



Coping Tendency as a Mediator in the Relationship Between Psychological Resilience and Health Problems Among College Students

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Purpose: The study aimed to explore the status of four common health problems (ie, smoking, internet addiction, physical inactivity, psychological disorder) among college students and analyze the relationship between psychological resilience, coping tendency and health problems.

Participants and Methods: The convenience sampling method was used to recruit 500 college students from four universities. The General Information Questionnaire, Adolescent Psychological Resilience Scale, Simplified Coping Style Questionnaire and Health Risk Behavior Questionnaire were used for survey.

Results: Among the students, there were 71 smokers (15.4%) and 61 internet addicts (13.2%). Over a third of the students reported physical inactivity (35.9%) and a minority had psychological disorder (6.3%). The psychological resilience score differed between students who smoked, had internet addiction, physical inactivity, psychological disorder and those without these health-risk behaviors. Logistic regression analysis showed that negative coping tendency was the common contributing factor of physical inactivity, internet addiction and psychological disorder. Coping tendency played a partial mediating effect in the relationship between psychological resilience and health problems, with a mediating effect of 37.93%.

Conclusion: Psychological resilience can not only affect health problems directly but also influence health problems indirectly through coping tendency. Educators and administrators in universities can apply effective measures to improve psychological resilience and positive coping to prevent or reduce health problems among undergraduates.

Keywords: undergraduates, psychological resilience, coping, health problems, mediating effect

Introduction

College is an important stage in the transition from adolescence to adulthood and a critical period of psychosocial adjustment for individuals.¹ In the Chinese context, college students are generally viewed as late adolescents due to their relatively immature psychological development and financial dependence on family.² Adolescence is time to foster healthy habits and foster resilience while individuals also possibly engage in unhealthy behaviors such as smoking, drinking alcohol and physical inactivity.³ According to available studies, the total cigarette smoking rate among Chinese adolescents is 8.17%,⁴ and 11.9% of non-smoking students have the intention to smoke in the next five years.⁵ Adolescents often have low self-control and are more prone to internet addiction, with the overall prevalence of internet addiction in China being 19.8% in mainland China.⁶ Physical inactivity is common in adolescents, and only about 30% of the adolescents meet recommended physical activity guidelines.^{7,8} In addition, the psychological problems of college students are more common than the general population. For instance, the prevalence rate of depression in undergraduate students is higher, and some students experienced suicide-related events.⁹ An international survey showed that 35% of students had at least one common mental health problem.¹⁰ In China, 17.6% of adolescents have one or more mental disorders.¹¹ The Health Survey Report of Chinese College Students in 2020 indicated that

inadequate physical activity, anxiety, and depression were salient among college students. These health-risk behaviors significantly impact adolescents' physical and psychosocial health. In fact, adolescence is an important turning point over a complete life cycle, and there is continuity of health behaviors through adolescence into early adulthood.¹² In this sense, health-risk behaviors in adolescence have a direct and lasting negative impact on quality of life in adulthood.¹³

Psychological resilience refers to the ability or characteristics of individuals to adjust themselves and take healthy measures in the face of life adversity, trauma, threat, or other major life events.¹⁴ Resilience is a dynamic process that embodies a pattern of continuous flexibility and adaptive responses, through which people can respond to changing environmental demands.¹⁵ Individuals with resilience may show positive abilities and attitudes in coping with stressors.¹⁶ Psychological resilience has been shown to be one of the key protective factors of mental health,¹⁷ which can reduce the negative impact of stimuli (eg, stress) on individuals. In addition, resilience was found to be a mediating factor that indirectly affected mental health through the way of coping with stress.¹⁸ Research has demonstrated the mediating effect of resilience on the relationships between physical literacy and mental health among college students,¹⁹ as well as between fear of happiness and satisfaction with life among adults.²⁰ College students usually face pressure from academic and personal life. The empirical evidence indicates that psychological resilience can play a protective role in promoting mental health of college students.

