

The Associations Between Psychological Distress and Academic Burnout: A Mediation and Moderation Analysis

Hui Ling Chen¹, Hui Yuan Wang¹, Sheng Feng Lai², Zeng Jie Ye¹

¹School of Nursing, Guangzhou University of Chinese Medicine, Guangzhou, People's Republic of China; ²School of Nursing, Guangzhou Medical University, Guangzhou, People's Republic of China

Correspondence: Zeng Jie Ye, School of Nursing, Guangzhou University of Chinese Medicine, Out Ring Road No. 262, Panyu District, Guangzhou, 510006, People's Republic of China, Tel +86 15914411786, Email zengjieye@qq.com

Background: Psychological distress is reported to be associated with academic burnout in students while the mediation and moderation effect of resilience and personality are less explored.

Purpose: The current study was designed to estimate the mediating effect of resilience and the moderation effect of personality between psychological distress and academic burnout.

Participants and methods: A total of 613 students were enrolled from two medical universities between December 2020 and January 2021. They were administered with Academic Burnout Scale, 10-item Kessler Psychological Distress Scale (K10), Connor-Davidson Resilience Scale (CD-RISC-10) and NEO Five-Factor Inventory (NEO-FFI). Latent profile analysis and moderated mediation analysis were performed.

Results: Three personalities were identified and named as resilient (13.4%), over-controlled (50.2%) and under-controlled (36.4%). Resilience significantly mediated the relationship between psychological distress and academic burnout while personality significantly moderated the relationship between psychological distress and resilience.

Conclusion: Resilience and personality may be two important mediators between psychological distress and academic burnout. More attentions should be paid to students with under-controlled personality and resilience-enhancing interventions could be developed to prevent or alleviate academic burnout in future research.

Keywords: psychological distress, academic burnout, resilience, personality, mediation, moderation

Introduction

Academic burnout is first proposed by Freudenberg and Maslach and described as a syndrome of emotional exhaustion, depersonalization, and a low sense of personal accomplishment caused by learning pressure or lack of interest in learning.¹⁻³ Academic burnout is reported to be associated with poor academic performance, hypertension, arteriosclerosis and self-injury⁴⁻⁸ and can be easily recognized among university students worldwide. For example, a national study indicated that one-third of Finnish university students had academic burnout and 13% suffered had severe ones.⁹ Xu et al¹⁰ also revealed that 48.3% of general university students scored above the average on academic burnout. In addition, medical students are more vulnerable to academic burnout due to specialized academic requirements and medical internships.¹¹⁻¹³ For example, 85% of medical students in England reported to be exhausted in their study period⁴ and more attention should be paid to this vulnerable group. Psychological distress, a poor emotional state that reflects the individual's mental health, has been reported to be associated with academic burnout.¹⁴ In addition, resilience, defined as the ability to bounce back when confronted with challenges, has also been reported to be negatively correlated with academic burnout.^{15,16} Thus, based on these findings, we can hypothesize that psychological distress may affect academic burnout through two pathways, including: (1) psychological distress directly affects academic burnout, and (2) psychological distress indirectly affects academic burnout through resilience (as the

mediator). Furthermore, three personality types are identified as Resilient (defined as independent and confident), Under-controlled (defined as impulse and aggressiveness), Over-controlled (defined as prosocial, sensitive, and obedient), based on the big-five personality scale, including openness to experience (O), conscientiousness (C), extraversion (E), agreeableness (A), and neuroticism (N).²² It indicates that the resilient-type personality is high ego-resiliency while the under-controlled and over-controlled ones are low ego-resiliency.^{17,18} Thus, we have interests whether the personality plays a role in the associations between psychological distress, resilience and academic burnout, resulting in a moderated mediation model. The hypothesized framework is described in Figure 1A. In the current study, it is designed to:

- (1) explore the difference of academic burnout between medical and non-medical students;
- (2) identify latent subgroups in students with different personality types based on Latent Profile Analysis (LPA);
- (3) examine the role of resilience in the relationship between psychological distress and academic burnout;
- (4) estimate the role of personality in the relationship between psychological distress to resilience, and resilience to academic burnout.

