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# The correlation between social adaptability and academic procrastination of undergraduate nursing students: the mediating role of resilience

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## Abstract

**Background** How to mobilize nurses students' learning initiative, reduce the incidence of academic procrastination, and improve their social adaptability is a key factor in lowering nursing brain drain and improving nursing quality.

**Objective** To explore the mediating role of resilience in the correlation between social adaptability and academic procrastination of undergraduate nursing students.

**Methods** This study is a cross-sectional survey. The researchers conducted an electronic questionnaire survey of 962 nursing undergraduates in Guanzhong District, Shaanxi Province from November 2022 to April 2023, and adopted the intention sampling method. And make the following assumptions: (1) There is a significant negative correlation between academic procrastination and social adaptability. (2) Academic procrastination can directly affect the social adaptability of undergraduate nursing students, and it has a significant negative predictive effect. (3) Resilience can directly affect academic procrastination and social adaptability. At the same time, resilience plays an intermediary role between the two. In this study, the Aitken procrastination scale, the resilience scale, and the social adaptability diagnostic scale were used to evaluate undergraduate nursing students. SPSS27.0 software is used to analyze the data statistically, and the Hayes PROCESS Macro method is used to test the model.

**Results** The study's findings are as follows: 1) Academic procrastination significantly and negatively impacts social adaptability ( $c = -0.292$ ,  $t = -6.407$ ,  $p < 0.001$ ). 2) Even when accounting for resilience, academic procrastination still significantly predicts lower social adaptability ( $c' = -0.204$ ,  $t = -4.338$ ,  $p < 0.001$ ). 3) The Bootstrap method test of percentile bias correction indicates that resilience serves as a significant mediator between academic procrastination and social adaptability. Bootstrap SE = 0.018, 95% CI = (-0.124, -0.055). The indirect effect contributes to 29.79% of the total effect.

**Conclusion** Resilience not only directly affects the academic procrastination and social adaptability of nursing students, but also partially intermediate the relationship between academic procrastination and social adaptability.

**Keyword** Undergraduate nursing students, Academic procrastination, Social adaptability, Resilience

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## Introduction

Social adaptability refers to an individual's ability to actively adapt to the environment (natural, social, cultural, and expectation), learn to choose and avoid behaviors in activities such as life, learning and interpersonal communication, regulate and change the environment, and make social expectations and requirements that are consistent with their age [1]. Its development and changes are also a response to the level of resilience and are directly affected. From the perspective of constituent factors [2, 3], social adaptability includes four factors: interpersonal adaptability, psychological sense of advantage, resilience and psychological energy [4]. In previous theoretical studies, it has been found that the self-response model in social adaptability research suggests that individuals facing nerve-wracking situations develop psychological defense mechanisms to reduce anxiety. As individuals mature, their psychological defense mechanisms also mature, which helps them adapt to their environment and maintain mental health [5]. Research on social adaptability includes primary and secondary school students, college students, graduate students, teachers, athletes, and patients with diseases. However, researchers have mainly focused on college students, and there are two main research trends in this area [6]: (1) adaptation problems when new students enter school. (2) Social adaptation problems when college students graduate. Many Chinese scholars have highlighted in their research that the challenge of adjusting to society after graduation mainly affects work, life, and interpersonal relationships. This is often accompanied by negative emotions like disappointment and self-denial. Various studies have demonstrated that societal maladjustment can lead to increased levels of anxiety and depression in college students, which can indirectly impact their sleep [7]. It can also result in harmful behaviors such as Internet addiction [8], leading to a range of psychological issues that ultimately affect career development [9]. Social adaptability plays a crucial role in the performance of medical students during their internships and post-graduation work. For instance, nursing students who lack social adaptability are more likely to make mistakes at work, leading to strained relationships with colleagues and patients, heightened stress, and a negative approach to nursing tasks [10]. During their school years, nursing students face pressure to learn, adapt to the environment, build interpersonal relationships, and prepare for employment. After completing their internships and entering the workforce, they encounter high-intensity nursing work and intense doctor-patient relationships, which can lead to poor psychological resilience and difficulty adapting to society [11]. Surveys indicate that undergraduate nursing students [12, 13] are more likely

to experience adaptation problems, with their social adaptability at a medium level and showing a downward trend in development. Simultaneously, the increasing demand for nursing professionals has led to challenges in recruiting and retaining nurses worldwide [14, 15]. Addressing how to enhance the social adaptability of undergraduate nursing students and alleviate the global shortage of nursing human resources is an urgent problem that needs to be addressed.

