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Analysis of the mental health of pharmacy students at A number of public and private universities in Indonesia

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ABSTRACT

Background: This study examines the mental health of pharmacy students at various state and private universities in Indonesia, as well as the factors that influence it. The low mental health of pharmacy students can be found in a third of some countries. Similar findings occurred in the United States, France, and several Asian countries. However, there has been no research involving various universities in Indonesia to identify the factors that influence their mental health.

Methods: This research used a cross-sectional method involving students from western, central, and eastern Indonesia. It used the DASS-21 (Depressin Anxiety and Stress Scale) and BRS (Brief Resilience Scale) instruments.

Results: The results of the DASS-21 analysis of pharmacy students in Indonesia, the majority reported experiencing normal depression with a score of 3.198, normal anxiety with a score of 1.858, and stress with a score of 3.621. Mental resilience with the BRS instrument: 18 % of state university students reported medium-low, while private university students reported 17.5 % ($p < 0.012$). Influencing factors vary between public and private universities. Academic pressure is a major trigger, with students tending to seek support from their close friends. These findings provide an in-depth understanding of pharmacy students' mental health conditions in Indonesia, as well as strategies to overcome this problem, such as creating special spaces for mental health-related counselling at both types of universities.

Conclusion: This study confirms the normal prevalence of mental health problems among pharmacy students in Indonesia, especially depression and low mental resilience. The study showed the relationship between depression, anxiety, stress, and mental resilience, indicating that the severity of a mental problem correlates with a decrease in mental resilience. A special room is required for health counselling.

1. Introduction

Mental health is a condition in which a person achieves psychological, social, and emotional well-being that allows them to overcome the challenges associated with mental disorders and live their daily lives effectively[26]. Research that was previously conducted in two developed countries, The United States and France presents the high level of anxiety in pharmacy students. In the United States, research comparing pharmacy students with other medical students found that pharmacy students had higher levels of anxiety than other medical students[9]. Additionally, reports indicate that mental health issues, particularly high levels of anxiety due to academic stress, plague pharmacy students in the United States[20,27]. In France, research showed that pharmacy students experience high levels of anxiety, depressive symptoms, and

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burnout[10]. This condition is not only occurs in developed countries, but also in several other countries also report almost the same situation.

Research conducted in 14 Asian and predominantly Middle Eastern countries (Bahrain, Bangladesh, Egypt, India, Indonesia, Iraq, Jordan, Libya, Malaysia, Oman, Pakistan, Saudi Arabia, Sudan, and the United Arab Emirates) describes an in-depth evaluation of mental health levels of pharmacy students and identifies factors that can significantly influence mental health (n = 2665). This research reported that 35 % of participants were in the low mental health category, 57 % were in the middle category, and only around 8 % were in the high (good) mental health category. Furthermore, this research mentions several socio demographic conditions associated with good mental health, including: (i) being male; (ii) participants without chronic disease; (iii) diligent exercise; (iv) from a private university; (iv) passion or interest in the pharmaceutical field (inspired by a known pharmacist); (v) good and very good academic achievement. Next, if we look more specifically in Indonesia (n = 209), only around 10 % of students reported their mental health as being good, the remaining 55 % had moderate mental health, and 35 % were in the low category[7].

According to the study's findings, approximately one-third of the population reported low mental health. More interestingly[7], mental health scores were categorized on (i) demographic factors (being female), (ii) lifestyle, and (iii) academic load, while[3] it found that pharmacy students in Brazil tended to use antidepressant drugs during their studies.

In a number of Middle Eastern and South Asian countries, research on the mental health of pharmacy students gained significant attention. Research in the area has revealed high rates of psychological problems among pharmacy students. For example, studies in Iran, Jordan, Saudi Arabia, and Bangladesh show significant rates of diagnosed psychological problems among pharmacy students compared to students from other healthcare fields[2,4,12,17]. Southeast Asia, particularly Malaysia and Indonesia, also revealed similar findings, revealing quite striking variations in levels of depression, anxiety, and stress among pharmacy students[1,16,19,24].

In Indonesia, previous research has revealed significant levels of stress among pharmacy students, mainly caused by a heavy academic load[8,15]. Resilience is defined as the ability to maintain a healthy level of functioning despite difficult experiences, or to return to normal functioning after facing adversity. A high level of resilience is associated with an optimistic attitude, positive actions, and self-confidence in facing difficult life situations. This, in turn, leads to better physical and mental health and well-being. Individuals with high levels of resilience who face serious threats and crises tend to have more positive mental health outcomes and are described as more flexible and adaptive in handling crises[30].

There is a correlation between mental health and mental resilience, where the lower the mental health, the lower the mental resilience[11]. One method for assessing mental health is using the Depression Anxiety Stress Scales (DASS-21). Meanwhile, to assess the level of mental resilience, the Brief Resilience Scale (BRS) can be used[6,22]. The Depression Anxiety Stress Scales (DASS-21) instrument is a short questionnaire that can be filled out quickly by respondents, has clear ratings, is easy to interpret, even for those who have no training in psychology, has good reliability and validity for measuring depression, anxiety, and stress in Indonesia, and has been used successfully in various age groups and cultural environments. The Brief Resilience Scale (BRS), a short and fast instrument, is highly effective in assessing mental resilience. It is applicable to a wide range of populations, has strong validation for measuring psychological resilience, and is the only instrument specifically designed to measure mental resilience. A person's resilience refers to their ability to bounce back or recover from stress[6,22]. The researchers utilized the Depression Anxiety Stress Scales (DASS-21) and Brief Resilience Scale (BRS) instruments. However, the majority of this research only focuses on one particular university. Until now, there has been no research that explores the mental health of pharmacy students at various universities, especially by comparing public and private universities in Indonesia and the factors that influence it as a whole.

We assumed that differences in the academic and social environment between public and private universities could be one of the factors causing differences in students' mental health levels. Public universities often have different curricula and academic requirements than private universities. Furthermore, factors such as social support, mental health facilities, and awareness of the importance of mental health may also differ between the two types of universities. Therefore, defining the mental health of pharmacy students at public and private universities could provide valuable insights for the development of appropriate interventions and policies. This research aimed to analyse the mental health of pharmacy students at various state and private universities in Indonesia, where data collection covered the western, central, and eastern regions of Indonesia. Another aim of the research was to identify various factors that may play a role in influencing the mental health of pharmacy students.

