcomes, it inadvertently fosters intense competition among students. Moreover, when the social environment promotes destructive competition, learned helplessness is worsened. In the long run, the intrinsic value of learning is overshadowed, thus, failing to provide long-term benefits and potentially worsening the *lying flat* mentality among certain students. A survey of Chinese university students revealed that 53% of undergraduates felt unclear about the significance of their studies. Furthermore, feelings of lack of enjoyment and anxiety pervade the process and outcomes of learning. The core of education should be to inspire, guide, and enhance the perceptions of students regarding the value of learning. As emphasized by the concept of lifelong learning,⁶⁰ learning is the most natural instinct of human beings. In a rapidly changing world, each individual must remain adaptive, flexible, and versatile. Everyone needs to challenge their maximum potential, which can only be achieved through persistent learning.

Limitations and Implications

However, while this study found that high levels of learning burnout seemingly decrease internet addiction among students with anxiety and depression, it must be noted that the study adopted a cross-sectional survey design, which lacks rigor in establishing causality. We lean toward the first explanation, which posits that learned helplessness exacerbates the emotional symptoms of depression and anxiety among students, which manifests in specific behaviors. Nonetheless, the possibility of a second explanation exists. In the face of high-intensity academic pressure and prolonged negative emotions, learned helplessness may serve as a psychological self-regulation mechanism. However, this hypothesis requires further exploration through future longitudinal or experimental research to effectively elucidate the causal relationships. Additionally, the current study endeavors to elucidate the mechanisms that link academic burnout, depression, and anxiety with internet dependency among university students from the theoretical perspective of learned helplessness. Nevertheless, it provides a theoretical framework for understanding the psychological self-regulation processes of students. However, the study design lacks a direct measurement of learned helplessness using a standardized scale, which relatively limits the empirical support for the theoretical explanations. To address this limitation, we intend to incorporate the Learned Helplessness Scale into the core measurement framework in future research. By conducting a longitudinal tracking of the learned helplessness psychological state among the same cohort of students, we aim to obtain more systematic and in-depth empirical data. Furthermore, future research should analyze data from diverse populations to validate and enhance the generalizability of our findings.

Conclusion

This study identified that social support acts as a mediating factor, while learning burnout serves as a moderating factor, illustrating how and under which conditions learning burnout is associated with internet addiction.

Importantly, the psychological adaptation mechanisms resulting from high levels of academic burnout may exacerbate or interact synergistically with depressive and anxious symptoms, leading to significantly reduced interest in activities. Therefore, for students who exhibit the characteristics of the above mentioned model, a decrease in internet addiction should not necessarily be perceived as a positive outcome. Instead, it may indicate a worsening of depressive and anxious symptoms, which requires heightened attention and care for their psychological well-being. Furthermore, addressing and

mitigating academic burnout among university students can help alleviate depressive and anxious symptoms, improve social functioning, and offer new perspectives for psychological treatment. This aspect is crucial for the development and enhancement of intervention measures aimed at reducing internet addiction.

Data Sharing Statement

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

This retrospective study was approved by the Ethics Committee of The First Affiliated Hospital of Xinjiang Medical University and carried out in accordance with the ethical standards set out in the Helsinki Declaration. Informed consent was received from all participating.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

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

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