

The Mediating Role of Avoidant Personality Disorder Features in the Relationship Between Stressful Life Events and Depression Among First-Year University Students

Huihui Zhou^{1,*}, Sifang Niu^{1,2,*}, Yangziye Guo^{1,3}, Yan Qin^{1,3}, Hao Sun⁴, Fuqin Mu⁵, Ximing Duan⁵, Yi Zheng⁵, Ying Zhang⁶, Yan Liu¹, Ning Liu⁷

¹School of Public Health, Jining Medical University, Jining, 270213, People's Republic of China; ²School of Public Health and Management, Binzhou Medical University, Yantai, 264003, People's Republic of China; ³School of Public Health, Shandong First Medical University, Jinan, 250117, People's Republic of China; ⁴School of Clinical Medicine, Jining Medical University, Jining, 270213, People's Republic of China; ⁵School of Mental Health, Jining Medical University, Jining, 272013, People's Republic of China; ⁶School of Public Health, University of Sydney, Sydney, NSW, 2006, Australia; ⁷School of Basic Medicine, Jining Medical University, Jining, 272067, People's Republic of China

*These authors contributed equally to this work

Correspondence: Yan Liu, School of Public Health, Jining Medical University, Jining, 272065, People's Republic of China, Email hakunaly@163.com; Ning Liu, Department of Graduate, Jining Medical University, Jining, 272065, People's Republic of China, Email 631864@qq.com

Purpose: Stressful life events are risk factors of depression. To explore whether the avoidant personality disorder (AVPD) features play a mediating role between stressful life events (SLEs) and depression among Chinese first-year university students.

Methods: The cross-sectional study was conducted from April to October 2018. The participants were the freshmen selected from Jining Medical University and Weifang Medical University (n=7390) in Shandong Province in China. Depression was assessed by the Beck Depression Inventory-II, AVPD were measured by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM 5). The data were processed and analyzed by SPSS24.0 software, Pearson correlation analysis and PROCESS3.3 program intermediary analysis. The method of Bootstrap was adopted to determine whether the AVPD features act as mediating factors in the association between the NLEs and depression.

Results: A total of 34.68% of the participants reported one to three AVPD features, and 18.15% reported four to seven AVPD features. AVPD features ($r=0.384$, $P<0.05$) and the SLEs ($r=0.309$, $P<0.05$) were positively related to the risk of depression, respectively. AVPD features play a partial mediating effect on the relationship between SLEs and depression (the effect value is 0.133, $P < 0.01$; 32.28% of the total effect).

Limitation: There might be recall bias in this cross-sectional study.

Conclusion: AVPD features are prevalent among Chinese university students. AVPD features displayed the mediation effect on depression related to stressful life events. Psychological interventions for depression in college students should focus not only on stress but on individual personality traits and cognitive mode. Care-givers, teachers, and health professionals should pay more attention to the early identification of the AVPD features among university students.

Keywords: stressful life events, depression, avoidant personality disorder, mediator

Introduction

Depression is the second most common psychological problem among university students.¹⁻⁴ Recent research has shown that the prevalence of depression symptoms in university students was 33.6% (95% CI: 29.3%, 37.8%), and the figure was 22% (95% CI: 19%, 25%) for China.^{5,6} The risk of suicidal behavior is significantly correlated with various psychological symptoms, and among student populations, depressive moods notably elevate this risk.⁴ Thus, early

detection and assessment of depression are critical for the mental health of university students, which would contribute to the overall evaluation of mental health services on campus.

There are many potential risk factors for depression, such as low self-efficacy, low perceived social support, low self-esteem, insomnia, stressful life events (SLEs).⁷⁻¹⁰ Among them, the SLEs are well-established predictors of depressive symptoms. SLEs are negative life events that people may encounter in the daily lives, for example, the breakdown of romantic relationships. Previous studies demonstrated a dose-response relationship between the number and severity of SLEs and depression,¹¹ SLEs are positively correlated prodromal symptoms of depression, and can predict the onset and recurrence of major depressive disorder.^{12,13} For university students, the SLEs play a remarkable role in developing depression,^{14,15} especially for first-year university students who have just experienced the university entrance exams.¹⁶ Due to late adolescence and young adulthood, the mental health status of first-year university students will be influenced by new challenges, such as interpersonal problems and learning stressors.^{17,18} Stressors can increase stress-induced activity with hyperactivations in the hypothalamic-pituitary-adrenal (HPA) axis, which is associated with more depressive symptoms.¹⁵

Although stressful life events put individuals under pressure, the exposed individuals will not necessarily develop a depressive disorder. The mediators and moderators in the development process of depression have been the focus of recent studies.^{19,20} Personality disorders is often co-morbid with depression,^{21,22} but the study on their role in the development of depression is limited, particularly for avoidant personality disorders (AVPD). AVPD is defined as a pervasive pattern of social inhibition, feelings of inadequacy, and hypersensitivity to negative evaluation, beginning by early adulthood and across time and situations. Daily functioning is most severely impaired in individuals with AVPD compared with other personality disorders.²³ Previous research found that individuals with AVPD are more likely to adopt avoidant cognitive emotion regulation strategies such as self-blame and rumination when faced with SLEs.²⁴ Individuals with AVPD experience more negative emotions and few positive emotions,²⁵ and AVPD is a risk factor for recurrence of major depressive disorder.²⁶ Therefore, we hypothesize that AVPD may interact with SLEs to affect the development of depression in the college students.