2. Methods

2.1. Study design, population, and setting

This research has a cross-sectional study design. We collected data on the population of pharmacy students from state and private universities in Indonesia from August to December 2023 who met the inclusion criteria.

2.2. Participants and sample size calculation

Participants in the research were active pharmacy students with a minimum age of 18 years who were willing to participate in the research. The Slovin formula, with a 95 % confidence interval and an error factor of 5 %, determined the minimum sample size[18]. The calculation results showed that the minimum sample size required for pharmacy students from three geographical regions in Indonesia, namely western Indonesia (390), central Indonesia (389), and eastern Indonesia (339), was a total of 1118 students.

2.3. Instrument

2.3.1. Student Sociodemographics

The questions asked in the study included the following variables: age, gender, place of residence, study programme, semester of study, year of entry, educational institution, most recent cumulative grade point average, current location of residence, level of physical activity, smoking habits, consumption of alcohol, consumption patterns of caffeinated drinks, sleep time, experience of losing a family member in the last year, family history of mental disorders, type of transportation used, duration of travel to campus, average expenses, motivation in choosing a study programme, and whether participants experienced difficulties academically and their advice regarding the mental health problems they faced.

2.3.2. Depression anxiety and stress scale (DASS-21)

The DASS-21 is an instrument consisting of 21 items that combines three separate scales designed to measure levels of depression, stress, and anxiety independently, with specified levels of severity. The rating scale in this instrument uses a score of 0 for "never," a score of 1 for "rarely," a score of 2 for "often," and a score of 3 for "very often." The range of scores used to measure the level of depression in the DASS-21 is as follows: 0–9 (normal condition), 10–13 (moderate level), 14–20 (severe level), and 21+ (very severe level), the range of scores used to measure the level of anxiety in the DASS-21 is as follows: 0–7 (normal condition), 8–9 (moderate level), 10–14 (severe level), and 15+ (very severe level), and the range of scores used to measure the level of stress in the DASS-21 is as follows: 0–14 (normal condition), 15–18 (moderate

level), 19–25 (severe level), and 26+ (very severe level) Related literature[6,13,14,23] contains research references that support this instrument. The DASS-21 and BRS instruments, which are available in Indonesian, have been validated for the Indonesian population.

2.3.3. Brief resilience scale (BRS)

BRS is a simple method consisting of six items used to evaluate an individual's ability to face and recover from stressful situations. We adapted this scale to measure mental and emotional resilience, using positive words for items 1, 3, and 5, and negative words for items 2, 4, and 6. The BRS employs the following rating scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The interpretation of the total score obtained from the BRS is as follows: 6–10 (very low level), 11–15 (low level), 16–18 (medium low level), 19–21 (moderate level), 22–23 (medium high level), 24–27 (high level), 28–30 (very high level)[22]. We will distribute both of our instruments online in their entirety.

2.4. Data collection

The destination university received the EC (ethical clearance) documents and research permit applications. After obtaining approval to carry out research, pharmacy lecturers from each institution assisted in distributing research links to students. Once they had read the research information, we asked students who were willing to participate to provide their consent by checking the box on the home page. The study was voluntary, and we anonymized all entered data.

2.5. Data analysis

The collected data were analysed using IBM SPSS Statistics version 25.0 software (IBM Corp., Armonk, New York, USA). We conducted univariate testing using descriptive frequency analysis to determine the overall frequency of the research variables. Meanwhile, bivariate testing used gamma correlation cross-tabulation because the data used has nominal-ordinal characteristics and to identify factors that influence the mental health of pharmacy students. For multivariate analysis, a regression logistic multinominal is used to determine the most significant factor among the influencing factors. Data significance assessment was carried out using a p value of <0.05.

3. Results

3.1. Sociodemographic characteristics

There were a total of 4.038 pharmacy students, with almost equal numbers between public and private (51 % vs. 49 %) universities. The majority of participants were women (87 %), aged 18–23 years (97 %), and the majority were domiciled according to their identity cards in the Sulawesi region (61 %). Almost 100 % of participants stated that they did not smoke or drink alcohol. 62 % of the participants reported that they engaged in physical activity. Almost 60 % of participants always consumed coffee in their daily lives. Regarding participants' sleep duration, 61 % said they could only sleep 4–6 h a day; in fact, our observation results stated that participants in semesters 3–4 could only sleep a maximum of 4 h. The majority of students lived in boarding houses (51 %), and they used motorbikes as a means of transportation (79 %). Only around 20 % of participants stated that they had loat one or more immediate family members in the past year. The detailed characteristics of our participants are presented in Appendix A.

3.2. Results of DASS-21 and BRS analysis

Based on the results of the DASS-21 analysis of pharmacy students in Indonesia, the majority reported experiencing normal depression with a score of 3.198, normal anxiety with a score of 1.858, and stress with a score of 3.621. Meanwhile, in terms of pharmacy students' resilience level, this finding is consistent with the fact that approximately 54 % of pharmacy students in Indonesia are in the very low, low, and medium low categories; only about 1 % fall into the very high category. For more detailed information regarding DASS-21 and BRS results, please see Appendix B and Appendix C.

3.3. Bivariate analysis

3.3.1. DASS-21 (Depression anxiety stress scale-21)

In the bivariate analysis of levels of depression, anxiety, and stress in pharmacy students at state and private universities, the depression scale had 13 factors, anxiety 11 factors, and 14 factors that were significantly related to state universities, whereas the depression scale had 4 factors, anxiety 3 factors, and stress 3 factors associated with private higher education. We observed differences in these factors, with state universities showing a significant influence of factors such as location of residence, age, physical activity, sleep duration, reasons for choosing a study program, and someone to talk to at the university if experiencing mental health problems. All other factors are considered almost uniform, except for the ones already mentioned. The results of the factors that influence the DASS-21 instrument at state and private universities can be seen in Table 1. More detailed information regarding the relationship between DASS-21 scores and other variables can be seen in Appendix D and E.