Apart from the benefits in mental health, resilience exerts a protective effect on other health problems in adolescents, such as cigarette smoking, alcohol consumption, disordered eating behavior, physical inactivity and obesity.²¹ Parenting styles, parental health behaviors, self-control, cognitive abilities and school factors are the main influencing factors of health-risk behaviors.²² Research shows that health problems often occur simultaneously.^{22,23} For instance, infrequent vegetables intake, obesity or overweight, and smoking often coexist, and these multiple health problems result in increased adverse health outcomes.²⁴ Therefore, it is imperative to reduce the occurrence of detrimental health problems in adolescents including undergraduates. University is a stage of transition to maturity in life development. In this process, students have a strong demand for the development of self-awareness and autonomy,²⁵ while they often face heavy pressure of study, career planning and interpersonal relationship²⁶ and lack of self-control.²⁷ When the development demand conflicts with the pressure faced, they are prone to develop health problems such as smoking, internet addiction, lack of exercise, and psychological disorders.²⁸ Currently, relatively few studies explored the relationship between health problems and psychological resilience of undergraduates especially in the Chinese context, and the correlation mechanism between the two variables remains unclear.

Research suggests that individual's health problems are influenced by their coping tendency.²⁹ Specifically, avoidance coping leads to health-risk behaviors and is detrimental to health, while approach coping contributes to desirable results.³⁰ Coping is defined as the cognitive and behavioral way that individuals adopt in the face of setbacks and stress. Overall, there are two main strategies for coping. One is problem-focused coping, which helps alleviate distress and benefits physical and mental health. The second one is emotion-focused coping that can regulate emotions while often has less ideal results compared to problem-focused coping.³¹ Individuals with a high level of psychological resilience tend to adopt more effective positive coping strategies, which can help reduce the negative effects of stress, improve adaptability, and possibly prevent or alleviate health problems.³² Conversely, negative coping styles may exacerbate stress, leading to psychological disorders including anxiety and depression, and may even endanger physical health, such as increasing the risk of chronic diseases due to poor lifestyle habits.³³ Coping modes have been confirmed to play a mediating role between multiple psychological factors (eg, illness perception,³⁴ anxiety,³⁵ and attachment³⁶) and health behaviors. Nevertheless, whether coping tendency serves as a mediator in the association between psychological resilience and health problems among undergraduates is to be elaborated.

The purpose of this study was to understand the current status of the four common health problems (ie, smoking, internet addiction, physical inactivity and psychological disorder) of undergraduates and the influencing factors, with a focus on exploring the mediating role of coping tendency in the relationship between psychological resilience and health problems. The findings are expected to provide implications for formulating intervention strategies to improve undergraduates' physical and mental health.

Material and Methods

Participants and Procedure

From August to November 2021, convenient sampling method was used to recruit a certain number of undergraduate students majoring in humanities and social sciences, science and technology, and healthcare at four comprehensive universities in Shandong Province. The inclusion criteria of the study participants were as follows: (1) ≥ 18 years; (2) being a full-time undergraduate; (3) with normal reading and writing ability; and (4) willing to participate in the study voluntarily. Through a combination of paper-based and electronic questionnaire distribution, a total of 500 questionnaires were returned, with 462 being valid. The effective response rate of the questionnaire was 92.4%.

Measures

Questionnaires were distributed on the principle of voluntary and informed consent. The questionnaire consisted of five instruments.

General Information Questionnaire

The questionnaire designed by researchers included basic information such as gender, major, academic performance, parental education level and family residence.

Adolescent Psychological Resilience Scale

The Adolescent Psychological Resilience Scale was developed by Hu et al³⁷. The scale was in Chinese and consisted of 27 items that measured five dimensions of goal focus, emotional control, positive perception, interpersonal assistance, and family support. The scale was scored on Likert-5 scoring method, from one “completely inconsistent” to five “completely consistent”, with a high score indicating a high level of resilience. The average score of item > 3.67 indicates high psychological resilience, 2.33–3.67 indicates medium resilience and < 2.33 indicates low resilience. The original Cronbach's α coefficient for the Scale was 0.85,³⁷ and the scale has been applied to college students.³⁸ In the present study, the Cronbach's α coefficient was 0.845.

Chinese Adolescent Health-Related Behavior Questionnaire

The Chinese Adolescent Health-related Behavior Questionnaire was compiled by the National Adolescent Health-related behavior Survey Group.³⁹ The questionnaire was widely used across China as a standardized tool and has been validated in previous research.⁴⁰ We used the version for high school and college students and selected three related parts of the questionnaire to assess internet addiction, smoking, and physical inactivity in college students. Participants were asked to self-report whether smoke cigarettes in the past 30 days. In this questionnaire, internet addiction refers to spending more than 4 hours a day on the Internet in the past 7 days, and reporting at least 4 items of the following 9 items: ①feeling that the Internet has occupied one's own life; ②feeling that one can only be satisfied by prolonging his/her online time; ③feeling unable to control the impulse to surf the Internet; ④feeling restless or depressed when unable to surf the Internet; ⑤using the Internet to avoid problems and relieve anxiety; ⑥concealing the degree of addiction to the Internet from guardians; ⑦surfing the Internet often exceeds expectations; ⑧surfing the Internet affects academic or real-life relationships; and ⑨conflicting with guardians due to surfing the Internet. Physical inactivity is defined as exercise (eg, jogging, playing basketball, swimming, and riding bicycle) for over 60 minutes per week being less than 3 times.³⁹