## Background

### The importance of academic procrastination

Procrastination is the act of unconsciously delaying scheduled plans without a clear reason [16]. Academic procrastination specifically relates to postponing learning tasks within a school setting [17]. Some scholars argue that academic procrastination is a conscious decision to delay completing tasks within a specified timeframe, despite its potentially harmful impact [18]. Academic procrastination is quite prevalent among medical students, with approximately 13.8% to 49.9% of them experiencing procrastination in their study tasks [19, 20]. This behavior not only leads to a decline in academic performance but also triggers negative emotions such as depression, anxiety, and shame. These emotions can disrupt interpersonal relationships among students, leading to conflicts between peers and mistrust between students and teachers [21] and may even contribute to suicidal thoughts [22, 23]. The Hemingway App helps writers make their writing more concise and grammatically correct. Research indicates that over 90% of medical students experience some level of procrastination, with about 45.3% facing moderate to severe procrastination [24]. Approximately 95% of nursing students also exhibit varying degrees of academic procrastination [25]. A 2019 Chinese research report found that 78.3% of nursing students experience moderate to high levels of academic procrastination, which hinders their acquisition of nursing and professional knowledge [26, 27]. This, in turn, impacts their performance in clinical settings and their social adaptation. Currently, most research on academic procrastination among nursing students focuses on junior college students, with less emphasis on undergraduate nursing students, despite notable differences in their learning foundations, independent learning abilities, and self-management skills [28]. The academic procrastination of nursing undergraduates has been studied internationally, but there is limited research on Chinese nursing undergraduates. In China, there is a high demand for nurses with advanced diplomas or bachelor's degrees to work in health care and primary health care departments at all levels. The undergraduate stage is crucial for the

development of nursing students' professional concepts, values, and abilities [29].

**The potential mediating role of resilience**

Resilience is defined as "the behavioral tendency of individuals to adapt to a changing environment and the ability to recover from stressful situations" [30]. According to the theory of psychological stress, internal psychological activities of individuals play a significant role in regulating stress sources and behavioral changes [31]. Richardson's resilience model suggests that resilience is influenced by individual cognition and behavior, and also has a protective effect on cognition and behavior [32]. Further research has introduced resilience models by scholars such as Masten and Tellegen, the Kumpfer resilience model, and the dynamic model of resilience [33–35]. The Kumpfer resilience model proposes that resilience involves three aspects: environmental factors, personal processes, and the overall environment. The second aspect includes individual resilience characteristics such as cognition, spirit, behavior, and so on. The third aspect involves the process of protective factors, risk factors, and individual interaction when facing pressure and challenges. The process of change occurs when individuals encounter environmental changes. Resilience, as a positive individual feature, enables individuals to mobilize their protective resources and carry out resilience reorganization, helping them better cope with unfavorable situations, maintain a positive emotional state [36], effectively resist the negative effects of pressure, and adapt to poor reorganization. It is a successful response of the "self-adjustment mechanism" [32, 37]. Studies have shown that psychological resilience can reduce the risk of individual psychological problems and is a protective factor for maintaining mental health status [38]. In previous studies, researchers have often examined resilience as a key factor affecting mental health [39–41]. Some studies have shown that resilience can directly impact the academic procrastination of undergraduate nursing students, enhance the emotional intelligence of nursing students, and reduce their levels of academic

procrastination [42]. Therefore, it is important for nursing students to focus on developing their resilience in order to effectively cope with environmental pressures and challenges. By internally adjusting and reorganizing their resilience, nursing students can successfully manage and maintain a dynamic and balanced social adaptation.

**Aims**

Currently, there is a global shortage of nursing professionals, and researchers around the world are increasingly focusing on the quality of education for undergraduate nursing students. Academic procrastination and social adaptive capacity are closely linked to this issue. This study aims to thoroughly explore the impact of academic procrastination on the social adaptive capacity of undergraduate nursing students from a positive psychology perspective. The study utilizes the Kumpfer model of resilience as the theoretical framework and the mediating effect model, as shown in Figure 1. The research methodology involves a questionnaire survey to assess the current status of academic procrastination, resilience, and social adaptive capacity among undergraduate nursing students. The study investigates the relationship between academic procrastination, resilience, and social adaptability. Three hypotheses were formulated: Hypothesis 1: Academic procrastination is negatively correlated with social adaptability. Hypothesis 2: Academic procrastination directly affects the social adaptability of undergraduate nursing students. Hypothesis 3: Resilience serves as a mediator in the relationship between academic procrastination and social adaptability.

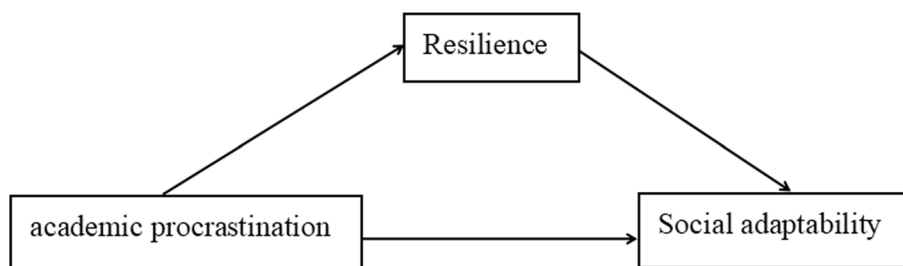
**Methods**

**Design**

A cross-sectional survey was conducted from November 2022 to April 2023.

**Participants**

Please note the following criteria for selecting undergraduate nursing students from colleges and universities in the Guanzhong region of Shaanxi Province:



**Fig. 1** The theoretical model of this study

### Inclusion criteria

- 1) Students enrolled in 2019 or later who have been registered.
- 2) Students who have voluntarily signed the informed consent form and are able to truthfully fill out the questionnaire.

### Exclusion criteria

- 1) Students who have been on leave of absence for over a year.
- 2) Students with significant psychological disorders such as depression, etc.
- 3) Students with mental illnesses such as schizophrenia, mania, etc.