3.3.2. BRS (Brief resilience scale)

In a bivariate analysis regarding the level of mental resilience in pharmacy students at state and private universities, there were 10 factors that were significantly associated with state universities and private universities. Significant differences in these factors were identified, where there was an influence of the question factor if experiencing mental health problems related to academics, someone who would be talked to at state universities but not at private universities, and there was an influence related to age at private universities but not at state universities. All other factors, except for the two previously mentioned, were considered equal. Table 2 presents the results of the analysis of influencing factors on the BRS instrument at state and private universities. More detailed information regarding the relationship between BRS scores and other variables can be found in Appendices F and G.

3.4. Multivariate analysis

3.4.1. DASS-21 (Depression anxiety stress scale-21)

3.4.1.1. State Universities. We performed a multivariate analysis on variables with significant values in Table 1, revealing 10 significant factors related to state universities out of the 14 initially identified in the bivariate analysis. You can obtain additional details about the results of the multivariate analysis between DASS-21 and other variables as shown in Table 3.

3.4.1.2. Private universities. We conducted a multivariate analysis on the variables with significant values in Table 1, finding 10 significant factors related to private universities, out of the initial 11 factors in the bivariate analysis. You can obtain additional details about the results of the multivariate analysis between DASS-21 and other variables as shown in Table 4.

3.5. BRS (Brief resilience scale)

3.5.1. State universities

Multivariate analysis was carried out on variables with significant values in Table 2, and the results obtained were that there were 9 significant factors related to state universities, while initially there were 10

Table 1
Results of DASS-21 bivariate analysis of state and private universities.

Depression			Anxiety		Stress	
Influencing factors	State University	Private University	State University	Private University	State University	Private University
Gender	–	–	–	–	√	–
Age (years)	–	–	√	–	√	–
Semester	√	√	–	√	√	√
History of Alcohol Consumption	√	–	√	–	√	–
Physical Activity	√	–	√	–	√	–
Caffienated Beverages (coffee) at least once a week	√	√	√	–	√	–
Duration of Nightly Sleep (hours) at least in the past month	√	–	√	–	√	-
Tempat tinggal			√	–	–	–
transportasi					√	
Average Monthly Expenditure (million rupiahs)	√	√	√	√	√	√
Family History of Mental Illness	√	√	√	–	√	√
Reasons for Choosing the pharmacy program	√	–	√	–	√	–
Pharmacy programme						–
Burdened with academic demands	√	–	–	–	√	
Questions regarding steps to take if you experience mental health problems that are believed to affect academic performance	√	√	√	√	√	–

(√) = $p < 0.05$.
(−) = Not Significant.

Table 2
Results of BRS bivariate analysis of state and private universities.

BRS		
Influencing factors	State Universities	Private Universities
Gender	√	√
Age (years)	–	√
Most recent GPA	√	√
Physical Activity	√	√
Beverages (coffee) at least once a week	√	√
Duration of Nightly Sleep (hours) at least in the past month	√	√
Family History of Mental Illness	√	√
Reasons for Choosing the Pharmacy Program	√	√
Burdened with academic demands	√	√
Questions regarding steps to take if you experience mental health problems that are believed to affect academic performance	√	–

(√) = Significance of $p < 0.05$.
(−) = Not Significant.

factors in the bivariate analysis. Table 5 provides further information about the outcomes of the multivariate analysis between BRS and other variables.

A multivariate analysis of the State University BRS is listed in Table 5. The results obtained from the Likelihood Ratio Test parameters were significant between the BRS and the variables tested, namely: gender, last GPA, physical activity, consuming caffeinated drinks, family history of mental illness, reasons for choosing a pharmacy study program, and questions regarding the burden of academic demands. And in the Parameter Estimates results obtained, there was a relationship between gender in the male category [(β = −2.786, 95 % CI = (0.010–0.391), *p*-value = 0.003)], sometimes doing 150 min of physical activity a week or 30 min a day [(β = 2.292, 95 % CI = (1.408;69.586), *p*-value = 0.021)], night sleep duration 1–3 h [(β = −15.262, 95 % CI = (1.060;5.2334), p-value = 0.000)], night sleep duration 4–6 h [(β = −16.688, 95 % CI = (3.223;9.931), p-value = 0.000], night sleep duration 6–8 h [(β = −17.684, 95 % CI = (1.343;3.252), p-value = 0.000)] and burdened by academic demands [(β = 3.038, 95 % CI = (4.224;103.135), p-value = 0.000)].

3.6. Private universities

Multivariate analysis was carried out on variables with significant values in Table 2, and the results obtained were that there were 8 significant factors related to private universities, while initially there were 9 factors in the bivariate analysis. Table 6 provides further details on the results of the multivariate analysis between BRS and other variables.

A multivariate analysis of the private university BRS is listed in Table 4. The Likelihood Ratio Test parameters yielded significant results between the BRS and the variables tested. These variables included gender, age, last GPA, physical activity, consumption of caffeinated drinks, duration of sleep at night, family history of mental illness, reasons for choosing a pharmacy study program, questions about experiencing mental health problems related to academics, the need for someone to talk to, and the likelihood of being burdened by academic demands. And in the Parameter Estimates results obtained, there was a relationship between male gender [(β = −1.871, 95 % CI = (0.029–0.817), *p*-value = 0.028)], last GPA 3.51–3.75 [(β = 2.224, 95 % CI = (1.069–79.913), p-value = 0.043)], family history of mental illness [(β = 1.629, 95 % CI = (1.335–19.476), p-value = 0.017)], and burdened of academic demands [(β = 2.579, 95 % CI = (4.276–40.635), p-value = 0.000)].

4. Discussion

Our research evaluated levels of depression, anxiety, stress, and mental resilience in pharmacy students from various public and private universities in Indonesia. Analysis of the DASS-21 assessment instrument revealed that participants showed levels of depression, anxiety and stress in the normal category. State universities show a higher proportion of depression and stress in the severe category (167 and 36) compared to private universities with depression and stress in the severe category (134 and 26). The research results show that the mental health of students at state universities tends to be worse than at private universities. Previous research at a private university in Indonesia showed that the majority of pharmacy students experienced anxiety disorders in the mild to moderate category [1,8]. However, our findings are in line with previous research, which shows that students at state universities tend to experience lower mental health compared to students at private universities.[7]

Our research found a significant relationship between levels of depression, anxiety, and stress, as well as levels of mental resilience, in

Table 3
State universities' logistic multinominal regression analysis.