Chinese Health Questionnaire-12 Item

The Chinese Health Questionnaire-12 item compiled by Cheng⁴¹ was used to measure the presence or absence of psychological disorder. The total score of the scale being ≥ 4 indicates that the individual has the inclination of experiencing psychological disorder symptoms. The Cronbach's α coefficient of the questionnaire was 0.84 in the community population and 0.83 in the hospital population.⁴² In the present study, the Cronbach's α coefficient was 0.737.

Simplified Coping Style Questionnaire

The Chinese version of Simplified Coping Style Questionnaire was validated to assess coping style.⁴³ It comprised 20 items in two dimensions of positive coping (items 1–12) and negative coping (items 13–20). The Cronbach's α coefficient

for the full scale was 0.90. The coefficient for positive coping subscale was 0.89 and the negative coping subscale was 0.78. The formula for determining individual coping tendency is the standard score of positive coping minus the standard score of negative coping.⁴⁴ The value being greater than 0 signifies that the study participant's coping tendency is mostly positive. In contrast, the value being less than 0 indicates the study participant mainly adopts negative coping strategy. In the present study, the Cronbach's α coefficient was 0.886.

Data Analyses

SPSS25.0 was used for statistical analysis. Descriptive statistics were applied to analyze the demographic characteristics and scores of each scale. For numerical variables, the psychological resilience and coping tendency scores were normally distributed while coping style score was not. Therefore, Spearman correlation analysis was performed to analyze the correlation between psychological resilience and coping style. An independent two-sample *t*-test was performed to compare the difference of psychological resilience and its dimensions between groups by different health problems. With demographic characteristics, psychological resilience and coping tendency as independent variables, binomial logistic regression was applied to analyze the influencing factors of the four health problems. PROCESS version 3.5 Model 4 developed by Hayes⁴⁵ was used to test the mediating effect of coping tendency. The bootstrapping method (5000 resamples) was employed to estimate the 95% bias-corrected confidence interval (BC CI) for the indirect effect of the mediator. When the 95% confidence interval does not contain zero, the indirect effect is deemed to be significant.⁴⁶ A *p* value < 0.05 was defined as statistical significance.

To be noted, in the mediation analysis step, we summed the number of health problems as the dependent variable. A previous study indicates that using a count of the number of risk behaviors is an equally effective method as latent class analysis that did not characterize clusters of adolescents by distinct risk behavior profiles. In the meantime, summing the behaviors to create an overall score was recommended as a more replicable approach to providing implications when designing health interventions aimed at reducing health problems.⁴⁷ In the present study, the variable of health problems was dichotomous, with a score of 1 indicating engagement in one of the four health problems. The scores were summed into an overall score of health problems for each participant as the main variable in the study.

Ethical Considerations

This study has been approved by the Ethics Committee of Medical College of Qingdao University and followed the guidelines outlined in the Declaration of Helsinki. All participants provided informed consent and voluntarily participated in this study.

Results

Demographic Characteristics of the Participants

The 462 students in this study were aged 19.52 ± 1.51 years, with most being female (72.7%). Among the students, 42.4% (196), 30.9% (166), and 21.6% (100) were majored in science and engineering, healthcare, and humanities and social sciences, respectively. Students whose families were located in urban and rural areas accounted for 54.1% and 45.9%, respectively. Compared with their classmates in the same major, 42.9% (189), 32.9% (152), 19.1% (88) reported average, poor, and good academic performance, while 7.1% (33) indicated being unclear about their overall grade ranking. The number of students who perceived schoolwork burden as very heavy, heavy, average and light was 53 (10.5%), 163 (32.1%), 189 (37.3%) and 57 (11.2%), respectively. In addition, 151 students were the only child in their family (32.7%). A relatively large proportion of the students reported that their father (40.6%) and mother (50.7%) had secondary school education.