The objective of this study was to explore whether and how the AVPD features could act as mediating factors in the associations between the SLEs and depression. And how SLEs aggravates the risk of depression by influencing the characteristics of AVPD, and provide path analysis for the occurrence and development of depressive symptoms, new insights for the pathogenesis of depression, and scientific basis for personalized prevention and intervention strategies for high-risk individuals. We hope to better understand of the relationship between stressful life events, avoidant personality traits, and depressive symptoms through this study, providing a theoretical basis for the development of mental health interventions for the college students.

Methods

Participants and Procedures

The sampling method used in this study is cluster sampling. In April 2018, a total of 9928 freshmen from two universities were selected by cluster sampling in three prefecture-level cities (Jining, Rizhao and Weifang) in Shandong Province, China. Shandong Province enjoys a mid-to-upper level of economic and socio-economic status compared to other provinces in the country. Students at Jining Medical University and Weifang Medical University originate from over 25 provinces and regions. Their familial residences span a diverse range of geographical areas, encompassing large and medium-sized cities, as well as rural and village settings. A total of 8079 students provided complete baseline survey data, and the effective recovery rate was 81.4%. The research plan was approved by the Ethics Review Committee of Jining Medical University (No.2019-JS-004).

Inclusion criteria:

- 1) First-year students studying in two selected universities
- 2) Those who voluntarily participate in the research and sign the informed consent form.
- 3) Be able to complete the questionnaire survey by yourself or with the help of investigators;
- 4) Normal language communication and understanding ability, able to understand the meaning of each item in the questionnaire.

Exclusion criteria:

- 1) Unwilling to participate in the research or refusing to sign the informed consent;
- 2) Suffering from schizophrenia, bipolar disorder or other serious mental disorders;
- 3) Students who cannot understand the contents of the survey or answer questions;
- 4) Those who have other serious physical diseases cannot complete the investigation.

Data were collected through a computer-aided self-management system, which has the function of logical check and jump. The subjects were assigned to different groups and completed the questionnaire within a specific time. The questions raised by participants were addressed by six well-trained investigators, 4 of whom were in Jining, and the other two were in Weifang and in Rizhao, respectively. After each participant completed and submitted their answers, the information was immediately uploaded and saved to the online server. This study was approved by the Health Research Ethics Committee of Jining Medical University. All participants signed the digital informed consent before participation.

Research Instruments

Depression

The depressive symptoms of the subjects in the past week were evaluated by the Beck Depression Inventory (BDI), which contains 21 self-reported items.²⁷ Each item has four options with an assigned point of 0~3 (the gravity of the symptoms proportional to the score). The probability and severity of depression increase with the total points on a scale of 0 to 63. In this study, the Cronbach's α of the BDI was 0.91.

Stressful Life Events

The SLEs of the participants in the past 12 months were estimated with the Adolescent Self-Rating Life Events Check List (ASLEC) established by Liu et al.²⁸ The impact of each of the 26 self-reported stress events on their life was estimated via a 5-point Likert scale with a scope of 0 to 4. A higher score indicates a greater impact. The 26 self-reported items of this scale were allocated to 5 dimensions: interpersonal relationships, learning stress, punishment, loss and health adaptation,²⁹ and the total points of each dimension were calculated respectively. In this study, the Cronbach's α of the ASLEC was 0.91.

AVPD Features

AVPD features in this study included seven features that were derived from DSM-5.³⁰ These seven features include avoiding occupational activities, being unwilling to interact with other people, showing restraint within intimate relationships, focusing on being reproached or refused in social situations, holding back emotions in a new interpersonal relationship, considering self as socially incompetent, being unusually reluctant to participate in any new activities. The answer to each question is either "yes" or "no", recorded as 1 and 0. Then the total score of the above seven questions was divided into three levels: 0, 1–3, and 4–7 points, for the analysis.

Statistical Analysis

SPSS 24.0 was used in all analyses. In the data cleaning phase, participants with missing values of the primary variables (Beck depression score, the SLEs and AVPD features) were removed. For the aim of this study, the participants with lifetime MDD (N=440) were excluded. Finally, 7390 participants were collected for further analysis. The difference in numerical variables between the two groups was contrasted via independent-sample *t* test, while ANOVA was conducted among more than two groups. The relativity among two continuous variables was analyzed by Pearson's correlation analysis. After adjusting for variables that were statistically different in the univariate analysis, structural equation modelling was carried out to determine whether the AVPD features mediated the relation between depression and the SLEs (the total score and the score of five dimensions, respectively). Process macro program (Model 4) in SPSS were used to conduct Structural equation modeling (SEM). In the present study we hypothesized the existence of a chain model in which stressful life events can lead to depression by influencing AVPD features. To analyze the mediation effects of AVPD features on stressful life events and

depression score, stressful life events was used as independent variables, AVPD features score as intermediary variables, and depression score as the outcome variable. The number of repeated samples was set at 5000. A meaningful intermediary was assumed if the 95% confidence interval did not contain 0. Analyses were carried out by SPSS 24 (IBM, Armonk, NY, USA).