				State Universities (DASS-21)							
					Parameter Estimates						
			β			95 % CI			*p-value*		
Influencing factors		n (%)	Depression	Anxiety	Stres	Depression	Anxiety	Stres	Depression	Anxiety	Stres
Gender	Male	268 (12.9 %)	1.581	1.285	1.581	(0.649–36.429)	(0.476–27.471)	(0.649–36.429)	0.124	0.214	0.124
	Female	1.808 (87.1 %)	REF	REF	REF	REF	REF	REF	REF		
Age (years)	18–23	2.054 (98.9 %)	−22.028	−12.003	−46.042	0.000-.[c]	(1.478–0.055)	2.022–5.040	0.904	0.989	0.000*
	24-27	20 (1.0 %)	−19.604	−12.931	−48.087	0.000-.[c]	(5.776–5.776)	1.306–1.306	- REF	1.000	
	28–30	2 (0.1 %)	REF	REF	REF	REF	REF	REF	REF		REF
Semester	1-2	415 (20.0 %)	−0.528	−2.316	−0.528	(0.067–5.171)	(3.819–2.548)	(0.067–5.171)	0.634	0.587	0.634
	3-4	657 (31.6 %)	0.411	−0.534	0.411	(0.193–11.766)	(5.0373–6.821)	(0.193–11.766)	0.695	0.68	0.695
	5-6	572 (27.6 %)	0.356	−2.769	0.356	(0.172–11.835)	(1.910–2.059)	(0.172–11.835)	0.742	0.643	0.742
	7-8	432 (20.8 %)	REF	REF	REF	REF	REF	REF	REF REF	REF	REF
History of Alcohol Consumption	Yes	26 (1.3 %)	0.249	1.415	−1.27	(0.003–615.523)	(0.000-.b)	(0.009–8.638)	0.937	0.891	0.467
	No	2.050 (98.7 %)		REF	REF	REF	REF	REF	REF REF	REF	REF
Physical Activity (150 min per week or 30 min per day)	Never	620 (29.9 %)	−0.329	1.195	−1.869	(0.095–5.467)	(2.147–3.049)	(0.062–0.382)	0.751	0.614	0.000*
	Sometimes	1.188 (57.2 %)	−0.358	0.916	−1.299	(0.112–4.357)	(1.708–6.391)	(0.123–0.604)	0.72	0.45	0.001*
	At least 2–3 per week	268 (12.9 %)	REF	REF	REF	REF		REF	REF	REF	REF
Average Monthly Expenditure (million rupiahs)	1–2	1.385 (66.7 %)	−0.836	0.892	−0.836	(0.021–9.065)	(0.081–65.152)	(0.021–9.065)	0.59	0.235	0.59
	2.1–3	420 (20.2 %)	−0.831	0.598	−0.831	(0.018–10.783)	(0.061–71.375)	(0.018–10.783)	0.612	0.683	0.612

(*continued on next page*)

Table 3 (*continued*)

				State Universities (DASS-21)							
					Parameter Estimates						
			β			95 % CI			*p-value*		
Influencing factors		n (%)	Depression	Anxiety	Stres	Depression	Anxiety	Stres	Depression	Anxiety	Stres
	3.1–4	119 (5.7 %)	−0.557	−0.426	−0.557	(0.011–29.041)	(0.005–6.528)	(0.011–29.041)	0.781	0.351	0.781
	4.1–5	42 (2.0 %)	−13.034	−0.016	−13.034	(2.210–215.861)	(0.002–244.659)	(2.210–215.861)	0.165	0.915	0.165
	>5	110 (5.3 %)	REF	REF	REF	REF	REF	REF	REF	REF	REF
Consumption of Caffeinated beverages (coffee) at least once a week	Never	690 (33.2 %)	0.223	6.221	0.223	(0.002–651.859)	(25.711–2251.66)	0.192–100.614	0.944	0.000*	
	Sometimes	1121 (54.0 %)	−0.589	6.591	−0.589	(0.001–271.241)	(36.135–264.358)	0.100–51.521	0.852	0.000*	
	<2 glasses per day	215 (10.4 %)	−2.014	7.343	−2.014	(0.000–70.406)	(21.469–4305)	0.122–71.076	0.529	0.000*	
	>2 glasses perday	50 (2.4 %)	REF	REF	REF	REF	REF	REF	REF REF	REF	
Duration of Nightly Sleep (hour) at least in the past month	1–3	393 (18.9 %)	−6.766	−3.127	−7.754	(1.053–0.126)	(0.032–101.160)	0.006–0.003	0.001*	0.998	0.000*
	4–6	1312 (63.2 %)	−4.407	−2.625	−7.056	(0.000–1.102)	(0.027–64.393)	0.000–0.005	0.007*	0.999	0.000*
	6–8	326 (15.7 %)	−4.102	−1.754	−5.825	(0.000–1.723)	(0.021–77.336)	0.000–0.018	0.198	0.996	0.000*
	>8	45 (2.2 %)	REF	REF	REF	REF	REF			REF	REF
Family history of mental illness	Yes	109 (5.3 %)	−1.107	−2.452	−1.107	(0.032–3.406)	(0.003–357)	(0.032–3.406)	0.352	0.005*	0.352
	No	1967 (94.7 %)	REF	REF		REF	REF	REF			REF
Reasons for Choosing the Pharmacy Program	Interest	669 (32.2 %)	−0.016	0.241	−0.016	(0.121–7.977)	(0.487–17.363)	(0.1121–7.977)	0.988	0.242	0.988
	Fammily recommendation	856 (41.2 %)	−0.25	−0.54	−0.25	(0.107–5.670	(0.287–9.513)	(0.107–5.670)	0.805	0.573	0.805
	Inspired by pharmacist	128 (6.2 %)	0.908	1.943	0.908	(0.123–49.919)	(0.227–130.188)	(0.123–49.919)	0.553	0.296	0.553
	A reasonable choice	172 (8.3 %)	−0.437	−0.547	−0.437	(0.038–11.033)	(0.090–49.314)	(0.038–11.033)	0.763	0.643	0.763
	Other/no specific reason	251 (12.1 %)	REF	REF	REF	REF		REF	REF	REF	REF
Current Residence	Dormitory	22 (1.1 %)	3.185	0.175	3.185	(2.567–227.860)	(2155–1.768)	(2.5667–2276)	0.65	0.956	0.65