In order to calculate the sample size, we will follow Kendall's method. The sample should contain 5 to 10 times the number of independent variables, so the formula to calculate the sample size is  $N = 56 \times (5 \text{ to } 10)$ , which gives a range of 280 to 560 people. However, to account for potential errors and sample loss, we will consider a 20% sample loss rate. Therefore, the final sample size is calculated using the formula  $N = \text{Item} \times m (1 + \delta)$ , where  $\text{Item}$  is the maximum number of variable dimensions,  $m$  is the multiplier, and  $\delta$  is the sample loss rate. Plugging in the numbers, we get  $N = 56 \times (5 \text{ to } 10) \times (1 + 20\%)$ , resulting in a final sample size range of 336 to 672 people.

## Data collection and ethical considerations

### *Stage 1: Establishment of a research team and literature review*

(1) A research group was formed, consisting of one faculty member and three postgraduate students. The team consulted a large amount of literature to determine the research theme and content based on the current situation of undergraduate nursing education in Shaanxi Province. They then used databases such as Weipu, Wanfang, PubMed, and others to gather relevant research materials on topics including undergraduate nursing students, medical students, nursing majors, academic procrastination, resilience, and social adaptability. Finally, they determined the research types and methods. (2) Select Instruments: Based on the literature review, search for research instruments that align with the variables of the study. Evaluate the suitability of research institute scales based on the research purpose and the scope of application of the research instruments. Finally, integrate the self-designed general data questionnaire of the survey object with the scales used for each variable to create the final questionnaire."

### *Stage 2: Distribution and recovery of questionnaires*

At the pre-survey stage: 200 undergraduate nursing students from a medical school in Shaanxi Province were selected for participation. The investigators obtained approval from the director of the nursing faculty before distributing the questionnaires. The questionnaire was then reviewed and approved by nursing faculty experts. The questionnaire was distributed to the students via QR code, and anonymity and voluntariness were ensured during the data collection process. Through the pre-surveys, issues with the initial general information questionnaire were identified and amended, and experiences from the distribution and collection process were used to revise the survey program for the formal surveys. Two invalid and two unreasonable general information items were deleted or modified, resulting in 12 retained general information items. It was observed during the pre-survey that students had poor compliance in filling out the questionnaire, which was attributed to a lack of explanation by the class teacher regarding the purpose of the questionnaire. To address this, the research team decided to include an informed consent form at the beginning of the electronic questionnaire to help students better understand the study and increase their compliance.

Formal survey: (1)The study uses intentional sampling to select undergraduate nursing students in the Guanzhong region of Shaanxi Province. This includes four undergraduate nursing colleges: Shaanxi University of International Trade & Commerce, Shaanxi University of Traditional Chinese Medicine, Xijing College, and Peihua College. These colleges are located in different areas of Guanzhong region, covering the east, south, west, and north. The survey aims to encompass the entire Guanzhong region, ensuring the sample's universality and representativeness. (2)Before issuing the questionnaire, the research team contacts the nursing department heads in the four colleges and universities. The questionnaire is sent to them for review via email, WeChat, QQ, etc. They can provide feedback and suggest modifications, which the research team will then discuss and implement. After any necessary changes, the questionnaire is sent for review again. (3)Once approved, an electronic questionnaire is used for online distribution, including an informed consent form. Participants are informed and voluntary when completing the questionnaire, which is anonymous and confidential. The data collected is solely for academic research purposes. Additionally, the researchers contacted the nursing college that had conducted a pre-survey and excluded the 200 students who had already participated, ensuring the reliability of the survey results. The questionnaires were collected from November 2022 to April 2023. The study was reviewed and approved by the Shaanxi University of International

Trade & Commerce Ethics Committee, and was conducted in accordance with the Declaration of Helsinki.

### Stage 3: Analysing the data

The results of the General Information Questionnaire, Aitken Procrastination Scale, Resilience Scale and Social Adaptability Diagnostic Scale were analysed statistically by the research team using the SPSS27.0 software, comparing the results with the evidence obtained from the literature review, and summarising the results in order to draw conclusions.