Results

The demographic information of the participants is listed in Table 1. Of the 7390 participants, 4461 (60.37%) were female students, and 4683 (63.37%) were from rural regions. The average age of the subjects was 18.36 years ($SD = 0.83$). 2798 (38.24%) participants were from one-child families, and 5270 (71.31%) were studying medicine. The mean BDI score was 3.05 ($SD = 5.20$). About 34.68% of the participants reported one to three AVPD features, and 18.15% reported four to seven AVPD features.

The differences in BDI scores of the participants with different characteristics are listed in Table 2. The result suggested that the BDI scores differ significantly between the presence and absence of all AVPD features (Avoids interpersonal occupational activities: $t = 19.095$, $P < 0.05$; unwilling to get involved with people: $t = 18.951$, $P < 0.05$; shows restraint within intimate relationships: $t = 18.675$, $P < 0.05$; is preoccupied with being criticized or rejected: $t = 20.182$, $P < 0.05$; inhibited in new interpersonal situations: $t = 20.282$, $P < 0.05$; views self as socially inept: $t = 19.584$, $P < 0.05$; unusually reluctant to engage in any new activities: $t = 13.687$, $P < 0.05$), campus sites ($F = 15.012$, $P < 0.05$) and major ($t = -3.506$, $P < 0.05$). No significant differences were observed in BDI scores by gender, family residence, and only-child status. Participants with AVPD features

Table 1 Demographic Characteristics of First-Year University Students Without Lifetime MDD (N=7390)

Variables	N (%)
Sex	
Male	2929 (39.63)
Female	4461 (60.37)
Age (mean, SE)	18.36 (0.83)
Family residence	
Rural areas	4683 (63.37)
Urban areas	2707 (36.63)
From one-child family	
Yes	2798 (38.24)
No	4519 (61.76)
Campus sites	
Jining	3996 (54.07)
Rizhao	973 (13.17)
Weifang	2421 (32.76)
Major	
Medicine major	5270 (71.31)
Non-medicine major	2120 (28.69)
University entrance exam score (mean, SE)	511.07 (50.87)
Beck depression score (mean, SE)	3.05 (5.20)
Negative life events	
Interpersonal relationships (mean, SE)	4.37 (3.48)
Learning stress (mean, SE)	5.69 (3.93)
Punishment (mean, SE)	1.46 (2.58)
Health adaptation (mean, SE)	2.93 (3.02)
Loss (mean, SE)	2.63 (3.38)
Number of AVPD features	
0	3486 (47.17)
1–3	2563 (34.68)
4–7	1341 (18.15)

Table 2 The Beck Depression Score in First-Year University Students Without Lifetime MDD by Difference Characteristics (N=7390)

Variables	Beck Depression Score Excluding Lifetime MDD Participants (N=7390)		
	Mean (SE)	t/F	P
Sex			
Male	2.91 (5.53)	-1.839	0.066
Female	3.14 (4.98)		
Family residence			
Rural areas	3.09 (5.17)	0.776	0.438
Urban areas	2.99 (5.25)		
From one-child family			
Yes	3.01 (5.34)	-0.523	0.601
No	3.07 (5.10)		
Campus sites			
Jining	2.78 (5.08)	15.012	<0.001
Rizhao	3.71 (6.15)		
Weifang	3.23 (4.95)		
Major			
Medicine major	2.91 (5.06)	-3.506	<0.001
Non-medicine major	3.40 (5.53)		
Avoids interpersonal occupational activities			
Yes	5.81 (6.94)	19.095	<0.001
No	2.30 (4.33)		
Unwilling to get involved with people			
Yes	6.29 (7.26)	18.951	<0.001
No	2.35 (4.33)		
Shows restraint within intimate relationships			
Yes	5.62 (6.85)	18.675	<0.001
No	2.31 (4.34)		
Is preoccupied with being criticized or rejected			
Yes	4.88 (6.34)	20.182	<0.001
No	2.08 (4.17)		
Inhibited in new interpersonal situations			
Yes	5.26 (6.45)	20.282	<0.001
No	2.17 (4.31)		
Views self as socially inept			
Yes	5.78 (6.84)	19.584	<0.001
No	2.28 (4.34)		
Unusually reluctant to engage in any new activities			
Yes	7.22 (8.32)	13.687	<0.001
No	2.65 (4.61)		
Number of AVPD features			
0	1.52 (3.49)	548.707	<0.001
1-3	3.22 (4.87)		
4-7	6.68 (7.27)		

have higher scores on all five dimensions of the SLEs, and the scores increase as the number of AVPD features increases ([Supplementary Table 1](#)). The associations between the five dimensions of the SLEs, the number of AVPD features and BDI scores were all statistically significant ([Table 3](#)).