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Table 3 (*continued*)

				State Universities (DASS-21)							
					Parameter Estimates						
			β			95 % CI			*p-value*		
Influencing factors		n (%)	Depression	Anxiety	Stres	Depression	Anxiety	Stres	Depression	Anxiety	Stres
	Living alone	104 (5.0 %)	1.021	−2.43	1.021	(0.119–64.647)	0.003–0.478)	(0.119–64.647)	0.525	0.011*	0.525
	Boarding house	972 (46.8 %)	−0.436	−0.233	−0.436	(0.129–3.233)	(0.201–4.003)	(0.129–3.233)	0.595	0.887	0.595
	Relative's house	432 (20.8 %)	−0.106	−0.076	−0.106	(0.130–6.226)	(0.189–7.44)	(0.130–6.0.226)	0.914	0.856	0.899
	With parents	546 (26.3 %)	REF	REF	REF	REF	REF	REF	REF REF	REF	REF
Type of Transportation Used	Car	63 (3.0 %)	−0.199	−2.292	−1.751	(0.010–69.677)	2.763–4.871	0.013–2.370	0.93	0.999	0.189
	Motorcycle	1713 (82.5 %)	−0.471	−0.524	−1.557	(0.112–3.483)	0.000-.b	0.094–0.475	0.591	1.000	0.000*
	Bicycle	7 (0.3 %)	−13.094	37.126	10.769	(1.983–2134)		9.786–2309.801	0.656		0.013*
	Public transportation	293 (14.1 %)	REF	REF	REF	REF	REF	REF	REF	REF	REF
If you were experiencing mental health problems, which some believed were affecting your academic performance, then who at your university would you talk to?	Local Friends	46 (2.2 %)	−1.637	2.763	−1.637	(0.009–4.268)	0.000-.b	(0.009–4.268)	0.299	0.997	0.299
	Close Friends	1439 (69.3 %)	−0.307	0.974	−0.307	(0.170–3.179)	7.020–9.988	(0.170–3.179)	0.681	0.994	0.681
	Academic advisor	158 (7.6 %)	−0.612	0.422	−0.612	(0.029–10.086)	1.633–1.423	(0.029–10.086)	0.682	0.999	0.682
	Supervisor	66 (3.2 %)	−0.002	−2.004	−0.002	(0.010–101.936)	0.000-.b	(0.010–101.936)	0.999	0.996	0.999
	Friends from other faculties	42 (2.0 %)	−0.596	−0.564	−0.596	0.006–48.750)	7.765–4.169	(0.006–48.7500	0.794	0.999	0.794
	Dean	14 (0.7 %)	−0.78	1.222	−0.78	(5.757–3650)	0.000-.b	(5.757–3650)	0.865	0.999	0.865
	Other	311 (15.0 %)	REF	REF	REF	REF		REF	REF	REF	REF
Are you currently experiencing academic difficulties such as academic demands?	Yes	1227 (59.1 %)	−0.898	−0.379		(0.090–1.839)	6.331–7.385	(0.090–1.839)	0.243	0.992	0.243
	No	849 (40.9 %)	REF	REF		REF		REF	REF	REF	

(−) = No valid cases were found. Estimation cannot be performed

* *p*<0.05.

Table 4
Private universities' linear regression analysis.

			Private universities (DASS-21)								
			Parameter Estimates								
			β			95 % CI			*p-value*		
Influencing factors		n (%)	Depresi	Anxiety	Stres	Depresi	Anxiety	Stres	Depresi	Anxiety	Stres
Consumption of Caffeinated beverages (coffee) at least once a week	Never	588 (30.0 %)	−15.0.691	–	–	0.000–0	–	–	0.996	–	–
	Sometimes	1.166 (59.5 %)	−15.671	–	–	0.000–0	–	–	0.996	–	–
	<2 glasses per day	145 (7.4 %)	0.636	–	–	0.000–0	–	–	1.000	–	–
	>2 glasses per day	61 (3.1 %)	0	–	–	REF	–	–	REF	–	–
Semester	1–3	629 (32.1 %)	0.791	–	–	0.000–0	–	–	1.000	–	–
	4–6	478 (24.4 %)	−16.654	–	–	0.000–0	–	–	0.997	–	–
	6–8	468 (23.9 %)	−15.952	–	–	0.000–0	–	–	0.997	–	–
	>8	385 (19.6 %)	0	–	–	REF	–	–	REF	–	–
Average Monthly Expenditure (million rupiahs)	1–2	1.360 (69.4 %)	−17.139	–	–	0.000–0	–	–	0.998	–	–
	2,1–3	337 (17.2 %)	−17.618	–	–	0.000–0	–	–	0.998	–	–
	3,1–4	95 (4.8 %)	−0.467	–	–	0.000–0	–	–	1.000	–	–
	4,1–5	50 (2.6 %)	−1.1458	–	–	0.000–0	–	–	0.169	–	–
	>5	118 (6.0 %)	0			REF			REF		
Family history of mental illness	Yes	127 (6.5 %)	−2.336	–	–	0.008–1.214	–	–	0.070	–	–
	No	1.833 (93.5 %)	0	–	–	REF	–	–	REF	–	–

*$p < 0.05$.
(−) = No valid cases were found. Estimation cannot be performed.

pharmacy students in Indonesia. Our findings are consistent with the results of previous research in Malaysia, which stated the existence of a similar correlation. Next, an analysis of the factors that influence the levels of depression, anxiety, stress, and mental resilience in pharmacy students at state and private universities was carried out. There are similarities in the factors affecting both types of universities, but the relationships are different. For example, we found that a history of alcohol consumption was associated with levels of depression, anxiety, and stress in pharmacy students at a public university but not among students at a private university. In contrast, students at private universities showed higher levels of depression, anxiety, and stress due to their age, whereas this relationship was less significant for students at public universities. In addition, we found the presence of students aged over 30 years in private universities, which is probably due to the continued enrollment of students in the D3 pharmacy program at private universities in Indonesia for their undergraduate studies. In Indonesia, the age limit requirements for those wishing to enroll in state universities are stricter compared to private universities. And we also found that the percentage of female students is greater than that of male students. This is because the number of pharmacy students in Indonesia is greater than that of men.