### Instruments

- (1) Demographic information. It was designed by the research team according to the purpose of the study and with reference to domestic and international literature. It contains 12 entries, including gender, age, grade, place of origin, relationship with parents, and academic ranking.
- (2) The Aitken Procrastination Scale, developed by Aitken (1982) and later revised by Chen Xiaoli et al. [43], consists of 19 one-dimensional items rated on a five-point scale. The scale is administered to college students to assess procrastination tendencies, with a Cronbach's coefficient of 0.83. The scoring range is 19 to 95 points, with 9 questions (e.g., 2, 4, 7, 11, 12, 14, 16, 17, and 18) scored in reverse. The higher the score, the more serious the delay in schooling. This study used SPSS27.0 software and the exploratory factor principal component analysis method to test the credibility and validity of the scale. The Cronbach's alpha coefficient for this study was 0.783, and the retest validity was 0.876.
- (3) The Resilience Scale, developed by Connor and Davidson and revised by scholars Zhang Xinjian and Yu Xiaonan [44], consists of three dimensions: self-improvement, optimism, and resilience, with a total of 25 items. A 5-point Likert scale was used, leading to a total score range of 1 to 125. This scale is commonly used to measure resilience, with higher scores indicating greater resilience. In our study, the theoretical median of the resilience scale was calculated to be 75, and the Cronbach's coefficient was found to be 0.91, indicating good reliability and validity. To further test the credibility and validity of the scale, we used the exploratory factor principal component analysis method and the maximum variance orthogonal rotation method in SPSS 27.0 software. The Cronbach's coefficient for this scale in our study was 0.935, with a retest validity of 0.952.
- (4) The "Social Adaptability Diagnostic Measure" [45] was developed by Professor Zheng Richang of Beijing Normal University. It consists of 20 questions, scored using "yes," "no," and "unsure," including 10 reverse-scored questions. The Cronbach's alpha coefficient for the entire questionnaire is 0.837. When scoring the questionnaire, odd-numbered questions are scored positively, with a "yes" response receiving -2 points, an "unsure" response receiving 0 points, and a "no" response receiving 2 points. Even-numbered questions are reverse-scored. The lowest possible score is -28, and the highest possible score is 40. A higher score indicates stronger social adaptability, while a lower score indicates weaker social adaptability. The score breakdown is as follows: ① 35 to 40 points: strong ability. ② 29 to 34 points: good ability. ③ 17 to 28 points: average ability. ④ 6 to 16 points: poor ability. ⑤ Less than 5 points: very poor ability. In this study, we used the exploratory factor principal component analysis method and the maximum variance orthogonal rotation method in SPSS 27.0 software to evaluate the internal consistency and structural validity of the scale. The Cronbach's alpha coefficient for this study was 0.768, and the test-retest reliability was 0.869.

### Statistical analyses

The data collected for this study were organized in an Excel spreadsheet and entered by two individuals to ensure accuracy. The error-free data were analyzed using SPSS 27.0 with a significance level of  $\alpha=0.05$ , considering statistical significance at  $P<0.05$ . Continuous variables were tested for normality using the Kolmogorov-Smirnov test. The survey data, which consisted of count data, conformed to a normal distribution and were statistically described using  $\chi^2$ s, frequency counts, and constitutive ratios. The study analyzed the academic procrastination, resilience, and social adaptability of nursing students using ANOVA analysis. The data, which were linear and continuous, were analyzed for correlation using Pearson correlation to explore the relationship between academic procrastination, psychological resilience, and social adaptability among undergraduate nursing students. The study utilized the PROCESS plug-in for SPSS to construct structural equations for analyzing the mediating effect of resilience as a mediating variable. This analysis provided additional useful statistics and safeguards for irregular sampling distributions, including ordinary least squares, regression-based path analysis, and Bootstrap confidence intervals to meet the analytical needs of the study.

### Validity and reliability/rigour

All instruments used in the study were adapted and validated for Chinese culture and had good validity and reliability. In addition, all investigators were trained in registration, checking the completeness of the questionnaires, and the ethical principles of conducting research prior to the formal survey. To reduce the risk of self-reporting bias, the identities of all participants were kept strictly confidential. Finally, to ensure the rigor and accuracy of the statistical analyses, a statistician was asked to check the data processing.

## Results

### Common method bias test

The Harman one-way test extracted 29 factors with eigenvalues greater than one. The first factor explained 16.89% of the total variance, which is below the recommended threshold of 40%[32]. It indicates that common method bias is unlikely to confound the interpretation of the data analysis results [46].

### Participants' characteristics

For the study conducted from December 2022 to February 2023, a sample size of 600 was required, and 962 samples were collected. Out of these students, 812 were female, which accounted for 84.4% of the total. Only 34 (3.5%) were younger than 18 years of age, and 579 (60.2%) were between 18 and 20 years of age. The majority (81.2%) of students hailed from rural areas, while 1.8% were estranged from their parents. Additionally, 89.8% of the nursing students were ranked as good in their studies. A significant 75.7% of the students reported having parents with democratic parental styles. Furthermore, 199 (20.7%) students were only children, and 832 (86.5%) students chose to continue in the nursing profession. Lastly, 834 (86.7%) students recognized themselves as nursing students, whereas 27 (2.8%) did not.

### Analysis of the current status of academic procrastination, resilience, and social adaptability

The average score on the academic procrastination ability scale for undergraduate nursing students in the Guanzhong region was  $46.36 \pm 8.92$  points, which was lower than the expected median value of 57 points, indicating mild academic procrastination. The students' resilience score was  $(81.88 \pm 14.18)$  points, higher than the expected median value of 75 points, indicating a high level of resilience. The total score for the nursing students' social adaptability was  $(18.49 \pm 12.74)$  points, and based on the grade distribution, their social adaptability was rated as average, as shown in Table 1.