After adjusting for age, sex, family residence, one-child family, major, university entrance exam score and campus sites, which were statistically significant in the univariate analyses, the number of AVPD features had a partial mediating effect on the association between the SLEs and BDI scores, accounting for 32.28% of the total effect ([Table 4](#) and [Figure 1](#)). Further, we

Table 3 The Associations Between Negative Life Events, the Number of AVPD Features and BDI Scores in First-Year University Students Without Lifetime MDD

Variables	BDI Score	Number of AVPD Features	Negative Life Events	Interpersonal Relationships	Learning Stress	Punishment	Health Adaptation	Loss	Age
Number of AVPD features	0.384**	0.605 [#]							
Negative life events	0.309**	0.336**	0.592 [#]						
Interpersonal relationships	0.242**	0.298**	0.793**	0.633 [#]					
Learning stress	0.223**	0.290**	0.788**	0.534**	0.657 [#]				
Punishment	0.182**	0.161**	0.672**	0.457**	0.412**	0.678 [#]			
Health adaptation	0.301**	0.250**	0.681**	0.437**	0.413**	0.336**	0.698 [#]		
Loss	0.189**	0.201**	0.698**	0.428**	0.488**	0.413**	0.326**	0.665 [#]	
Age	0.001	-0.007	-0.052**	-0.059**	-0.035**	-0.037**	-0.008	-0.023*	
University entrance exam score	-0.044**	-0.007	-0.059**	-0.043**	-0.056**	-0.031*	-0.054**	-0.046**	-0.079**

Notes: * $P<0.05$; ** $P<0.01$. [#]Average variance extracted (AVE) values.

Table 4 The Mediating Role of Avoidant Personality Disorders Features Between Negative Life Events and Depression Scores in First-Year University Students Without Lifetime MDD After Adjusting for Age, Sex, Family Residence, One-Child Family, Major, University Entrance Exam Score and Campus Sites

Path	Total Effect (95% CI)	Direct Effect (95% CI)	Indirect Effect (95% CI)	Indirect Effect Proportion (%)
X→M→Y	0.1333 (0.1237, 0.1428)	0.0875 (0.0779, 0.0971)	0.0457 (0.0404, 0.0515)	32.28
X1→M→Y	0.3565 (0.3231, 0.3900)	0.2051 (0.1721, 0.2381)	0.1514 (0.1335, 0.1697)	42.47
X2→M→Y	0.2922 (0.2621, 0.3222)	0.1619 (0.1325, 0.1913)	0.1303 (0.1150, 0.1469)	44.59
X3→M→Y	0.3625 (0.3171, 0.4079)	0.2433 (0.2004, 0.2861)	0.1192 (0.0992, 0.1414)	32.88
X4→M→Y	0.5149 (0.4772, 0.5525)	0.3733 (0.3366, 0.4100)	0.1415 (0.1230, 0.1604)	27.48
X5→M→Y	0.2827 (0.2479, 0.3176)	0.1765 (0.1434, 0.2096)	0.1062 (0.0901, 0.1226)	37.57

Notes: X: the score of ASLEC. X1-X5: the score of interpersonal relationships, learning stress, punishment, loss, health adaptation, respectively. M: the number of the AVPD features. Y: the BDI score.

analyzed the mediating role of the number of AVPD features in 5 dimensions of the SLEs and depression, respectively, and the result also suggested statistical significance (Table 4 and Figure 1).

Then the moderating variable gender is brought into the mediation model to test the moderating effect of gender on different paths in the mediation model. The results show that in the model of life stress events → avoidant personality