Our findings show that 1.427 (35.3 %) of participating pharmacy students showed low levels of mental resilience. This difference is striking when compared with the results of research in Malaysia, where the majority of pharmacy students showed a level of mental resilience that was in the normal to high category[11]. Furthermore, we also found that although the influencing factors were similar between public and private university settings in both countries, there were significant differences in the relationship between grade point average and questions regarding steps to take if experiencing academic-related mental health problems. In Indonesia, regarding resilience, the tendency is to find individuals who are willing to talk. This occurs more often in state universities than in private universities; this is what was found in our research. In addition, our research revealed notable variations in the correlation between age and university type, with private universities exhibiting a stronger relationship than state universities. In our conclusion, the majority of participants at both types of university showed the medium-to-low category in terms of resilience. This analysis provides an overview of the complex factors that influence pharmacy students' mental health in various university contexts in Indonesia.

We found that the main trigger for depression, anxiety, stress, and low levels of mental resilience in pharmacy students in Indonesia is academic pressure. Our findings suggest that both pharmacy students at public and private universities experience too much academic pressure. Their highest percentage is in the very severe category, while their level of mental resilience tends to be low. Our research results are also consistent with other research findings showing a correlation between stress levels, mental resilience, and academic pressure[5,15]. As a strategy for coping with mental health problems related to academic difficulties, we found that pharmacy students tend to seek support from their close friends.This finding is also in line with research in the United States, which shows that close friends are the main source of support for students in dealing with mental health problems[9]. Intervention strategies that focus on social support are effective for improving the mental well-being of pharmacy students; this is in line with other research findings that show that social support regarding mental health will be beneficial for pharmacy academics[21].

In our research, it was discovered that women have a mental health category that is "very severe" and more dominant than men, both at state and private universities. This is because some hormones play an important role in women's mental health, making them more susceptible to mental health problems than men. Estrogen hormone levels, for example, fluctuate throughout the menstrual cycle and can affect mood. A drop in estrogen levels in the second half of the cycle can cause

Table 5
State universities' linear regression analysis.

State University (BRS)					
		Parameter Estimates			
Influencing factors		n (%)	B	95 % CI	*p-value*
Gender	Male	268 (12.9 %)	−2.786	(0.010–0.391)	0.003*
	Female	1.810 (87.1 %)	REF	REF	REF
Most Recent GPA	Not yet	205 (9.9 %)	−0.395	(0.674–0.063)	0.744
	<2	72 (3.5 %)	17.200	(2950–0.000)	0.996
	2–2.5	81 (3.9 %)	−0.718	(0.488–0.024)	0.640
	2.51–3.0	301 (14.5 %)	−0.112	(0.894–0.050)	0.939
	31–3.50	773 (37.2 %)	−1.225	(0.294–0.040)	0.229
	3.51–3.75	431 (20.7 %)	−0.345	(0.708–0.076)	0.762
	3.76–4.0	215 (10.3 %)	REF	REF	REF
Physical Activity (150 minutse per week or 30 min per day)	Never	621 (29.9 %)	1.619	(0.654–38.906)	0.120
	Sometimes	1.189 (57.2 %)	2.292	(1.408–69.586)	0.021*
	At least 2–3 times per week	268 (12.9 %)	REF	REF	REF
Consumption of Caffeinated beverages (coffee) at least once a week	Never	690 (33.2 %)	18.122	(0.000–0)	0.992
	Sometimes	1.122 (54.0 %)	18.410	(0.000–0)	0.992
	<2 glasses per day	216 (10.4 %)	25.509	(26376–26,376)	–
	>2 glasses per day	50 (2.4 %)	REF	REF	REF
Duration of Nightly Sleep (hours) at least in the past month	1–3	393 (18.9 %)	−15.262	(1.060–5.2334)	0.000*
	4-6	1.313 (63.2 %)	−16.688	(3.223–9.931)	0.000*
	6-8	327 (15.7 %)	−17.684	(1.343–3.252)	0.000*
	>8	45 (2.2 %)	REF	REF	REF
Family History of Mental Illness	Yes	109 (5.2 %)	16.689	(0.000–0)	0.996
	No	1.969 (94.8 %)	REF	REF	REF
Reasons for Choosing the Pharmacy Program	Interest	670 (32.2 %)	−1.099	(0.052–2.570)	0.311
	Family recommendation	857 (41.2 %)	−0.568	(0.082–3.907)	0.564
	Inspired by pharmacist	128 (6.2 %)	16.002	(0.000–0)	0.995
	A reasonable choice	172 (8.3 %)	−0.541	(0.052–6.585)	0.662
	Other/ no specific reason	251 (12.1 %)	REF	REF	REF
If you were experiencing mental health problems, which some believed were affecting your academic performance, then who at your university would you talk to?	Local friend	46 (2.2 %)	−18.851	(0.000–0)	0.997
	Close friend	1.441 (69.3 %)	−1.758	(0.018–1.628)	0.125
	Academic advisor	158 (7.6 %)	−3.118	(0.002–1.021)	0.052
	Supervisor	66 (3.2 %)	−0.974	(0.000–0)	1.000
	Friends from other faculties	42 (2.0 %)	15.647	(0.000–0)	0.997
	Dean	14 (0.7 %)	−1.891	(0.000–0)	1.000
	Other	311 (15.0 %)	REF	REF	REF
Are you currently experiencing academic difficulties such as academic demands?	Yes	1.228 (59.1 %)	3.038	(4.224–103.135)	0.000*
	No	850 (40.9 %)	REF	REF	REF

* $p<0.05$.