Methods

Study Design and Data Collection

Seven hundred students were approached from two medical universities between December 2020 and January 2021. Eighty-seven were excluded due to non-responses and incomplete reasons, resulting in a final sample of 613 (response rate = 87.6%). Among which, 499 and 114 were medical and non-medical students in the current study, respectively. The inclusion criteria were as follows: (a) could communicate fluently in Mandarin; (b) agreed to participate in this study. The exclusion criteria was presence or history of a diagnosis of mental disorders. The minimum sample size was calculated based on Gorsuch and Tinsley's recommendation, which was 300 in consideration of 60 items in NEO-FFI (at least 5 persons per item).^{19,20}

Measuring Instruments

Academic Burnout Scale

The 16-item modified Chinese version of Academic Burnout Scale was developed by Zhu et al,²¹ which has been validated among Chinese university students. It has 16 items and three dimensions, including emotional exhaustion, depersonalization, and low personal accomplishment. The total score ranges from 0 to 64 with higher scores indicating severe academic burnout. The Cronbach's α of the three dimensions in the current study ranged from 0.747 to 0.887.

Cd-Risc-10

CD-RISC-10 is derived from the original 25-item Connor-Davidson Resilience Scale.^{22,23} The Chinese version of CD-RISC-10 was validated by YE²⁴ and its Cronbach's α was 0.874. The total score ranges from 0 to 40 with higher score indicating higher resilience. This scale has been successfully administered in our previous studies.^{25,26}

Neo-Ffi

The Chinese version of Neuroticism Extraversion Openness Five-Factor Inventory (NEO-FFI) was a revised version from the original Personality Inventory developed by Costa and McCrae.^{27,28} The NEO-FFI includes 60 items and five domains named as Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. The Chinese Version of NEO-FFI has been validated by Yao et al²⁹ among 1255 Chinese students with the Cronbach's α coefficient ranging from 0.63 to 0.78.

K10

The Chinese version of 10-item Kessler Psychological Distress Scale (K10) was widely used in psychological disease screening.^{30,31} It has ten items and the total score ranges from 0 to 40. The Cronbach's α coefficient was 0.801.³²

Data Analysis

First, descriptive analysis was performed for demographic characteristics and psychological variables. Second, correlational analysis was used to estimate the associations among psychological variables. Third, Latent Profile Analysis (LPA) was utilized to recognize latent subgroups of students with different personality types. Fourth, the role of resilience as a mediator (M) between the independent (psychological distress) and dependent (academic burnout) was evaluated. Fifth, the role of LPA-based personality as a moderator was estimated in the mediating model through the pathways from psychological distress to resilience, and resilience to academic burnout.³³ Bootstrapping was set to 5000 and 95% confidence interval of the bootstrapping was reported. The significant test level was set at $\alpha=0.05$. All analysis was performed in SPSS 23.0 (IBM) and MPLUS 8.3 (Muthen & Muthen).

Results

Demographic Characteristics of Students

The mean of academic burnout, resilience and psychological distress among students were 22.83 (SD = 8.64), 25.87 (SD=5.64), and 19.43 (SD = 6.59) respectively. Most of students were postgraduates (54.6%), followed by bachelor (45.4%). The gender was balanced (46.2% vs 53.8%). Only relationship and performance were associated with academic burnout levels and these two variables were included as confounders in further analysis. In addition, no significant difference was demonstrated in academic burnout levels between medical and non-medical students ($P = 0.731$). Other details are described in [Tables 1](#) and [2](#). Thus, subsequent moderated mediation analysis was based on the sample of medical and non-medical students combined.