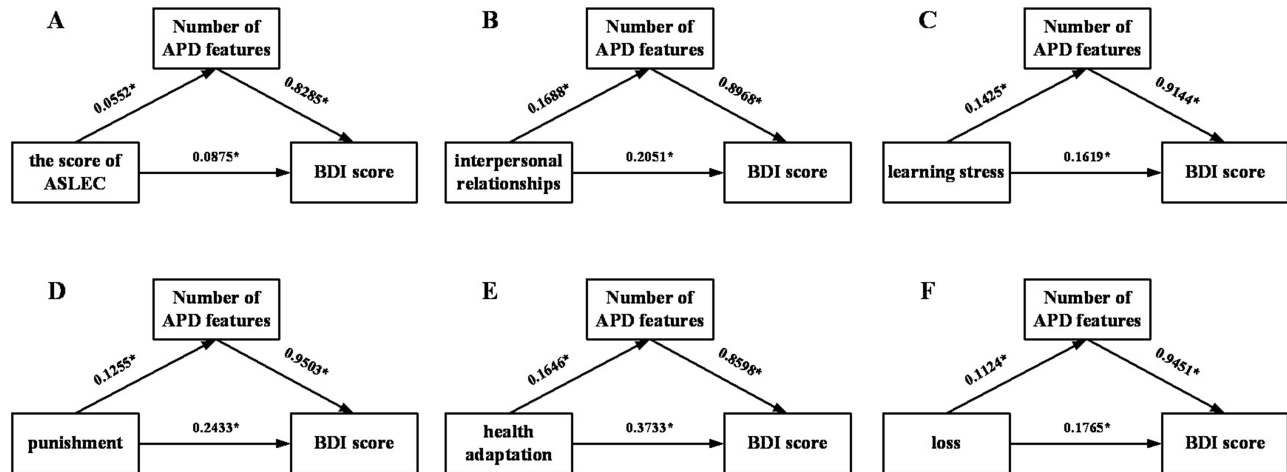


Figure 1 The mediating role of avoidant personality disorders features between negative life events and depression scores in first-year university students without lifetime MDD after adjusting for age, sex, family residence, one-child family, major, university entrance exam score and campus sites. (A) the score of ASLEC; (B) interpersonal relationship; (C) learning stress; (D) punishment; (E) loss; (F) health adaptation; respectively. * $P<0.05$.

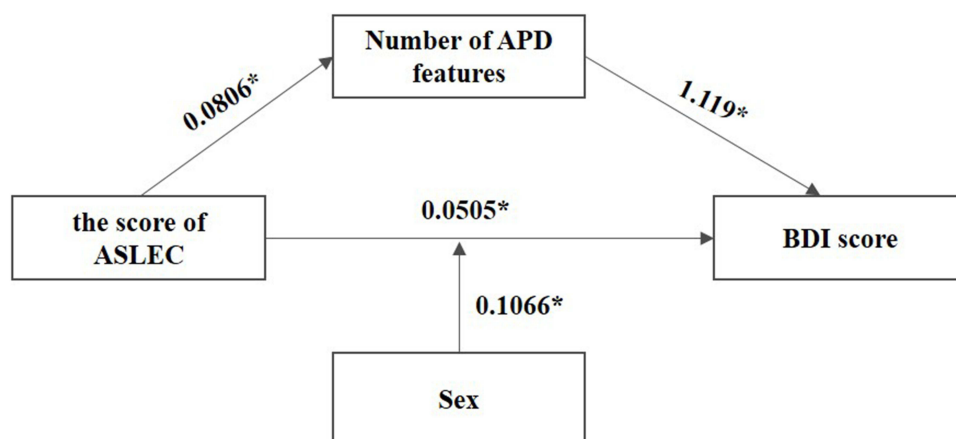


Figure 2 The mediating role of avoidant personality disorders features between negative life events and depression scores in first-year university students. * $P < 0.05$.

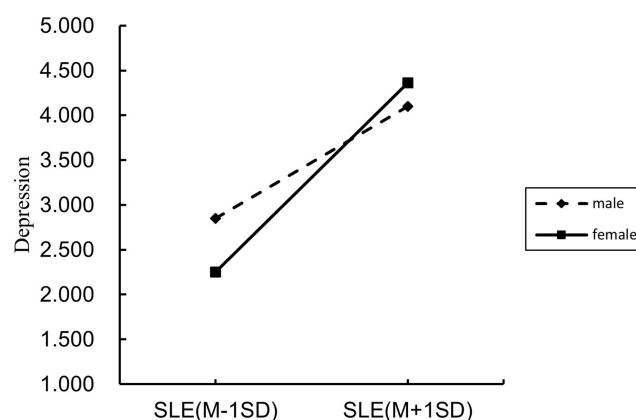


Figure 3 The moderating effect of sex in Stressful life events (SLE) model.

traits → depression, gender plays a moderating role in the path of ASLECs → depression (Figure 2, $\beta = 0.10$, $P < 0.01$). In order to better show the moderating effect of gender in the model, a simple slope diagram is drawn to describe the predictive effect of different dimensions of stress events and avoidant personality traits on depression in men and women, as shown in Figure 3.

Discussion

In this study, we found that AVPD features are prevalent among Chinese university freshmen. Participants with AVPD features have higher scores on depression and all five dimensions of the SLEs, and the scores increase as the number of AVPD features increases. The number of AVPD features play a partial mediating role between the five dimensions of the SLEs and depression, especially in the dimensions of interpersonal relationship and learning pressures. Interestingly, although all five dimensions of the SLEs had a large impact on depression in our study, the effect of the total score was reduced. Whether this phenomenon means that there are inconsistencies or weightings in the dimensions of the SLEs is required to be further explored.

In Chinese society where interpersonal harmony is highly valued, interpersonal relationship with parents, teachers and peers is very important for teenagers.³¹ Tension in interpersonal relationships can be quite stressful, especially the conflicts among adolescents, parents and teachers, which may be exacerbated when they are exposed to diverse values that may be different from traditional living habits.¹⁹ In addition, teenagers are faced great learning pressures during high school and university due to the score-oriented examination system.^{16,32} In this situation, schools should set up mental

health education courses to teach students how to manage their emotions and deal with interpersonal relationships. Enhance teenagers' mental health awareness through lectures, activities and other forms. This study revealed a direct impact of SLEs on depression, which consistent with previous findings that SLEs are a risk factor for depression.¹¹ In the biological perspective, chronic stress caused by SLEs can lead to structural changes in the brains, such as the reduction of the amiga and hippocampus,³³ which can worsen depression.³⁴ Therefore, not only can stress increase the risk of developing depression, but people with depressive symptoms are, in turn, more sensitive to stress. However, depression is not an inevitable trend for individuals experiencing the SLEs, because of the different sensitivities of individuals for the SLEs.^{35,36} Personality traits may be an influencing factor of individual sensitivity,^{20,32} which can affect the way individuals perceive or respond to the SLEs, thus affecting the impact of the SLEs on depression.