Psychological Resilience of the Participants

The total score of psychological resilience of the undergraduates was 95.70 ± 14.00 , and the average item score of was 4.35 ± 0.64 . The majority of the undergraduates (85.7%) had a high level of psychological resilience, and the left (14.3%) had a medium level of psychological resilience. The average item scores of positive perception, interpersonal assistance,

family support, goal focus, and emotional control were 3.70 ± 0.95 , 3.58 ± 0.77 , 3.52 ± 0.58 , 3.50 ± 0.87 , and 3.48 ± 0.79 , respectively.

Health Problems and Their Association with Psychological Resilience

Among the 462 undergraduates, 166 students (30.9%) reported physical inactivity, 71 students (15.4%) were smokers, 61 students (13.2%) were internet addicts, and 29 students (6.3%) had psychological disorders. A total of 187 students (36.9%) had one of the four health problems, and 58 students (11.4%) reported two of these health problems. The independent two sample *t*-test showed significant differences in the total scores of psychological resilience between undergraduates with or without physical inactivity, smoking, internet addiction and psychological disorders ($P < 0.05$). The dimension of emotional control score differed significantly between undergraduates with or without internet addiction ($P < 0.001$) and psychological disorders ($P < 0.001$). In addition, the scores of the dimensions of interpersonal assistance ($P < 0.001$) and family support ($P = 0.041$) differed significantly between undergraduates with or without psychological disorders. The detailed results are shown in Table 1.

Correlation Between Psychological Resilience and Coping Style of Undergraduates

The Spearman correlation analysis showed that the total score of psychological resilience was positively correlated with positive coping style ($r_s = 0.508$, $P < 0.01$), while negatively correlated with negative coping style ($r_s = -0.039$, $P < 0.05$). The dimensions of goal focus, interpersonal assistance, family support and positive perception in psychological resilience were all positively correlated with the positive coping style ($r_s = 0.200$ – 0.466 , $P < 0.01$). The correlations are presented in Table 2.

Table 1 Comparison of Psychological Resilience and Its Dimensions Between Groups by Different Health Problems (N=462, $\bar{X} \pm S$)

Variables		n (%)	Statistical Value	Goal Focus	Interpersonal Assistance	Family Support	Emotional Control	Positive Perception	Psychologic Resilience
Physical inactivity	Yes	166(35.9%)		16.83±4.70	21.36±4.33	20.73±3.39	20.28±4.64	14.41±4.17	93.60±13.66
	No	296(64.1%)		17.84±4.11	21.51±4.79	21.32±3.53	21.17±4.76	15.03±3.54	96.88±14.08
			<i>t</i>	-2.428	-0.324	-1.755	-1.972	-1.619	-2.423
			<i>P</i>	0.016	0.746	0.08	0.049	0.107	0.016
Smoking	Yes	71(15.4%)		16.85±4.95	20.83±3.87	20.25±3.35	20.34±4.85	14.21±4.17	92.48±13.39
	No	390(84.5%)		17.60±4.24	21.56±4.75	21.26±3.50	20.95±4.71	14.91±3.71	96.28±14.07
			<i>t</i>	-1.207	-1.403	-2.243	-1	-1.325	-2.109
			<i>P</i>	0.231	0.163	0.023	0.381	0.188	0.035
Internet addiction	Yes	61(13.2%)		17.02±3.35	20.89±4.42	20.90±3.36	18.03±4.24	14.69±3.21	91.52±11.71
	No	401(86.8%)		17.55±4.49	21.54±4.65	21.14±3.51	21.28±4.66	14.83±3.87	96.33±14.22
			<i>t</i>	-1.100	-1.032	-0.496	-5.129	-0.263	-2.898
			<i>P</i>	0.274	0.303	0.62	<0.001	0.793	0.005
Psychological disorder	Yes	29(6.3%)		16.97±3.22	18.86±3.32	19.83±3.20	16.41±4.44	14.97±2.87	87.03±9.73
	No	433(93.7%)		17.51±4.42	21.63±4.65	21.19±3.49	21.15±4.60	14.80±3.84	96.28±14.06
			<i>t</i>	-0.861	-4.213	-2.051	-5.372	0.232	-4.794
			<i>P</i>	0.395	<0.001	0.041	<0.001	0.817	<0.001

Table 2 Correlation Between Psychological Resilience and Coping Style (r_s)

Variables	Total Score of Psychological Resilience	Goal Focus	Interpersonal Assistance	Family Support	Emotional Control	Positive Perception
Positive coping	0.508**	0.466**	0.321**	0.335**	0.200**	0.421**
Negative coping	-0.039*	-0.040	-0.103*	0.067	-0.201**	0.074

Note: ** $P < 0.01$, * $P < 0.05$.