**Table 1** Nursing students' academic procrastination, resilience and social adaptability scores (Mean $\pm$ SD, points)

Variable	Max	Min	Score
Academic procrastination	79	19	46.36 $\pm$ 8.92
Resilience	125	25	81.88 $\pm$ 14.18
Self-empowerment	40	8	25.31 $\pm$ 4.58
Optimist	20	4	13.43 $\pm$ 2.57
Resilience	65	13	43.14 $\pm$ 8.50
Social adaptability	60	-4	18.49 $\pm$ 12.74
Managing peer relationships	12	-2	4.38 $\pm$ 3.51
Self-management skills	12	-2	3.27 $\pm$ 3.30
Learning skills	12	-2	3.11 $\pm$ 3.28
Obedience skill	12	-2	3.96 $\pm$ 3.26
Expression of interest skills	12	-2	3.77 $\pm$ 3.62

### ANONA results of academic procrastination, resilience, and social adaptability

The study's results indicated that several factors influenced academic procrastination, resilience, and social adaptability among undergraduate nursing students. These factors included gender, relationship with parents, academic performance status, social practice experience, parenting style, willingness to continue in the nursing profession, difficulty of learning tasks, and recognition of the nursing profession. The study found that the relationships with parents, academic performance status, social practice experience, difficulty of learning tasks, recognition of the nursing profession, and parenting style significantly influenced resilience. Furthermore, the study revealed that academic performance status, parenting style, being an only child, difficulty of academic tasks, and recognition of the nursing profession were significant factors affecting social adaptability ( $P < 0.01$ ), as shown in Table 2.

### Correlation analysis of academic procrastination, resilience, and social adaptability

Based on the study results, it's evident that academic procrastination is significantly and negatively correlated with resilience ( $r = -0.321$ ,  $P < 0.01$ ) and its dimensions. Additionally, academic procrastination shows a significant negative correlation with social adaptability ( $r = -0.196$ ,  $P < 0.01$ ) and its dimensions, confirming Hypothesis 1. On the other hand, resilience is significantly and positively correlated with social adaptability ( $r = 0.238$ ,  $P < 0.01$ ) as well as with all dimensions of social adaptability.

### Multifactorial analysis of social adaptability

Multiple analyses were performed with the total score of social adaptability as the dependent variable. The

**Table 2** ANONA results of undergraduate nursing students' social adaptability (Mean±SD, scores)

Variable	Categories	Number	Score	t/F	P
Relations with parents	intimacy	528	19.37±12.72	3.806	0.023
	good	417	17.24±12.47		
	distancing	17	21.64±17.12		
Academic achievement	excellent	60	23.27±13.71	5.542	0.004
	good	864	18.04±12.50		
	qualified	38	21.00±14.81		
Parenting style	democratic	728	18.13±12.67	4.150	0.016
	autocratic	103	17.28±12.48		
	indulgence type (psychology)	131	21.38±13.02		
Whether or not you are an only child?	yes	199	20.21±13.26	4.623	0.032
	no	763	18.04±12.57		
Difficulty level of learning tasks	difficulty	397	17.14±12.13	5.529	0.004
	usual	556	19.30±12.92		
	simple	9	27.22±19.84		
Recognition level of the nursing profession	accreditation	834	18.68±12.40	10.163	<0.01
	general	101	14.72±13.00		
	non-accreditation	27	26.59±17.23		

**Table 3** Multiple Analysis of Social Adaptability

Variable	B	Standard error	β	t	P
Constant	9.383	3.841		2.443	0.015
Resilience	0.288	0.050	0.192	5.813	<0.001
Academic procrastination	-0.196	0.048	-0.137	-4.111	<0.001
Parenting style	1.985	0.559	0.111	3.553	<0.001
Difficulty level of learning tasks	1.902	0.777	0.076	2.447	0.015

independent variables included the nursing students' relationship with their parents, academic performance status, parenting style, only child status, academic procrastination, and resilience. The values assigned to each variable are displayed in Table 2. The analyses revealed that parenting style, the difficulty of academic tasks, academic procrastination, and resilience were the main factors affecting social adaptability, as shown in Table 3.

**The mediating role of resilience in academic procrastination and social adaptability**

The results of the analysis revealed that parenting style and difficulty of academic tasks had a significant impact on social adaptability. These factors were included in the moderated mediation analysis as covariates. The study then examined the mediating role of resilience using the Process Macro model 4. It was found that academic procrastination significantly and negatively predicted social adaptability, even after controlling for parenting style and academic task difficulty ( $c=-0.292$ ,  $t=-6.407$ ,  $p<0.001$ ). Further analysis confirmed that academic procrastination

remained a significant predictor of social adaptability even when resilience was taken into account ( $c'=-0.204$ ,  $t=-4.338$ ,  $p<0.001$ ).

Additionally, academic procrastination was found to be a significant negative predictor of resilience ( $a=-0.503$ ,  $t=-10.187$ ,  $p<0.001$ ), while resilience was a significant positive predictor of social adaptability ( $b=0.174$ ,  $t=5.936$ ,  $p<0.001$ ). These results suggested that resilience partially mediated the relationship between academic procrastination and social adaptability, supporting Hypotheses 2 and 3.

The percentile bias-corrected Bootstrap method test confirmed that resilience significantly mediated the relationship between academic procrastination and social adaptability, with an indirect effect of -0.087 and a 95% confidence interval of (-0.124, -0.055). The indirect effects accounted for 29.79% of the total effect, indicating that psychological resilience serves as an intermediary in 29.79% of the relationship between academic procrastination and social adaptability, supporting hypothesis 3.