AVPD is defined as a pervasive pattern of social inhibition, feelings of inadequacy, and hypersensitivity to negative evaluation, beginning by early adulthood and across time and situations. Daily functioning is most severely impaired in individuals with AVPD compared with other personality disorders.¹¹ The number of AVPD features play a partial mediating role between the SLEs and depression. SLEs may lead to the development of AVPD features, then further contribute to increase the risk of depression, which is consistent with the developmental of personality disorders.²³ Previous studies have shown that individuals with high levels of maladaptive personality traits tend to exhibit negative psychological characteristics and behaviors.³⁷ For university students with AVPD features, they may adopt an avoidant coping strategy to cope with stress, such as investing considerable time in learning to avoid interpersonal contact.³⁸ Meanwhile, students with AVPD features reported lower levels of self-esteem than others.³⁹ Students with AVPD features, therefore are more likely to be affected by the SLEs, especially interpersonal and learning pressures, thereby being more prone to depression.³⁹ This study can provide a deeper understanding of the impact of SLEs on the depression and the internal mechanisms, further enriching the mechanisms and the development of depression, and perfecting the theoretical support and empirical evidence. Stressful life events can not only directly influence the occurrence and progression of depressive moods but also affect them through avoidant personality traits. Furthermore, compared to males, females are more prone to developing depressive moods. This may be a result of both physiological and environmental factors. Females experience greater hormonal fluctuations, which can easily lead to emotional instability, increasing irritability and anxiety, and thereby enhancing the development of depressive symptoms.⁴⁰ This finding further supports the stress vulnerability theory and shifts the perspective from a unidirectional model of stress-depression association to recognizing the influence of environmental and individual characteristics on the occurrence of stressors.¹¹ Individuals with adverse personality traits (such as personality disorders) are more likely to experience depressive moods when faced with stressors.

The practical significance of this study is that it emphasizes the importance of early identify the students with AVPD features, and then give them more attention and psychological intervention timely in order to reduce their sensitivity to the SLEs, thereby contributing to a reduction in the incidence of depression. First, educational institutions should increase focus on the students' mental health, especially during the freshman admission period. Our research found that the students with AVPD features are more likely to experience depressive symptoms when facing interpersonal relationships and academic pressure. Therefore, it is necessary to conduct mental health screenings in school to identify potentially high-risk students and provide personalized psychological support and intervention measures. For example, special psychological counseling groups can be established in school to provide emotional support and coping strategy training for these students, helping them improve their ability to cope with life's pressures.

This study has several limitations. First, this study has limited capacity in judging the causal relationship between the factors because it is a cross-sectional study. Secondly, the data collection mainly relied on the self-report of the participants. Therefore, reporting and recall bias may exist. Thirdly, the participants of this study were Chinese university freshmen, making the generalization of the results limited. Individuals from different cultural backgrounds may perceive and cope with stress in significantly different ways. Additionally, while this study reveals a partial mediating role of AVPD features between life stress and depression, other potential moderating variables, such as social support and coping strategies, need to be explored. These may play an important role in different social and cultural environments, affecting individuals' mental health. Therefore, we intend to adopt a longitudinal design in future research to thoroughly explore the dynamic relationships among AVPD, SLEs and depression, thereby clarifying the causal chain more clearly. Meanwhile, incorporating other potential variables in the analysis to build a more comprehensive theoretical model. In

terms promoting the research findings, comparative studies in different cultural and social contexts will also be considered to verify whether the findings of this study are applicable to a wider population.

Conclusion

AVPD features are prevalent among first-year Chinese university students. College students are in the transition phase from adolescence to adulthood, and they also bear various pressures such as academics, interpersonal relationships, and health adaptation. If these pressures are not promptly intervened and adjusted, depressive emotions may arise. As one of the risk factors for depression, personality disorders have a crucial impact on depressive symptoms among college students. This study found that stressful life events in college students can directly contribute to the occurrence of depressive symptoms or indirectly lead to them through the mediating role of avoidant personality traits, with gender playing a significant moderating role in this process. Findings suggests that we should pay more attention to adolescent mental health. It is necessary early identify the students with AVPD features, and then give them more attention and psychological intervention timely in order to reduce their sensitivity to the SLEs, thereby contributing to a reduction in the incidence of depression.

Ethical Standards

This study was approved by the Research Ethics Committee in Jining Medical University, Jining, China. This study complies with the Declaration of Helsinki.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

Acknowledgment

We would like to thank all fieldworkers and participants of this study.

