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RESEARCH ARTICLE

Perceived stress, resilience, and academic performance among pharmacy students in Indonesia: A cross-sectional study

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Abstract

Background: This study assessed the perceived stress and resilience of pharmacy students in three Indonesian universities and explored their relationship with academic performance. **Methods:** A cross-sectional survey was conducted using the Perceived Stress Scale (PSS-10) and the Connor-Davidson Resilience Scale (CD-RISC-25). A self-reported Grade Point Average (GPA) was collected to assess academic performance. Data were analysed using SPSS with Pearson correlation, *t*-tests, and ANOVA. **Results:** A total of 714 pharmacy students participated in the study, representing a 43% response rate from around 1,650 eligible students. Over half were aged 17 to 20, and 86.2% were female. The average PSS score was 21.58 (SD±5.10), while the CD-RISC score averaged 67.93 (SD±14.11). Male students had an average perceived stress score of 20.16 (SD ±5.48), while female students reported a higher score of 21.81 (SD ±5.00). Male students demonstrated greater resilience with an average score of 71.71 (SD±13.98), while female students had a lower score of 67.33 (SD±14.05). Significant differences in perceived stress and resilience scores were observed based on gender, with *p*-values of 0.003 and 0.004, respectively. Perceived stress and resilience significantly impacted academic performance ($p < 0.05$). **Conclusion:** The findings revealed the importance of fostering resilience and addressing stress to support the academic performance and well-being of Indonesian pharmacy students.

Introduction

Mental health problems are still considered to be relatively high because of their impact on declining academic achievement, especially among teenagers and early adults. Among university students, stress is primarily caused by several factors, including academic pressure, social aspects, and financial problems (Yousif *et al*., 2022). Stress among university students has increased over the past few decades. Research conducted among undergraduate pharmacy students at the University of Khartoum revealed that academic pressure, social challenges, and financial burdens significantly contribute to student stress (Yousif *et al*., 2022).

The educational process has been shown to produce significant levels of stress among students pursuing careers in the health professions, including medicine, pharmacy, dentistry, and nursing (Gomathi *et al*., 2013). Stress is a significant problem for pharmacy students and other healthcare professionals, as it negatively impacts their well-being and health. Pharmacy students have high levels of stress and anxiety, as shown in previous studies in Indonesia (Fadilah *et al*., 2024). This supports the idea that student life may be a challenging and anxious time for pharmacy students (Silva & Figueiredo-Braga, 2018).

Greater levels of grit and self-efficacy were often linked to improved performance, whereas stress alone was typically associated with worse results (Reynolds *et al*., 2021).

To address these challenges, resilience is an essential capacity that enables students to overcome significant obstacles considered threats to their educational goals. Resilience is the ability to withstand emotional stress and recover from it in a positive manner (Chisholm-Burns *et al*., 2021). Previous studies in the healthcare field, specifically in nursing settings, have shown that excessive and unbalanced stress can increase the risk of burnout (Hosseini *et al*., 2022).

Resilience plays a crucial role in shaping students' emotional health. Pharmacy programmes should acknowledge students' encounters with academic and personal challenges, as well as their real-world experiences, and adopt strategies to cultivate their resilience, thereby enhancing their emotional well-being in various settings, whether on campus or beyond (Fuentes *et al*., 2021). Understanding the frequency, factors involved, and methods for managing stress will create a learning environment that supports students' growth and achievement effectively in both academic and professional contexts (Schlesselman *et al*., 2020).

The Perceived Stress Scale (PSS-10) is a widely used instrument for measuring perceived stress (Cohen et al., 1983), whereas the Connor-Davidson Resilience Scale (CD-RISC-25) assesses general resilience (Connor & Davidson, 2003). Both are validated tools and have been applied in academic settings internationally. There is limited research examining the academic stress experienced by students in developing countries. Thus, the study aims to evaluate the relationships between stress, resilience, and academic achievement among pharmacy students in Indonesia.