Table 6
Private universities' linear regression analysis.

Private Universities (BRS)					
			Parameter Estimates		
Influencing factors			β	95 % CI	*p-value*
		240 (12.2 %)	−1.871	(0.029–0.817)	0.028*
	Female	1.721 (87.8 %)	REF	REF	REF
Age (years)	18–23	1.858 (94.7 %)	−0.544	(1.625–207.004)	0.961
	24–27	81 (4.1 %)	−1.716	(4.136–1.270)	0.880
	28–30	10 (0.5 %)	−18.181	(1.270–1.270)	–
	>30	12 (0.6 %)	REF	REF	REF
Most Recent GPA	Not yet	409 (20.9 %)	0.160	(0.187–7.349)	0.864
	<2	50 (2.5 %)	−2.773	(0.001–3.974)	0.191
	2–2.5	33 (1.7 %)	6.317	(1.012–303.738)	0.050
	2.51–3.0	187 (9.5 %)	1.708	(0.567–53.661)	0.141
	31–3.50	715 (36.5 %)	0.718	(0.361–11.648)	0.418
	3.51–3.75	351 (17.9 %)	2.224	(1.069–79.913)	0.043*
	3.76-4.0	216 (11.0 %)	REF	REF	REF
Physical Activity (150 min per week or 30 min per day)	Never	443 (22.6 %)	0.198	(0.238–6.245)	0.812
	Sometimes	1.304 (66.5 %)	0.264	(0.303–5.593)	0.723
	At least 2–3 per week	214 (10.9 %)	REF	REF	REF
Consumption of Caffeinated beverages (coffee) at least once a week	Never	589 (30.0 %)	−0.786	(0.004–49.338)	0.742
	Sometimes		0.680	(0.019–209.451)	0.775
	<2 glasses per day		0.291	(0.008–229.659)	0.912
	>2 glasses perday	1.166 (59.5 %)	REF	REF	REF
Duration of Nightly Sleep (hour) at least in the past month	1–3	145 (7.4 %)	2.634	(0.649–299.024)	0.092
	4–6	1.161 (59.2 %)	1.473	(0.257–74.131)	0.308
	6–8	370 (18.9 %)	2.129	(0.417–169.296)	0.165
	>8	69 (3.5 %)	REF	REF	REF
Family history of mental illness	Yes	127 (6.5 %)	1.629	(1.335–19.476)	0.017*
	No	1.834 (93.5 %)	REF	REF	REF
Reasons for Choosing the Pharmacy Program	Interest	720 (36.7 %)	−0.020		
	Fammily recommendation	742 (37.8 %)	−0.470		
	Inspired by pharmacist	219 (11.2 %)	−0.970		
	A reasonable choice	75 (3.8 %)	0.364		
	Other/no specific reason	205 (10.5 %)	REF	REF	REF
Are you currently experiencing academic difficulties such as academic demands?	Yes		2.579	(4.276–40.635)	0.000*
	No		REF	REF	REF

* Significance of $p < 0.05$.

irritability, depression, and anxiety. Additionally, increasing progesterone levels around ovulation can help counteract decreasing estrogen levels, but this hormonal imbalance can cause symptoms such as irritability, fatigue, mood swings, anxiety, and depression[28]. We also found that students who had a sleep duration of 4–6 h showed a significant impact on mental health in the 'severe' category, compared to students who had a sleep duration of more than 8 h. Lack of sleep affects several hormones critical for mental health. The hormone cortisol, often referred to as the "stress hormone," increases when sleep is lacking, causing increased stress and anxiety. Elevated cortisol levels can negatively impact mental health, contributing to mood disorders, anxiety, and depression. Additionally, the hormone melatonin, which is responsible for regulating the body's sleep-wake cycle, can be disrupted by irregular sleep patterns, further exacerbating mental health problems such as insomnia, anxiety, and depression[28].

We also found that students who never or only occasionally did physical activity showed a significant impact on mental health in the severe category, compared to students who did physical activity 2–3 times per week. Physical activity increases levels of the hormones adrenaline and serotonin, which contribute to feelings of happiness. Adrenaline, or epinephrine, is released in response to stress and excitement, while serotonin is a neurotransmitter involved in regulating mood, appetite, and sleep. Physical activity triggers the release of serotonin, dopamine, and endorphins, which improve mood and reduce stress [29]. And for more details, we will upload additional scientific literature to our journal.We have investigated the relationship between factors and mental health with data that adequately represents all causal factors by taking all factors based on journals regarding mental health that are used as references.

During data collection, we also provided opportunities for participants to provide suggestions regarding mental health. A total of 2105 (52.1 %) participants from both state and private universities suggested the establishment of a dedicated room for mental health counselling. More interestingly, the high percentage of participants who fell into the very severe category with moderately low levels of mental resilience emphasises the importance of such counselling services. This is in accordance with research that shows the importance of developing mental health counselling room facilities for students to increase awareness of their mental health and provide the necessary support for student growth and well-being in the educational environment[25].

5. Conclusion

A total of depression with a score of 3.198, normal anxiety with a score of 1.858, and stress with a score of 3.621 participants from state and private universities, while the level of mental resilience was

moderately low with a total of 1427 (35.4 %) participants. And there is a relationship between levels of depression, anxiety, stress, and mental resilience. The more severe the mental illness, the lower their level of mental resilience. The factors that influence mental health are similar at both state and private universities, with two exceptions: alcohol consumption influences mental health at state universities but not at private universities, and age influences mental health at private universities. But not with state universities.

Ethics approval and consent from participants

The study has been approved by the Research Ethics Committee of the Faculty of Pharmacy, Hasanuddin University, Makassar, with ethical approval number 992/UN4.17.8/KP.06.07/2023. All participants have given their consent by checking the consent mark on the Google form page that we distributed. In addition, they have also read that all data they provide will be anonymous.

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Availability of data and materials

The author can provide data and other materials upon request.