Latent Profile Analysis of Personality

It indicated that AIC, BIC, aBIC steadily decreased as the number of profiles increased and LMR was not significant in models with more than three profiles ([Supplementary Table S1 and Figure S1](#)). Thus, the 3-class model was the optimal one in the current study and three subgroups were named as resilient (13.4%), over-controlled (50.2%) and under-controlled (36.4%). The distribution of domain scores by the three latent subgroups with different personality types are described in [Figure 1B](#) and ANOVA analysis demonstrated a significant difference in academic burnout levels among these three subgroups ($F = 154.515$, $P < 0.001$). Under-controlled group reported the highest level of academic burnout (28.43 ± 7.50), followed by the over-controlled group (21.36 ± 6.67) and the resilient group (13.12 ± 7.18) as shown in [Table 3](#).

Correlations Among Psychological Distress, Resilience and Academic Burnout

Pearson's correlation analysis showed that psychological distress was negatively associated with resilience ($r = -0.51$, $P < 0.01$) while positively associated with academic burnout ($r = 0.55$, $P < 0.01$) and its three dimensions (r ranged from 0.37 to 0.47, all $P < 0.01$). Resilience was negatively associated with academic burnout ($r = -0.56$, $P < 0.01$) as well as its three dimensions (r ranged from -0.38 to -0.52 , all $P < 0.01$). Other details about correlations are presented in [Table 4](#).

The Mediation Analysis of Resilience

When significant confounders of performance and relationship were controlled, the results showed that psychological distress could directly affect all dimensions of academic burnout, including emotional exhaustion ($B = 0.191$, $SE = 0.021$, $P < 0.001$), depersonalization ($B = 0.209$, $SE = 0.021$, $P < 0.001$) and low personal accomplishment ($B = 0.096$, $SE = 0.022$, $P < 0.001$). The indirect effects of psychological distress through resilience on three dimensions of academic burnout were also significant by bootstrapping method, which are illustrated in [Table 5](#). More details of this mediation model are shown in [Figure 1C](#).

Table 1 Difference of Demographic Factors in Academic Burnout (Univariable Analysis)

Variables	N (%)	Academic Burnout Mean (SD)	P
Majors			0.731
Medical	499 (81.4%)	22.89 (8.76)	
Nonmedical	114 (18.6%)	22.58 (8.13)	
Gender			0.118
Male	283 (46.2%)	22.72 (8.99)	
Female	330 (53.8%)	22.92 (8.35)	
Education			0.863
Postgraduate	335 (54.6%)	22.98 (8.60)	
Bachelor	278 (45.4%)	22.65 (8.71)	
Grades			0.160
Year 1	231 (37.7%)	22.98 (8.11)	
Year 2	139 (22.7%)	22.37 (8.02)	
Year 3	171 (27.9%)	22.58 (9.64)	
Year 4	54 (8.8%)	25.13 (8.17)	
Year 5	18 (2.9%)	19.83 (10.54)	
Birthplace			0.706
Town	300 (48.9%)	22.82 (8.87)	
Village	313 (51.1%)	22.84 (8.44)	
One-child family			0.816
Yes	164 (26.8%)	22.54 (8.39)	
No	449 (73.2%)	22.94 (8.74)	
Family income			0.355
≤2000	38 (6.2%)	25.05 (10.85)	
2001–5000	162 (26.4%)	23.07 (8.90)	
5001–10,000	246 (40.1%)	22.65 (8.49)	
>10,000	167 (27.2%)	22.35 (8.02)	
Working-experience			0.465
Yes	180 (29.4%)	23.53 (8.69)	
No	433 (70.6%)	22.54 (8.62)	
Marital status			0.867
Yes	15 (2.4%)	23.20 (5.08)	
No	598 (97.6%)	22.82 (8.72)	

(Continued)

Table 1 (Continued).