Methods

Study design and setting

A cross-sectional study design was adopted to determine the relationship between perceived stress, resilience, and academic achievement among pharmacy students. The study was conducted from June to September 2023 at three different universities in Indonesia: Universitas Gadjah Mada (UGM), Universitas Lambung Mangkurat (ULM), and Universitas Jenderal Soedirman (UNSOED). These institutions were selected to represent diverse geographic regions and institutional types, thereby enhancing representation across universities in Indonesia.

Ethical approval

This study has obtained ethical approval from the Medical and Health Research Ethics Committee (MHREC), Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada - Dr. Sardjito General Hospital, with number KE/FK/0739/EC/2023, dated May 8, 2023.

Study participants

The total population of pharmacy students across the three universities was approximately 1,650 (UGM: 900 students, ULM: 350 students, and UNSOED: 400 students). All undergraduate and pharmacist professional programme students were eligible to participate in the study. Undergraduate students are those pursuing a Bachelor's degree, typically studying for 4 years, while the pharmacist professional programme is for students who have obtained a Bachelor's degree and are pursuing a Licensed Pharmacist degree. The sample was selected based on the criteria of being active students at the time of the research conducted and willing to complete the questionnaire.

Instrument and measurement

Stress levels were evaluated using the 10-item Perceived Stress Scale (PSS-10) questionnaire. Respondents were asked to rate the frequency of their negative thoughts and emotions during the previous month on a scale from 0 (never) to 4 (very often). For the PSS-10, stress levels were categorised into three stages: response (1-14), resistance (15-26), and exhaustion (27-40). By measuring how uncontrollable, overloaded, and unpredictable people feel their lives to be, the PSS-10 evaluates the fundamental components of stress (Cohen *et al*., 1983).

The Connor-Davidson Resilience Scale (CD-RISC-25), which has 25 items, was used to assess resilience simultaneously. The CD-RISC-25 is scored from 0 to 100, with higher scores indicating more resilience. Resilience was classified into three categories based on quartile distribution: low (0-59), intermediate (60-76), and high (77-100) (Connor & Davidson, 2003).

Additionally, the questionnaire concluded with an open-ended query concerning the respondent's Grade Point Average (GPA) to measure students' academic achievement. The questionnaire was distributed via social media and messaging applications, including Instagram, WhatsApp, and Line Messenger, along with a participant information sheet. No pilot studies were

conducted because both instruments have been standardised and validated.

Data analysis

To accomplish all statistical analyses, SPSS Statistics version 26 was used. The gender, age, academic year, non-academic experience, type of residence, and self-reported GPA of the participants were characterised using univariate analysis. Non-academic activities referred to student involvement in organisations, volunteering, or community services, while the type of residence referred to the students' living arrangements during study, such as living with parents, alone, or with friends or other family members. Pearson correlation, independent sample *t*-test, and analysis of variance (ANOVA) were used in bivariate analysis to determine the association between stress, resilience and academic performance. In the categories of gender and non-academic activities, the independent sample t-test was used, while age, academic year, type of residence, and self-reported GPA were analysed using one-way ANOVA.

Results

Participants demographic

The study involved 714 pharmacy students. Thus, the response rate was 43%. Table I shows the perceived stress and resilience scores for each sociodemographic group. The average perceived stress level of male students (20.16) was slightly lower than that of female students (21.81) out of 40 participants, while the average PSS score for all participants was 21.58 (SD ± 5.10). The average resilience score of respondents, as measured by the CD-RISC-25 in the study, was 67.93, with scores of 71.71 for male students and 67.33 for female students.