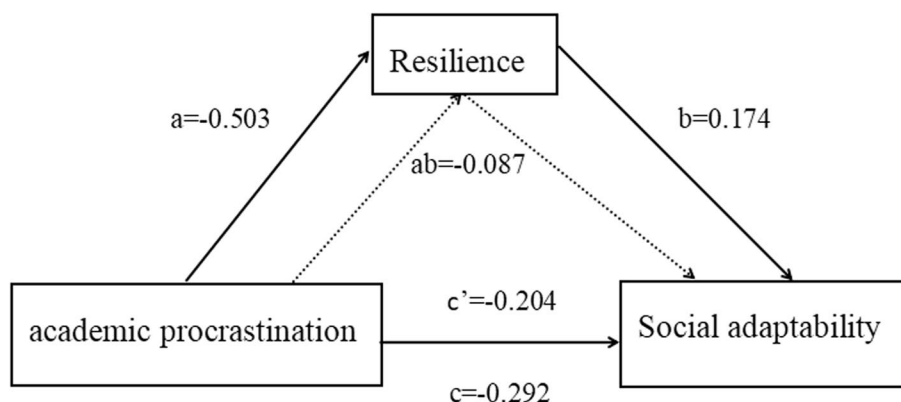


Fig. 2 Mediating effect of resilience

Table 4 Bootstrap mediation effect test results

Relation of efficacy	Efficiency value	SE	LLCI	ULCI	Percentage of efficiency
Total effect	-0.292	0.045	-0.379	-0.201	
Direct effect	-0.204	0.047	-0.293	-0.109	70.21%
Indirect effect	-0.087	0.018	-0.124	-0.055	29.79%

Figure 2 and Table 4 present a visual representation of the direct, indirect, and total impact. As shown in Table 4.

After controlling for age and gender, the results of the three models are presented in Table 5. In Model 1, it was found that academic procrastination had a significant negative impact on social adaptability ( $\beta=-0.290$ ,  $t=-6.422$ ,  $p<0.001$ ). In Model 2, academic procrastination showed a significant negative correlation with resilience. In Model 3, the interaction between resilience and academic procrastination had a significant effect on social adaptability. Academic procrastination had a negative effect on social adaptability, and resilience partially mediated this relationship.

### Discussion

#### Academic procrastination, resilience and social adaptability status quo

The results of this survey show that, first of all, the overall mean score of academic procrastination of undergraduate nursing students in the Guanzhong region is  $(46.36\pm 8.92)$ , which can be compared with the theoretical median of 57 points to know that the academic procrastination of nursing students is at a relatively low level, which is different from the results of the research of domestic scholars Chen Li [47], He Lantian [48], and Liu Yongli [49], but is in line with the results of the research of Mana [50] and others. Through reviewing the literature, it was found that the academic procrastination scale

used in previous studies was different from the research instrument in this study, there were some differences in the division of the scoring criteria, and the regions where the research subjects were located were not the same, which produced differences due to the influence of geography. Secondly, the optimism dimension of resilience was  $(13.69\pm 2.54)$  points, the self-improvement dimension was  $(25.75\pm 4.98)$  points, and the resilience dimension was  $(43.24\pm 8.31)$  points, which were slightly higher than the theoretical median of 12, 24, and 3 points for the dimensions and were at an intermediate level, and the results of the study are in agreement with the findings of Wang Chuning [51] and Kim J et al [52]. The reason may be that most of the objects of this investigation are students aged 18 to 20 years old, the body and mind belong to a mature stage, and the ability of self-regulation is better. At the same time, parents, schools, and society pay more and more attention to the physical and mental health of nursing students, not only focusing on students' performance but also paying more attention to the comprehensive quality of the students, and when the nursing students are under too much pressure due to a variety of factors, they will maintain the optimistic psychological feelings by adjusting their thinking. In addition, the social adaptability of the nursing students was  $(18.49\pm 12.74)$  points, which was at an average level according to the scoring criteria. This may be due to the fact that the nursing profession, compared to other non-medical professions, has more content to study and requires a higher level of professionalism, which causes nursing students to invest a lot of time and energy in their studies, resulting in a limited amount of time at their disposal and a decrease in social events, which results in a certain degree of impact on the cultivation of their social adaptability.



**Table 5** Modelling of intermediation effects

Predictive variable	Model 1		Model 2		Model 3	
	$\beta$	t	$\beta$	t	$\beta$	t
Gender	-2.695	-2.424	-0.854	-0.712	-2.545	-2.330
Age	1.006	1.350	-0.694	-0.864	1.128	1.540
AP	-0.290	-6.422	-0.512	-10.486	-0.201	-4.281
Resilience					0.175	5.952
R <sup>2</sup>	0.046		0.104		0.080	
F	15.454**		37.068**		20.865**	

AP Academic procrastination

\*p<0.05

\*\*p<0.001

**Differences in demographic factors in academic procrastination, resilience and social adaptability**

Academic procrastination: Firstly, due to gender role differentiation, male students are more independent and autonomous than female students. During university, many male students no longer focus on their studies, and they spend more time on social activities to gain a sense of personal achievement and the respect of others through their social activities[53], whereas female students are more submissive and conscientious and are able to take the initiative to actively complete the study tasks. In addition, many students are more likely to want to gain a sense of personal achievement and recognition from others through good academic performance. Secondly, the relationship with parents and parenting styles reflect parents’ parenting concepts, parenting behaviors, and emotional expressions towards their children, which have a significant impact on children’s academic performance and academic motivation [54]. Previous studies have found that parenting styles are significantly related to academic procrastination and that "democratic" parenting styles negatively predict academic procrastination. Appropriate relationships with parents and appropriate parenting styles give students more independent thinking, and students are more reflective and self-disciplined, thus avoiding academic procrastination. Finally, in the theory of temporal motivation proposed by Steel et al[55], which is expressed by the formula  $Utility = E \times V / (I \times D)$  (Utility stands for utility, E stands for the individual’s subjective expectation of the task, V stands for the value of the task, I stands for the individual’s susceptibility to procrastination, and D stands for the time limit), the higher the value of the task, the higher the utility, and the lower the risk of academic procrastination, in which the value of the task is mainly related to the nature of the task. On the other hand, nursing students find that the profession they study is different from what