Logistic Regression Analysis of Health Problems of Participants

Using participants' demographic characteristics, psychological resilience and coping tendency as the independent variables, binomial logistic regression analysis was conducted to predict the factors of each of the four health problems. The results showed that very heavy burden of schoolwork ($\beta=1.428$, $OR=4.171$, $P<0.05$) and humanities and social science major ($\beta=1.000$, $OR=2.719$, $P<0.05$) were the risk factors of smoking while female ($\beta=-1.546$, $OR=0.213$, $P<0.01$) and average academic achievement ($\beta=-1.312$, $OR=0.267$, $P<0.05$) were the protective factor. Negative coping tendency ($\beta=-0.756$, $OR=0.470$, $P<0.01$), living in urban area ($\beta=-0.671$, $OR=0.511$, $P<0.01$) were the risk factors of physical inactivity while major in humanities and social science ($\beta=0.906$, $OR=2.473$, $P<0.01$) was the protective factor. Negative coping tendency ($\beta=-0.746$, $OR=0.474$, $P<0.05$) was the promoting factors of Internet addiction. Negative coping tendency ($\beta=-1.088$, $OR=0.337$, $P<0.05$) and low psychological resilience ($\beta=-1.303$, $OR=0.272$, $P<0.05$) were the promoting factors of psychological disorders. The results are presented in Table 3.

Table 3 Logistic Regression Analysis of Health Problems

Health Problem	Variables	Unstandardized Coefficient		Wald χ^2	P	OR	95% CI
		B	Standard Error				
Smoking	Constant	1.690	1.698	0.991	0.320	5.419	
	Gender (ref=female)	-1.546	0.332	21.638	<0.001	0.213	0.111-0.409
	Academic performance (ref= unclear)			7.860	0.049		
	Academic performance (1= poor)	-1.009	0.610	2.735	0.098	0.365	0.110-1.205
	Academic performance (2= average)	-1.312	0.604	4.781	0.029	0.267	0.082-0.872
	Academic performance (3= good)	-0.494	0.619	0.635	0.425	0.610	0.181-2.055
	Schoolwork burden (ref= light)			5.694	0.127		
	Schoolwork burden (1= very heavy)	1.428	0.657	4.723	0.030	4.171	1.151-15.120
	Schoolwork burden (2=heavy)	0.649	0.587	1.222	0.269	1.193	0.606-6.043
	Schoolwork burden (3= average)	0.893	0.556	2.579	0.108	2.443	0.821-7.270
	Major (ref= Healthcare)			5.329	0.070		
	Major (1=Science and Engineering)	0.332	0.354	0.883	0.347	1.394	0.697-2.790
	Major (2=Humanities & Social Science)	1.000	0.434	5.306	0.021	2.719	1.161-6.367

(Continued)

Table 3 (Continued).

Health Problem	Variables	Unstandardized Coefficient		Wald χ^2	P	OR	95% CI
		B	Standard Error				
Physical inactivity	Constant	-0.657	1.298	0.256	0.613	0.519	
	Coping tendency (ref= negative coping tendency)	-0.756	0.223	11.461	0.001	0.470	0.303–0.727
	Place of family residence (ref= urban area)	-0.671	0.247	7.389	0.007	0.511	0.315–0.829
	Major (ref= Healthcare)			9.663	0.008		
	Major (1= Science and Engineering)	0.213	0.251	0.720	0.396	1.237	0.757–2.023
	Major (2=Humanities & Social Science)	0.906	0.295	9.413	0.002	2.473	1.387–4.411
Internet addiction	Constant	-3.597	1.981	3.296	0.069	0.027	
	Coping tendency (ref= negative coping tendency)	-0.746	0.314	5.636	0.018	0.474	0.256–0.878
	Academic performance (ref= unclear)			8.760	0.033		
	Academic performance (1= poor)	0.219	0.818	0.071	0.789	1.244	0.250–6.188
	Academic performance (2= average)	0.190	0.802	0.056	0.812	1.210	0.251–5.821
	Academic performance (3= good)	1.139	0.813	1.963	0.161	3.123	0.635–15.358
Psychological disorder	Constant	3.445	2.392	2.073	0.150	31.333	
	Coping tendency (ref= negative coping tendency)	-1.088	0.494	4.849	0.028	0.337	0.128–0.887
	Psychological resilience (continuous variable)	-1.303	0.506	6.638	0.010	0.272	0.101–0.732