Table I: Demographic characteristics of participants

Variable	Frequency (n=714)	No. (%)	Perceived stress score, mean ± SD	*P*-value	Resilience score, mean ± SD	*P*-value
Gender						
Male	98	13.73	20.16 ± 5.48	0.003*	71.71 ± 13.98	0.004*
Female	616	86.27	21.81 ± 5.00		67.33 ± 14.05	
Age (years old)						
17 – 20	375	52.52	22.08 ± 5.26	0.160	67.59 ± 14.57	0.677
21 – 23	303	42.44	20.95 ± 4.91		68.15 ± 13.44	
≥ 24	36	5.04	21.80 ± 4.36		69.58 ± 14.96	
Academic year						
First year	167	23.39	22.03 ± 5.19		68.06 ± 15.09	
Second year	151	21.15	22.30 ± 4.94	0.005*	68.19 ± 14.69	0.343
Third year	143	20.03	21.91 ± 5.36		66.08 ± 13.61	
Fourth year	253	35.43	20.68 ± 4.87		68.73 ± 13.34	
Non-academic activities						
Have participated	694	97.20	21.45 ± 5.07	<0.001*	68.29 ± 14.02	<0.001*
Never participated	20	2.80	26.15 ± 3.64		55.40 ± 11.36	
Type of resident						
Live alone	417	58.40	21.75 ± 5.12		68.19 ± 13.62	
Live with parents	193	27.03	21.49 ± 4.93	0.572	67.71 ± 14.79	0.756
Live with other family members	35	4.90	20.57 ± 5.67		69.02 ± 14.24	
Live with friends	69	9.66	21.37 ± 5.15		66.42 ± 15.17	
Grade point average						
3.50 to 4.00	382	53.50	20.97 ± 5.11		68.88 ± 13.03	
3.00 to 3.49	278	38.94	22.15 ± 4.94	0.004*	67.19 ± 14.51	0.164
2.50 to 2.99	43	6.02	23.11 ± 5.25		64.48 ± 18.62	
≤ 2.49	11	1.54	22.63 ± 5.50		67.00 ± 18.23	

*significant difference between variables ($p < 0.05$)

A *p*-value of 0.003 for perceived stress scores and 0.004 for resilience scores indicates a statistically significant difference between genders among the respondents. Students participating in non-academic activities had significantly lower stress and higher resilience ($p < 0.001$). In contrast, neither the age nor the type of resident significantly affected perceived stress and resilience scores ($p > 0.001$).

Students' self-reported academic performance

The majority of pharmacy students (53.5%) reported a GPA between 3.50 and 4.00, while only 1.54% had a GPA of ≤ 2.49 (Table I). Students with higher GPAs (3.50-4.00) reported the lowest mean stress scores (20.97 ± 5.11), while those with GPAs ≤ 2.49 had the highest stress scores (22.63 ± 5.50). A statistically significant difference was observed in perceived stress scores across GPA groups ($p = 0.004$). In contrast, resilience scores did not show a substantial difference across GPA groups ($p = 0.164$), with scores ranging from 64.48 ± 18.62 to 68.88 ± 13.03.

Students' stress and resilience levels

Table II illustrates the outcomes of the classifications of stress levels and resilience among pharmacy students. Stress levels are classified into three categories depending on the overall score received: response stage (1-14), resistance stage (15-26), and exhaustion stage (26-40) (Cohen *et al*., 1983). The average ± SD total score for perceived stress was 21.58 ± 5.10 for the sample ($p < 0.001$).

Table II: Stress and resilience levels

Categories	n=714 (proportion)	Mean ± SD	*P*-value
Stress level			
Response stage (1-14)	49 (6.9)	11.87 ± 2.26	
Resistance stage (15-26)	546 (76.5)	20.74 ± 3.08	<0.001*
Exhaustion stage (26-40)	119 (16.7)	29.45 ± 2.52	
All respondents	714 (100)	21.58 ± 5.10	
Resilience			
Low resilience (0-59)	179 (25.1)	49.10 ± 8.07	
Intermediate resilience (60-76)	359 (50.3)	68.97 ± 4.75	<0.001*
High resilience (77-100)	176 (24.6)	84.95 ± 6.54	
All respondents	714 (100)	67.93 ± 14.11	

*significant difference between variables ($p < 0.005$)

In addition, Connor and Davidson's study on resilience classification relied on quartile scores from the entire population (Connor & Davidson, 2003); therefore, this approach allowed them to establish resilience categories: low resilience (0-59), intermediate resilience (60-76), and high resilience (77-100). The results of perceived stress for all respondents showed that the average ± SD was 67.93 ± 14.11 ($p < 0.001$).