they imagined after entering the university, and there is resistance to the nursing profession, which leads to lower interest in professional learning, lower recognition of the nursing profession, reduced willingness to engage in the nursing career in the future, unwillingness to participate in apprenticeships or internships, a lack of social experience, and therefore academic procrastination [56].

Resilience: Family support plays a positive role in relieving work pressure and maintaining psychological health. Children who have a close relationship with their parents can get more attention and warmth from their parents, have more adequate family support, and mobilize more external resources when necessary to cope with difficulties and setbacks in a more positive and rational way [57]. Professional identity can be accompanied by active learning behaviors [58], which will directly affect students’ professional learning attitudes and effects. Nursing students with better academic performance indicate that they have clearer goals in completing their learning tasks, have better time management ability, are more optimistic, actively participate in various social activities related to the nursing profession, and improve their practical ability, while clinical learning is an important part of nursing professional education. Clinical learning is an important part of nursing professional education and is a key step to achieving the transformation of nursing students’ knowledge into competence, which puts forward new requirements and challenges to the learning tasks of nursing students. By learning in the clinical environment, nursing students can better combine theory and practice, develop interpersonal communication and problem-solving skills, and then improve their psychological adaptability in the face of difficulties and setbacks.

Social adaptability: harmonious family relationships and appropriate parenting styles play a positive role in the development of nursing students’ social adaptability [59, 60]. Those who have a good relationship with their

parents will express their problems of social adaptation more clearly when they seek help from their parents, and parents of only children will listen to them more wholeheartedly so that they can express themselves completely and thoroughly and get effective help. Appropriate parenting style will make the nursing students more courageous to express themselves, dare to communicate with others when they have different ideas, and also receive other fresh ideas, which can speed up the process of social adaptation. High academic achievers have stronger self-restraint in time management, self-management, etc. Early studies have shown that [61] students with strong time management abilities also have a higher level of social adaptability. The degree of difficulty of learning tasks determines the students' different attitudes towards their solutions, solution paths, solution resources, etc. Those who think that learning tasks are difficult tend to adopt negative attitudes and may even choose to give up directly. And since the sample size of students who disapprove of the nursing profession is only 9 cases, its representation is small, so only students who approve of the nursing profession are analyzed. Recognition of the profession, nursing students show positive attitudes when entering and integrating into society in the future and will plan for their future career as early as possible, study hard for their professional knowledge and skills, increase the opportunities to communicate with people from different professions, improve their interpersonal communication skills, and learn about the employment prospects of different professions so as to adapt to the changes in society as early as possible.

#### **Academic procrastination, resilience and social adaptability correlation**

The results of this study showed that academic procrastination was significantly and negatively correlated with resilience ( $r=-0.321$ ,  $P<0.01$ ), resilience was significantly and positively correlated with social adaptability ( $r=0.238$ ,  $P<0.01$ ), and academic procrastination was significantly and negatively correlated with social adaptability ( $r=-0.196$ ,  $P<0.01$ ) and also ( $r=-0.196$ ,  $P<0.01$ ). This suggests that the more serious the academic procrastination, the lower the social adaptability of nursing students. Firstly, undergraduate nursing students inevitably encounter difficulties and challenges during their study. In order to maintain a positive learning state, they need not only a strong internal learning motivation, but also good self-control, especially resilience [62]. Nursing students with higher levels of resilience are able to flexibly adjust their coping strategies when facing different social situations, face events in their lives with a more positive mindset, take the initiative to plan their own development routes, perceive and realise their own self-worth,

and arrange their lives and studies independently and autonomously, which can lead to individuals adopting positive attitudes in the process of adapting to the society, reducing the occurrence of negative emotions, and thus showing more adaptive social behaviours [63, 64]. Furthermore, undergraduate nursing students with high levels of resilience are able to regulate their emotions in a positive manner and cope efficiently with the difficulties they encounter, which significantly affects their performance in academics [8]. Finally, this study confirms that there is a significant and negative correlation between academic procrastination and social adaptability, adding to the important data results that students with higher levels of academic procrastination have problems with future social adaptability, which may be rooted in the fact that the process of learning in school is a manifestation of social adaptation, and that students are not able to optimise their learning styles in accordance with changes in the surrounding environment, resources, social skills, and so on. Students are unable to optimise their learning methods, coping resources and social skills according to the changes in the surrounding environment and things, and when they encounter learning problems, they treat them negatively, resulting in poor learning results, declining social skills, and not being able to better integrate into university life, and their social adaptability is not high.