Author Contributions

All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Funding

This work was supported by the Taishan Scholars Project of Shandong Province (tsqn201909145), Government-Sponsored Study Abroad Program & Supervisor Enhancement Program of Shandong Province and Canadian Institutes of Health Research (PCS-195122), Research Fund for Academician Lin He New Medicine (JYHL2021MS19) and Supporting Fund for Teachers' research of Jining Medical University (JYFC2019FP003). All funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Disclosure

The authors declare that they have no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

References

1. Bruffaerts R, Mortier P, Kiekens G, et al. Mental health problems in college freshmen: prevalence and academic functioning. *J Affect Disord.* 2018;225:97–103. doi:10.1016/j.jad.2017.07.044
2. Hoying J, Melnyk BM, Hutson E, Tan A. Prevalence and correlates of depression, anxiety, stress, healthy beliefs, and lifestyle behaviors in first-year graduate health sciences students. *Worldviews Evid Based Nurs.* 2020;17(1):49–59. doi:10.1111/wvn.12415
3. Aluri J, Goodman D, Antshel K, Mojtabei R. Variation in ADHD treatment by mental health care setting among US college students from 2019 to 2022. *J Atten Disord.* 2023;27(12):1411–1419. doi:10.1177/10870547231178310
4. Tang F, Byrne M, Qin P. Psychological distress and risk for suicidal behavior among university students in contemporary China. *J Affect Disord.* 2018;228:101–108. doi:10.1016/j.jad.2017.12.005