Variables	N (%)	Academic Burnout Mean (SD)	P
Family parenting			0.707
Democratic	532 (82.8%)	22.48 (8.62)	
Authoritarian	81 (13.2%)	25.10 (8.51)	
Major choice			0.022
Yes	347 (56.6%)	23.88 (8.11)	
No	266 (43.4%)	22.02 (8.96)	
Performance			<0.001
A	136 (22.2%)	19.53 (8.98)	
B	336 (54.8%)	22.85 (7.62)	
C	141 (23%)	25.97 (9.45)	
Relationship			<0.001
Good	141 (23%)	18.58 (8.94)	
Not bad	361 (58.9%)	23.07 (7.92)	
Not really good	111 (18.1%)	27.43 (8.01)	

The Moderation Effect of Personality

The LPA-based personality profiles were used to explore the role of personality in the moderation analysis after controlling the effects of significant confounders (Path 1: psychological distress + personality + performance + relationship → resilience; Path 2: resilience + personality + performance + relationship → academic burnout). In Path 1, compared with resilient group, it demonstrated that personality (over-controlled and under-controlled) had a significant

Table 2 Results of Significant Demographics ($P < 0.1$) by Multiple Linear Regression

Model	B	P	OR (95% CI)
Constant	28.105	<0.001	(26.248, 29.962)
Major choice	-0.654	0.333	(-1.979, 0.672)
Performance			
A	-4.155	<0.001	(-6.169, -2.142)
B	-2.034	0.014	(-3.662, -0.405)
C	Reference		
Relationship			
Good	-7.255	<0.001	(-9.351, -5.160)
Not bad	-3.140	0.001	(-4.912, -1.369)
Not really good	Reference		

Note: Bold text: highlight the variables with significance at $p < 0.05$ level in the multiple linear regression model.

Table 3 Differences in Academic Burnout Among Three Personality Types

Variables	Academic Burnout	
	N (%)	(X±SD)
Under-controlled ①	223 (36.4%)	28.43±7.50
Resilient ②	82 (13.4%)	13.12±7.18
Over-controlled ③	308 (50.2%)	21.36±6.67
Statistic (p value)		F= 154.515 (p < 0.001)
Post-hoc test		① > ③ > ② (p < 0.001)

Note: Bold text: highlight the significance (p<0.05) of the statistical results.

Table 4 Correlations Among Psychological Distress, Resilience and Academic Burnout

	Mean	SD	1	2	3	4	5	6
1.Resilience	25.87	5.64	I	−0.51**	−0.56**	−0.42**	−0.38**	−0.52**
2.Psychological distress	19.43	6.59	−0.51**	I	0.55**	0.47**	0.46**	0.37**
3.Academic burnout	22.83	8.64	−0.56**	0.55**	I	0.79**	0.83**	0.74**
4.Emotional exhaustion	7.82	3.55	−0.42**	0.47**	0.79**	I	0.58**	0.32**
5.Depersonalization	5.31	3.57	−0.38**	0.46**	0.83**	0.58**	I	0.41**
6.Low personal accomplishment	9.70	3.80	−0.52**	0.37**	0.74**	0.32**	0.41**	I

Note: **Significance at the 0.01 level (2-tailed).

role in the association between psychological distress and resilience (the interaction effects were 0.289, $P = 0.042$ and 0.281, $P = 0.043$, respectively). However, the moderation role of personality could not be identified in Path 2 (the interaction effects were 0.080, $P = 0.586$ and 0.060, $P = 0.703$ respectively). Other details are described in Table 6. In addition, simple slope test was also performed to visualize the findings which is described in Figure 2A. All results are demonstrated in Figure 2B.

Discussion

The current study was designed to explore the mediation role of resilience between psychological distress and academic burnout as well as the role of LPA-based personality as a moderator in the mediating model, through the pathways from psychological distress to resilience, and resilience to academic burnout. In the pandemic of Covid-19, the lockdown policy had caused far-reaching changes in individuals' lifestyles.³⁴ As for university students, online learning also induced or strengthened their psychological distress and academic burnout.³⁵ It was imperative that interventions were developed to reduce their psychological distress and academic burnout while the association between psychological distress and academic burnout should be first explored. In the current study, no significant difference of academic burnout was identified between medical and non-medical students. It revealed that psychological distress was positively associated with academic burnout which was consistent with previous studies.^{36–38} In addition, resilience significantly mediated the associations between psychological distress and three dimensions of academic burnout, including emotional exhaustion, depersonalization, and low personal accomplishment. Thus, strengthening resilience might be helpful to alleviate academic burnout in students with psychological distress and it was feasible to incorporate resilience-based intervention into academic burnout prevention programs for university students with high risk of psychological distress and academic burnout. For example, YE developed a program named as Be Resilient to Breast Cancer to promote breast