Analysis of the Mediating Effect of Coping Tendency Between Psychological Resilience and Health Problems

Based on whether there was any health problem (1 = yes, 0 = no), the number of four health problems was added up to obtain the total number of health problems of each participant. Taking the total number of health problems as the dependent variable, psychological resilience as an independent variable and coping tendency as a mediating variable, with demographic characteristics (ie, gender, academic performance, major, schoolwork burden, parents' education, place of family residence and family income) as covariates, PROCESS version 3.5 Model 4 was utilized to test the mediating effect of coping tendency. As shown in Figure 1, psychological resilience had a significantly and directly negative predictive effect on health problems ($\beta=-0.0072$, $P=0.012$). After including the coping tendency, psychological resilience still significantly and negatively predicted health problem ($\beta=-0.007$, $P=0.012$), and psychological resilience had a significantly positive predictive effect on the coping tendency ($\beta=0.041$, $P<0.001$). The negative predictive effect of coping tendency on health problem was also statistically significant ($\beta=-0.110$, $P=0.001$). Furthermore, the bootstrapping method (5000 resamples) was employed to estimate the 95% bias-corrected confidence interval (BC CI) for the indirect

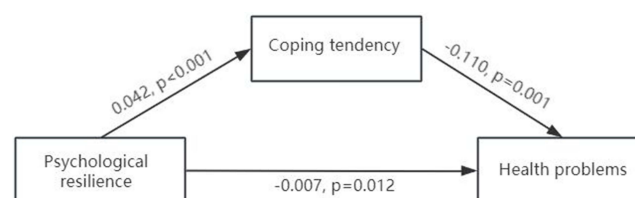


Figure 1 Mediating role of coping tendency in the relationship between psychological resilience and health problems.

Table 4 The Mediating Effect of Coping Tendency in the Relationship Between Psychological Resilience and Health Problems

Model	Effect Size	Boot SE	95% Confidence Interval		P	Relative Mediation Effect
			Lower Limit	Upper Limit		
Psychological resilience→health problems	−0.0072	0.0028	−0.0128	−0.0016	0.012	62.07%
Psychological resilience→coping tendency→health problems	−0.0044	0.0014	−0.0073	−0.0019	<0.001	37.93%
Total effect	−0.0116	0.0024	−0.0166	−0.0066	<0.001	

effect of coping tendency. The 95% BC CI of coping tendency was $[-0.0073 \sim -0.0025]$ and excluded zero, indicating that coping tendency had a partial mediating effect between psychological resilience and health problems. The mediating effect value was -0.0044 , accounting for 37.93% of the total effect. The results are presented in Table 4.

Discussion

In the present study, about a half of undergraduates had at least one health problem, evincing a high prevalence of multiple health problems among undergraduates, which is similar to the results of a previous study in Malaysia.⁴⁸ These problems can bring out adverse health outcomes, and thus need to be continuously monitored by university administrators and healthcare systems. The overall level of psychological resilience of undergraduates in the present study was higher, in line with that of a recent study.⁴⁹ The possible reason is that undergraduates are in the late adolescence or early adulthood stage of life development and have experienced more stress and challenges compared with young teenagers, which may help to improve the level of psychological resilience of undergraduates. Among the dimensions of psychological resilience, the positive perception was at a relatively high level, while emotional control was the lowest. One study showed that the psychological resilience level of college students in China is declining.⁵⁰ Resilience is considered a dynamic process,⁵¹ and can be enhanced through environmental change and interventions such as regular exercise,⁵² self-compassion⁵³ and providing students with stress management and mindfulness meditation courses.⁵⁴ The present study denotes that emotional control needs to be an educational priority in related Measures for improving psychological resilience of undergraduates.