5. Li W, Zhao Z, Chen D, Peng Y, Lu Z. Prevalence and associated factors of depression and anxiety symptoms among college students: a systematic review and meta-analysis. *J Child Psychol Psychiatry*. 2022;63(11):1222–1230. doi:10.1111/jcpp.13606
6. Wang C, Wen W, Zhang H, et al. Anxiety, depression, and stress prevalence among college students during the COVID-19 pandemic: a systematic review and meta-analysis. *J Am Coll Health*. 2023;71(7):2123–2130. doi:10.1080/07448481.2021.1960849
7. Bhattarai D, Shrestha N, Paudel S. Prevalence and factors associated with depression among higher secondary school adolescents of Pokhara Metropolitan, Nepal: a cross-sectional study. *BMJ Open*. 2020;10(12):e044042. doi:10.1136/bmjopen-2020-044042
8. Cattellino E, Chirumbolo A, Baiocco R, Calandri E, Morelli M. School achievement and depressive symptoms in adolescence: the role of self-efficacy and peer relationships at school. *Child Psychiatry Hum Dev*. 2021;52(4):571–578. doi:10.1007/s10578-020-01043-z
9. Hertenstein E, Feige B, Gmeiner T, et al. Insomnia as a predictor of mental disorders: a systematic review and meta-analysis. *Sleep Med Rev*. 2019;43:96–105. doi:10.1016/j.smrv.2018.10.006
10. Zou P, Sun L, Yang W, et al. Associations between negative life events and anxiety, depressive, and stress symptoms: a cross-sectional study among Chinese male senior college students. *Psychiatry Res*. 2018;270:26–33. doi:10.1016/j.psychres.2018.09.019
11. Hammen C. Risk factors for depression: an autobiographical review. *Annu Rev Clin Psychol*. 2018;14:1–28. doi:10.1146/annurev-clinpsy-050817-084811
12. Hammen C. Stress and depression. *Annu Rev Clin Psychol*. 2005;1:293–319. doi:10.1146/annurev.clinpsy.1.102803.143938
13. Gotlib IH, Joormann J. Cognition and depression: current status and future directions. *Annu Rev Clin Psychol*. 2010;6:285–312. doi:10.1146/annurev.clinpsy.121208.131305
14. Acharya L, Jin L, Collins W. College life is stressful today - Emerging stressors and depressive symptoms in college students. *J Am Coll Health*. 2018;66(7):655–664. doi:10.1080/07448481.2018.1451869
15. Maciejewski D, van Sprang E, Spinhoven P, Penninx B. Longitudinal associations between negative life events and depressive symptoms-A 9-year longitudinal study on between-person and within-person effects and the role of family history. *J Pers Soc Psychol*. 2021;121(3):707–721. doi:10.1037/pspp0000381
16. Ren Z, Cao J, Li Y, et al. Association between muscle strength and depressive symptoms among Chinese female college freshmen: a cross-sectional study. *BMC Musculoskelet Disord*. 2020;21(1). doi:10.1186/s12891-020-03478-w
17. Luo W, Zhong BL, Chiu HF. Prevalence of depressive symptoms among Chinese university students amid the COVID-19 pandemic: a systematic review and meta-analysis. *Epidemiol Psychiatr Sci*. 2021;30:e31. doi:10.1017/S2045796021000202
18. Zhang CL, Xu YM, Zhong BL. The association between smoking and loneliness among Chinese university freshmen. *Ann Transl Med*. 2020;8(10):649. doi:10.21037/atm-20-3523
19. Liu WJ, Zhou L, Wang XQ, Yang BX, Wang Y, Jiang JF. Mediating role of resilience in relationship between negative life events and depression among Chinese adolescents. *Arch Psychiatr Nurs*. 2019;33(6):116–122. doi:10.1016/j.apnu.2019.10.004
20. Liu L, Liu C, Ke X, Li N. Mediating effect of social support on the association between life events and depression: a cross-sectional study of adolescents in Chongqing China. *Medicine*. 2020;99(51):e22627. doi:10.1097/MD.0000000000002267
21. Bagby RM, Psych C, Quilty LC, Ryder AC. Personality and depression. *Can J Psychol*. 2008;53(1):14–25. doi:10.1177/070674370805300104
22. Williams R, Farquharson L, Rhodes E, et al. Impact of co-morbid personality disorder on quality of inpatient mental health services for people with anxiety and depression. *Personal Ment Health*. 2020;14(4):336–349. doi:10.1002/pmh.1484
23. Weinbrecht A, Schulze L, Boettcher J, Renneberg B. Avoidant personality disorder: a current review. *Curr Psych Rep*. 2016;18(3):29. doi:10.1007/s11920-016-0665-6
24. Ye G, Fu WQ. Cognitive emotion regulation strategies of university students with avoidant personality disorder. *China J Health Psychol*. 2013;21(6):906–908. doi:10.13342/j.cnki.cjhp.2013.06.066
25. Ye G, Yao FM, Fu WQ, Kong M. The relationships of self-esteem and effect of university students with avoidant personality disorder. *China J Health Psychol*. 2011;25(2):141–145. doi:10.3969/j.issn.1000-6729.2011.02.014
26. Tang JL. Gene-environment interactions for recurrence of major depressive disorders among freshmen college student. Jining Medical University, MA thesis. 2021. doi:10.27856/d.cnki.gjnyx.2021.000027.
27. Beck AT, Steer RA, Brown G. Beck depression inventory (BDI). *Arch Gen Psychiatry*. 1961;4(6):561–571. doi:10.1037/t00741-000
28. Liu XC, Liu LQ, Yang J, et al. Reliability and validity of the adolescents self-rating life events checklist. *Chin J Clin Psychol*. 1997;5:34–36.
29. Xin XH, Yao SJ. Validity and reliability of the adolescent self-rating life events checklist in middle school students. *Chin Mental Health J*. 2015;29(5):355–360.
30. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th edition ed. 2013.
31. Jiang Y, Zhang J, Ming H, Huang S, Lin D. Stressful life events and well-being among rural-to-urban migrant adolescents: the moderating role of the stress mindset and differences between genders. *J Adolesc*. 2019;74:24–32. doi:10.1016/j.adolescence.2019.05.005
32. Spinhoven P, Elzinga BM, Hovens JG, et al. Positive and negative life events and personality traits in predicting course of depression and anxiety. *Acta Psychiatr Scand*. 2011;124(6):462–473. doi:10.1111/j.1600-0447.2011.01753.x
33. McEwen BS. Physiology and neurobiology of stress and adaptation: central role of the brain. *Physiol Rev*. 2007;87(3):873–904. doi:10.1152/physrev.00041.2006
34. Zacková L, Jáni M, Brázdil M, Nikolova YS, Marečková K. Cognitive impairment and depression: meta-analysis of structural magnetic resonance imaging studies. *Neuroimage Clin*. 2021;32:102830. doi:10.1016/j.nicl.2021.102830
35. McMillen JC, Smith EM, Fisher RH. Perceived benefit and mental health after three types of disaster. *J Consult Clin Psychol*. 1997;65(5):733–739. doi:10.1037//0022-006x.65.5.733
36. Park CL, Cohen LH, Murch RL. Assessment and prediction of stress-related growth. *J Pers*. 1996;64(1):71–105. doi:10.1111/j.1467-6494.1996.tb00815.x
37. Bozzatello P, Rocca P, Bellino S. Trauma and psychopathology associated with early onset BPD: an empirical contribution. *J Psychiatr Res*. 2020;131:54–59. doi:10.1016/j.jpsychires.2020.08.038
38. Xu YM, Pu SS, Li Y, Zhong BL. Possible avoidant personality disorder magnifies the association between bullying victimization and depressive symptoms among Chinese university freshmen. *Front Psychiatry*. 2022;13:822185. doi:10.3389/fpsy.2022.822185
39. Mercan N, Uysal B. The relationship of social media addiction with interpersonal problem-solving and personality traits in university students. *Arch Psychiatr Nurs*. 2023;43:50–56. doi:10.1016/j.apnu.2022.12.025
40. Farage MA, Osborn TW, MacLean AB. Cognitive, sensory, and emotional changes associated with the menstrual cycle: a review. *Arch Gynecol Obstet*. 2008;278:299–307. doi:10.1007/s00404-008-0708-2

Psychology Research and Behavior Management

Dovepress
Taylor & Francis Group

Publish your work in this journal

Psychology Research and Behavior Management is an international, peer-reviewed, open access journal focusing on the science of psychology and its application in behavior management to develop improved outcomes in the clinical, educational, sports and business arenas. Specific topics covered in the journal include: Neuroscience, memory and decision making; Behavior modification and management; Clinical applications; Business and sports performance management; Social and developmental studies; Animal studies. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/psychology-research-and-behavior-management-journal>