Correlation of perceived stress and resilience to students' academic performance

Based on Table III, a *p*-value of less than 0.001 indicates a significant correlation between pharmacy students' stress levels and self-reported GPAs, suggesting that higher stress levels are associated with lower GPAs, and vice versa. There appears to be a correlation between pharmacy students' resilience and their GPA, as indicated by a *p*-value of 0.037, suggesting that students' resilience is related to their GPA. The r values in the table represent Pearson correlation coefficients.

Table III: Correlation of perceived stress and resilience to students' GPA

Variable	Perceived stress		Resilience	
	r	*P*-value	r	*P*-value
Grade point average	0.131	<0.001*	0.078	0.037*

*significant difference between variables ($p < 0.05$)

In addition, a closer look at Table I reveals that the stress and resilience scores across different GPA categories do not follow a perfectly linear trend. For example, although students with a GPA between 3.50 and 4.00 reported lower stress (mean = 20.97 ± 5.11) and higher resilience (mean = 68.88 ± 13.03), the lowest GPA group (≤ 2.49) did not demonstrate the highest stress or lowest resilience levels. These fluctuations may reflect individual variability, unmeasured confounding factors such as academic workload or

personal support systems, or the limitations of using self-reported GPA.

Discussion

The results indicate notable differences in perceived stress and resilience levels among pharmacy students. Female students reported slightly higher stress levels than male students. A previous study among healthcare students in Saudi Arabia found that stress is highly prevalent and significantly more prevalent among females gender than their male counterparts (Alwhaibi *et al*., 2023).

The research findings also indicate that students who participated in non-academic activities demonstrated higher levels of resilience than those who did not, highlighting the potential benefits of such activities in fostering emotional strength. This study is similar to previous research in Korea, which has shown an association between students' involvement in projects and their levels of academic resilience and emotional investment (Kim *et al*., 2021).

The findings of the study are almost indistinguishable from those of a 2019 randomised control trial assessing 83 graduating pharmacy students from Queen's University Belfast, which yielded an average CD-RISC-25 score of 68.01 (Hanna *et al*., 2022). In addition, similar studies in Malaysia reported an average PSS-10 score of 30.40 for 388 pharmacy students across two pharmacy faculties (Alshagga *et al*., 2015), which may be attributed to cultural or institutional differences.

This study also revealed a significant correlation between stress and resilience in academic performance. Higher stress levels were significantly associated with lower academic performance, while higher resilience positively correlated with better academic performance. These findings, therefore, highlight the importance of addressing stress and promoting resilience as strategies to enhance both the emotional well-being and academic success of pharmacy students (Fuentes *et al*., 2021).

It is crucial to better understand the perceived stress and resilience of pharmacy students in higher education institutions so that they can provide an educational environment that supports pharmacy students to obtain good academic performance. This finding aligns with a study on 6,479 students in Australia, which showed a tendency for GPA to decrease as stress levels increased (Stallman, 2011). Resilience is the ability to recover from challenges, adversity, or difficult situations. Previous research found a linear relationship between resilience and academic success, with factors such as learning approaches and coping strategies contributing to improved academic performance (de la Fuente *et al*., 2017).

Limitations

The study relied on self-reported GPA without further validation and had a cross-sectional design, limiting causality inference. Other influencing factors, such as socioeconomic background, family support, and personal coping strategies, were not examined. On the other hand, its strengths include the use of a validated instrument and participation from three different universities.

Conclusion

The findings indicate that perceived stress and resilience are significantly associated with academic performance among pharmacy students in Indonesia, where mental health resources are often limited. This suggests that promoting resilience may be a critical strategy for enhancing the emotional well-being and academic success of pharmacy students.

Conflict of interest

The authors declare no conflict of interest.

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