#### **Mediating role of resilience**

This study showed that academic procrastination had a direct negative effect on social adaptability ( $c = -0.292$ ,  $t = -6.407$ ,  $p<0.001$ ), and that resilience partially mediated the effect of academic procrastination on social adaptability among undergraduate nursing students. Specifically, academic procrastination not only directly affects social adaptability, but also indirectly affects social adaptability through the mediating role of resilience. Hypotheses 2 and 3 were tested, and Cleary et al. [62] suggested that nursing students are at an important developmental stage, and that resilience is a necessary trait for their success in learning and practice. In the actual work and study, nursing undergraduates often have to complete a large amount of theoretical knowledge and technical operations to learn and perform all the tasks of the clinic, daily learning and life and interpersonal interaction process will inevitably encounter difficulties and setbacks in the face of the possibility of negative withdrawal from the high load of workload tasks, and the gradual formation of chronic stress. It is more likely to choose to procrastinate to avoid the implementation of the learning task, which leads to the refusal to integrate into the social groups. In this case, in order to maintain a positive psychological state, it is not only necessary for nursing students to

have better learning and living environments, but also for them to have positive psychological resources, especially resilience [65], and resilience is considered to be a protective factor for individuals' psychology and behaviours [65], as well as an effective resource for coping with stressful situations, which reflects an individual's social adaptability [17]. Therefore, increasing the resilience of nursing students is effective in reducing the level of academic procrastination as it improves students' self-esteem and self-efficacy, enhances their resilience and ability to resist the temptation of short-term gain, thus allowing more psychological resources to be devoted to learning. Nursing students with high resilience are not only less affected by stress, more likely to recover as soon as possible, flexibly adjust their learning strategies, and have a high commitment to learning, but also can quickly regulate themselves in the face of adversity, fight difficulties with a positive mindset, and face the trials and tribulations of the society with an optimistic attitude, and even stimulate their own potential and enhance their social adaptability in difficult situations [62, 66].

#### Implications for nursing education

The results of this study have important theoretical significance and practical value for improving undergraduate nursing students' academic procrastination and social adaptability. In order to reduce the risk of academic procrastination, the study puts forward the following suggestions: First, nursing educators should pay attention to the impact of gender differences so that students can develop good study habits and enhance their time management skills. In the face of heavy learning tasks, nursing students should learn to break down tasks scientifically, breaking down large, high-difficulty tasks into a number of small, low-difficulty tasks and completing them one by one. Secondly, from the perspective of positive psychology, nursing educators should pay more attention to the harmonious development of nursing students' mental health, encourage nursing students to actively science the setbacks and challenges in learning and life, establish an optimistic attitude towards learning, increase coping resources, optimize coping, and at the same time, appropriately regulate their emotions through listening to music, physical exercise, and other activities to reduce the negative impact of stress and enhance medical students' social adaptability. The study of the relationship between academic procrastination, resilience, and social adaptability, especially the analysis of resilience as a mediator variable detailed in the mediating effect between academic procrastination and social adaptability, to a certain extent, to make up for the shortcomings of the existing research, provides important research data. This mediating effect model can be used

by first-line nursing teachers in the future teaching process, academic procrastination, and resilience training interventions with a view to improving nursing students' social adaptability. This mediation effect model can be used by frontline nursing teachers to intervene in the future teaching process of academic procrastination and resilience, with a view to enhancing the social adaptability of nursing students and promoting their psychological health development.

#### Limitations

Although this study is important for improving academic procrastination and social adaptability among undergraduate nursing students, there are some shortcomings. Firstly, this study was a cross-sectional study, and therefore, further longitudinal studies are needed to investigate causality. Secondly, the data used in this study were self-reported by the respondents, which may be affected by subjective factor bias. Although this study did not find bias from commonly used methods, a variety of data collection methods (e.g., a combination of self and others' reports) could still be used in future studies to ensure the reliability of the findings. Finally, the participants in this study only came from undergraduate colleges and universities in the Guanzhong region, which hinders the generalization of the findings to some extent. Future studies could expand the sample source and explore the differences in results across cultural backgrounds and educational levels.

#### Conclusion

In the context of the global nursing shortage, reducing nursing turnover and improving the quality of nursing education have become key measures, and it is an urgent task to reduce nursing students' academic procrastination, improve their social adaptability, and cultivate excellent nursing talent for clinical practice. This study found that resilience not only directly affects nursing students' academic procrastination and social adaptability but also partially mediates the correlation between academic procrastination and social adaptability. This suggests that it is necessary for nursing educators to develop a set of strategies to reduce nursing students' academic procrastination, improve their mental health, and reduce academic procrastination in order to enhance nursing students' social adaptability.

#### Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12909-024-06033-6>.

Supplementary Material 1.

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### Authors' contributions

YG and XJS designed the content of this study, YG wrote the main manuscript text, FFA, AQL, and JY participated in data collection and made adjustments to the format of the manuscript. The manuscript was examined by all the authors, and all authors are responsible for the content and have approved this final version of the manuscript. The author(s) read and approved the final manuscript.

### Availability of data and materials

The datasets used and/or analysed during the current study are available from the first and corresponding author on reasonable request.

### Declarations

#### Ethics approval and consent to participate

This study has been reviewed and approved by Ethical Approval and Consent to Participate. This study was approved by Shaanxi University of International Trade & Commerce Ethics Committee and was conducted in accordance with the Declaration of Helsinki. All participants voluntarily provided written informed consent before participating in the study. All methods were performed in accordance with relevant guidelines and regulations.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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