Table 5 Direct and Indirect Effect of Psychological Distress on Three Dimensions of Academic Burnout

Models	Resilience			Emotional Exhaustion			Depersonalization			Low Personal Accomplishment		
	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Model 1												
Constant	39.800	0.864	<0.001									
Performance	-1.047	0.286	<0.001									
Relationship	-2.049	0.305	<0.001									
Psychological distress	-0.402	0.028	<0.001									
Model 2												
Constant				7.565	1.212	<0.001	0.416	1.213	0.731	9.885	1.220	<0.001
Performance				0.098	0.191	<0.001	0.747	0.192	<0.001	1.106	0.193	<0.001
Relationship				0.794	0.203	<0.001	0.642	0.209	0.002	0.917	0.211	<0.001
Psychological distress				0.191	0.021	<0.001	0.209	0.021	<0.001	0.096	0.022	<0.001
Resilience				-0.147	0.026	<0.001	-0.074	0.026	0.005	-0.234	0.027	<0.001
Model 3												
Constant				1.683	0.586	0.004	-2.550	0.576	<0.001	0.548	0.610	0.369
Performance				0.253	0.194	0.192	0.825	0.203	<0.001	1.351	0.202	<0.001
Relationship				0.382	0.207	0.065	0.795	0.203	<0.001	1.398	0.215	<0.001
Psychological distress				0.251	0.019	<0.001	0.239	0.019	<0.001	0.190	0.021	<0.001
Indirect effect through resilience				0.060	0.011	* (0.03~0.09)	0.030	0.011	* (0.01~0.05)	0.094	0.015	* (0.06~0.12)

Notes: *The Boot (LLCI, ULCI) from bias-corrected bootstrapping test; bold text: highlight the significance ($p < 0.05$) of the important indicators in the mediation model.

cancer patients' resilience resulting in increased QoL and hope.³⁹⁻⁴² These successful programs could be adapted and utilized in students.

What is more, it demonstrated that personality significantly moderated the association between psychological distress and resilience instead of ones between resilience and academic burnout. In addition, it demonstrated that students with under-controlled personality were prone to the highest level of academic burnout, followed by students with over-controlled and resilient personalities, which was consistent with previous research.^{43,44} Students with under-controlled personality were impulsive and vulnerable to academic burnout when faced with various learning tasks while students with resilient personality were emotionally stable, environmentally adaptable and less prone to academic burnout.⁴⁵ Therefore, personality could be considered when academic-burnout-based intervention was developed.

To conclude, based on the findings derived from the current study, more attentions should be paid to students with under-controlled personality and resilience-enhancing interventions could be developed to prevent or alleviate academic burnout in future research.

Table 6 The Moderation Role of Personality in Path 1 and Path 2

Paths	Coefficient	SE	t	P	LLCI	ULCI
Path 1 (Outcome variable: Resilience)						
Constant	39.593	1.912	20.706	<0.001	35.838	43.349
Performance	−0.777	0.276	−2.81	0.005	−1.320	−0.235
Relationship	−1.515	0.298	−5.068	<0.001	−2.102	−0.928
Psychological distress	−0.528	0.131	−4.012	<0.001	−0.787	−0.270
Psychological distress * Over-controlled (Resilient as reference)	0.289	0.142	2.031	0.042	0.009	0.569
Psychological distress * Under-controlled (Resilient as reference)	0.281	0.139	2.020	0.043	0.007	0.554
Model Summary	R² 0.408		F 59.568			P <0.001
Path 2 (Outcome variable: Academic burnout)						
Constant	23.762	4.347	5.465	<0.001	15.224	32.301
Performance	1.727	0.394	4.375	<0.001	0.952	2.503
Relationship	1.289	0.432	2.981	0.003	0.440	2.139
Resilience	−0.407	0.128	−3.182	0.001	−0.659	−0.156
Resilience * Over-controlled (Resilient as reference)	0.080	0.147	0.544	0.586	−0.209	−0.370
Resilience * Under-controlled (Resilient as reference)	0.060	0.157	0.381	0.703	−0.249	0.369
Model Summary	R² 0.460		F 86.335			P <0.001

Note: Bold text: highlight the significance ($p < 0.05$) of the important indicators in the moderation model.