Consistent with previous studies,^{55,56} the present study revealed that psychological resilience played a protective role in smoking, internet addiction, physical inactivity and psychological disorder. Psychological resilience as a protective resource assists college students in coping with the stressors and challenges they encounter in college life.⁵⁷ Individuals with a higher level of psychological resilience are more likely to adopt healthy lifestyles,⁵⁸ such as regular exercise, balanced diet, avoidance of excessive alcohol consumption and smoking. This is attributed to psychological resilience as the effective response and adaptation of individuals in the face of adversity.⁵⁹ In contrast, students with lower resilience had more anxiety and depression symptoms,^{60,61} which were positively correlated with unhealthy behaviors.⁶² Therefore, higher resilient students are more likely to demonstrate adaptive behaviors in the face of challenges or adversity, and are inclined to avoid health problems. Taken together, the present study corroborates the viewpoint that improving the level of psychological resilience of undergraduates could be a beneficial attempt to reduce the occurrence of health problems. Accordingly, more assistance and support should be provided to students with low psychological resilience for prevention of health problems. Specifically, educators could provide mental health education courses for college students, guide students to plan future goals, and enable them to realize the importance of improving psychological resilience for physical and mental health development.⁴⁹ In the meantime, educators support students to solve problems with a problem-centered mindset, especially in face of setbacks and challenges, to shape their resilience.⁶³ In addition, university could implement social skills training programs where students learn emotion management skills. Through targeted training, students can recognize, understand and manage their own emotions, as well as adapt to the emotions of others in social interactions, which benefit their psychological health.⁶⁴

Logistic analysis in the present study showed that positive coping tendency was a protective factor against physical inactivity, internet addiction and psychological disorder among undergraduates. Furthermore, coping tendency played a partial mediating effect on the relationship between psychological resilience and health problems, with a mediating

effect of 37.93%. In other words, psychological resilience not only exerted a direct effect on health problems but also played an indirect effect through coping tendency. Psychological resilience is recognized as a positive and developmental competence for individuals to handle unexpected changes and to assume responsibility by rebounding from adversity and uncertainty.³² Furthermore, individuals with resilience deal with challenges by seeking social support, and reducing and releasing negative emotions. Through the cognitive and emotional process, higher resilience is associated with greater use of adaptive coping behaviors and less use of maladaptive coping behaviors.⁶⁵ This can be explained by previous research results that students with a higher level of resilience experience lower anxiety and have a greater sense of well-being,⁶⁶ which is conducive to students approaching life with a more positive and active mindset.⁶⁷ Consequently, they are less likely to suffer health problems. By contrast, students with lower resilience may be more susceptible to the impact of stress and adversity, and thus may adopt negative coping strategies to alleviate stress, such as smoking and addictive internet addiction.⁶⁸ This result is congruent with the findings that psychological resilience was an important factor affecting the coping mode of Chinese college students,⁶⁹ and coping tendency had an impact on psychological and behavioral health of teenagers.⁷⁰

The partial mediating role of coping tendency between psychological resilience and health-risk behaviors highlights that apart from psychological resilience, coping tendency is a crucial target in the establishment and maintenance of health behaviors of college students. Research has indicated that cognitive behavioral therapy-based mHealth interventions enable individuals to be aware of the coping tendency they used.⁷¹ Mindfulness trait contributes to the development of positive coping strategies. Previous research suggested that interventions combining cognitive behavioral therapy with mindfulness techniques improved college students' coping strategies.⁷² Additionally, undergraduates can be encouraged to reinforce positive coping strategies by seeking social support as well as learning ways of self-acceptance and problem solving skills to adapt to stressors.⁷³ These measures could be tailored for college students to shape their positive coping tendency, thereby reducing the occurrence of health problems.

Limitations

This study has several limitations. First, this research is the cross-sectional in nature and thus limits the inference of causal relationships between variables. Future research could use longitudinal studies to establish the causal relationship between psychological resilience and health problems among undergraduates. Second, data were collected through self-reported questionnaires and are thus potentially subject to social desirability bias. Future research could implement ecological momentary assessments to add the ecological validity of the data. Third, students were recruited from four universities in Mainland China by convenience sampling and the sample size was relatively small. Therefore, the results may not be able to be generalized to a wider group of undergraduates in China. A more representative sample could be obtained through probability sampling in future.

Conclusion

The prevalence of multiple health problems including smoking, physical inactivity, internet addiction and psychological disorders was high among undergraduates. Psychological resilience played both a direct effect on health problems and an indirect effect through the mediating role of coping tendency. This study enriches previous research on the association between psychological resilience and health problems in college students and provides implications for formulating interventions to reduce health problems of undergraduates in light of targeting coping tendency.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Acknowledgments

The authors would sincerely thank all the students who participated in the study.

Disclosure

The authors report no conflicts of interest in this work.

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