Limitations

Several limitations should be considered. First, recall bias should be noted in self-reported scales. Second, causality inferences can not be established in consideration of the cross-sectional nature of the present study and the moderated mediation results should be validated in a future intervention study. Third, the participants are enrolled from two medical universities and may be not representative of university students in China. Thus, the generalizability of results derived from the current study should be further validated. Fourth, medical students are quite different from other professionals and the resilience instrument utilized in the current study may not capture some resilience characteristics. Therefore, new resilience instruments specific to medical students should be developed which has been confirmed in other resilience-based research.^{46–51} Fifth, potential confounders, ie, social support, family resilience, etc., are not estimated in this study due to the heavy scale burden and these important variables can be considered in future research to improve the model fitting.

Conclusion

Resilience and personality may be two important mediators between psychological distress and academic burnout. More attentions should be paid to students with under-controlled personalities and resilience-enhancing interventions could be developed to prevent or alleviate academic burnout in future research.

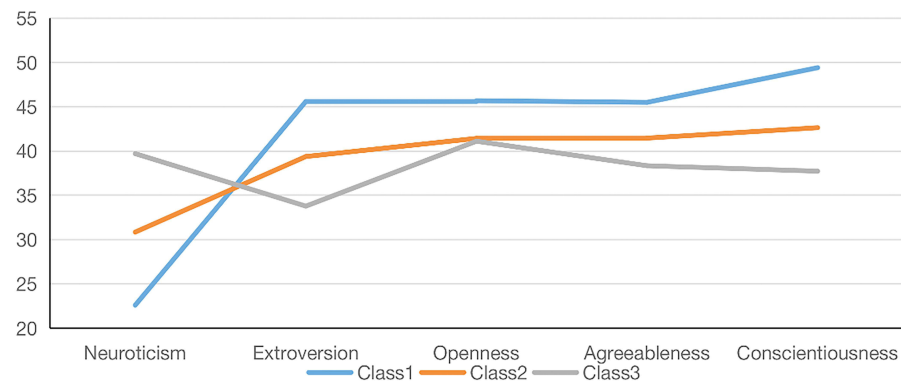
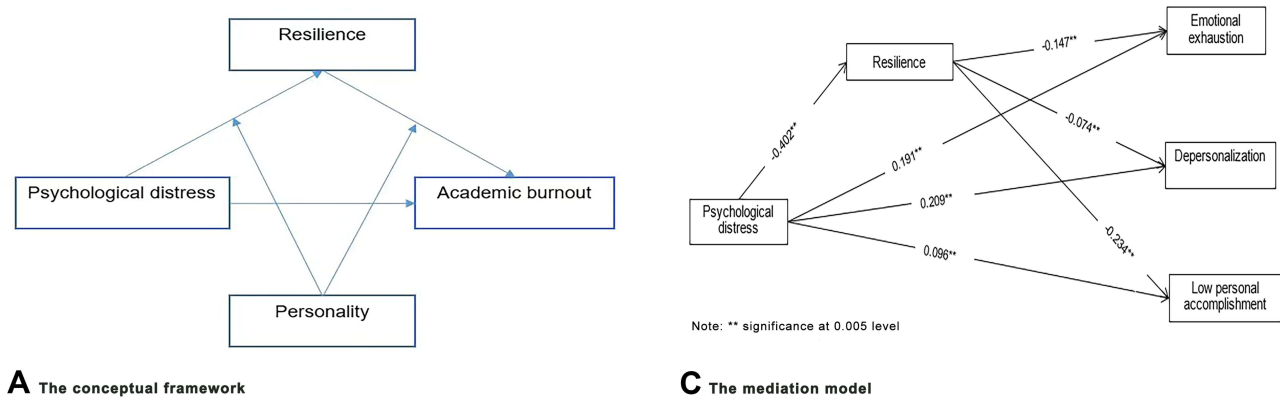


Figure 1 (A) The conceptual framework. (B) Factor scores by three latent profile. (C) The mediation model.

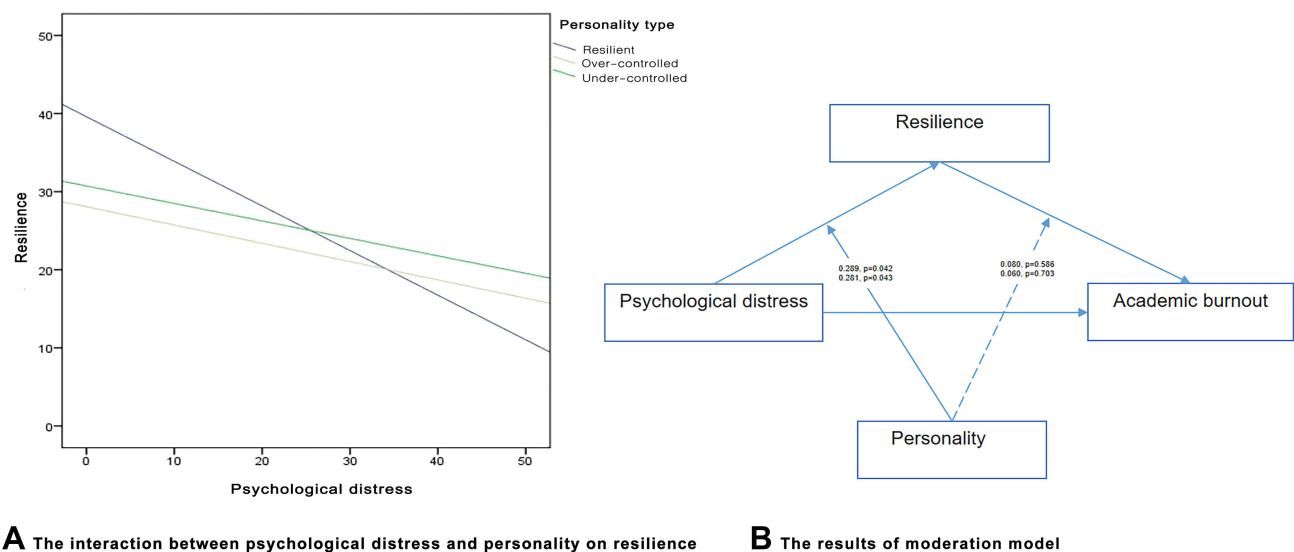


Figure 2 (A) The interaction between psychological distress and personality on resilience. (B) The results of moderation model.

Data Sharing Statement

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

Ethics Approval

All procedures in this study were conducted in accordance with the declaration of Helsinki. As a part of the Be Resilient to Nursing Career project (BRNC, Registration number: ChiCTR2000038693), this study was approved by the Ethics Committee of the First Affiliated Hospital of Guangzhou University of Chinese Medicine (No: NO.ZYYEC-ERK [2020] 132).

Consent to Participate

Verbal informed consent was obtained before questionnaire distribution. We emphasize this issue on the title page of the booklet, “Now you can choose to complete this booklet or not. If you want to finish it, we think that your informed consent is obtained. All personal information involved in this questionnaire will be confidential”. We chose this method because a signed informed consent may increase the risk of disclosure of participant’s identity or personal privacy. We have described the informed consent issue in our ethic proposal and the whole study protocol is approved by the Ethics Committee of the First Affiliated Hospital of Guangzhou University of Chinese Medicine (No: NO. ZYYEC - ERK [2020] 132). In addition, as a part of the Be Resilient to Nursing Career project (BRNC), the registered number is ChiCTR2000038693.

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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 for this work and agree on the content of the manuscript that is enclosed.

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