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CRediT authorship contribution statement

Nurul Amalia Fadilah: Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Habibie Habibie:** Writing – review & editing, Supervision, Methodology, Investigation, Data curation, Conceptualization. **Susi Ari Kristina:** Writing – review & editing, Methodology, Investigation. **Dyah Aryani Perwitasari:** Writing – review & editing, Investigation. **Najmiatul Fitria:** Writing – review & editing, Data curation. **Rusli Rusli:** Data curation. **Muh. Syahruddin**: Data curation. **Bustanul Arifin:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare no conflicts of interest.

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Appendix A. Supplementary data

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References

1. Wahab A, I. A, Goh KW, et al. Targeted primary and secondary preventive strategies for depression among Malaysian pharmacy students. *Int J Environ Res Public Health*. 2022;19(15):9629. https://doi.org/10.3390/ijerph19159629.
2. Al-Qerem W, Hammad A, Amawi HA, Jarab AS, Ling J. Anxiety and depression among pharmacy students before and during COVID-19 pandemic. *Trop J Pharm Res*. 2022;20(5):1039–1047. https://doi.org/10.4314/tjpr.v20i5.22.
3. Amaral CMM, Carvalho RC, Vieira MEB, Aguiar PM. Factors associated with use of medications for anxiety and depression in pharmacy students in Brazil. *Am J Pharm Educ*. 2021;85(6):8285. https://doi.org/10.5688/ajpe8285.
4. Asdaq SMB, Alshammari MK, Alsirhani AB, et al. Perceived stress and its triggers among pharmacy university students in comparison to student of other faculties: A cross sectional study. *Indian J Pharm Educ Res*. 2022;56(1s):s98–s104. https://doi.org/10.5530/ijper.56.1s.48.
5. Cassidy S, Mawdsley A, Langran C, Hughes L, Willis SC. A large-scale multicenter study of academic resilience and well-being in pharmacy education. *Am J Pharm Educ*. 2023;87(2), ajpe8998. https://doi.org/10.5688/ajpe8998.
6. Crawford JR, Henry JD. The depression anxiety stress scales (DASS): normative data and latent structure in a large non-clinical sample. *Br J Clin Psychol*. 2003;42(2):111–131. https://doi.org/10.1348/014466503321903544.
7. Elnaem MH, Mubarak N, K. T, et al. Assessment of mental wellbeing of undergraduate pharmacy students from 14 countries: the role of gender, lifestyle, health-related, and academic-related factors. *Front Public Health*. 2022;10, 1011376. https://doi.org/10.3389/fpubh.2022.1011376.
8. Febrinasari N, Nurul Fatiha C, Fatin Fitria R. Association between religiosity, spirituality, and depression-anxiety among pharmacist students in Indonesia. *BIO Web Conf*. 2023;75, 05005. https://doi.org/10.1051/bioconf/20237505005.
9. Fischbein R, Bonfine N. Pharmacy and medical Students' mental health symptoms, experiences, attitudes and help-seeking behaviors. *Am J Pharm Educ*. 2019;83(10):7558. https://doi.org/10.5688/ajpe7558.
10.. Frajerman A, Chaumette B, Krebs M-O, Morvan Y. Mental health in medical, dental and pharmacy students: A cross-sectional study. *J Affect Disord Reports*. 2022;10, 100404. https://doi.org/10.1016/j.jadr.2022.100404.
11. Hammoudi Halat D, Younes S, Safwan J, Akiki Z, Akel M, Rahal M. Pharmacy Students' mental health and resilience in COVID-19: an assessment after one year of online education. *Eur J Investig Health Psychol Educ*. 2022;12(8):1082–1107. https://doi.org/10.3390/ejihpe12080077.
12. Hasan AHMN, Islam MdAU, Rahman S, et al. Level of stress, predisposing factors and status of mental health among pharmacy students of a private University of Dhaka, Bangladesh: A cross sectional study. *Health*. 2019;11(02):222–232. https://doi.org/10.4236/health.2019.112020.
13. Henry JD, Crawford JR. The short-form version of the depression anxiety stress scales (DASS-21): construct validity and normative data in a large non-clinical sample. *Br J Clin Psychol*. 2005;44(2):227–239. https://doi.org/10.1348/014466505X29657.
14. Ifdil I, Syahputra Y, Fadli RP, et al. The depression anxiety stress scales (DASS-21): an Indonesian validation measure of the depression anxiety stress. *COUNS-EDU: Intern J Counsel Educ*. 2022;5(4):205–215. https://doi.org/10.23916/0020200536840.
15. Kristina SA, Widayanti AW, Sari IP. Investigating perceived stress among final-year pharmacy students in Indonesia. *Int J Pharm Res*. 2020;12(2):439–444.
16. Mardea NA, Widayanti AW, Kristina SA. Stress level comparison between pharmacy students and non-pharmacy students in Indonesia. *Intern J Pharm Res*. 2020;12(3):204–209.
17. Nakhostin-Ansari A, Akhlaghi M, Etesam F, Sadeghian MH. Suicidal ideation and its associated factors in medical, dental, and pharmacy students: A cross-sectional study during COVID-19 pandemic. *Psychiatry J*. 2022;2022:1–10. https://doi.org/10.1155/2022/8139351.
18. Nalendra ARA, Rosalinah Y, Priadi A, et al. *Statistika Seri Dasar dengan SPSS*. Media Sains Indonesia; 2021.
19. Paneerselvam GS. Empowering minds: A study of mental health among pharmacy students. *Progr Drug Discov Biomed Sci*. 2023;6(1). https://doi.org/10.36877/pddbs.a0000363.
20. Sabourin AA, Prater JC, Mason NA. Assessment of mental health in doctor of pharmacy students. *Curr Pharm Teach Learn*. 2019;11(3):243–250. https://doi.org/10.1016/j.cptl.2018.12.004.
21. Singleton J, Stevens JE, Truong R, et al. Consumer knowledge of mental health conditions, awareness of mental health support services, and perception of community pharmacists' role in mental health promotion. *Int J Pharm Pract*. 2024;32(2):170–179. https://doi.org/10.1093/ijpp/riad091.
22. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. *Intern J Behav Med*. 2008;15(3):194–200. https://doi.org/10.1080/10705500802222972.
23. Tran TD, Tran T, Fisher J. Validation of the depression anxiety stress scales (DASS) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. *BMC Psychiatry*. 2013;13(1):24. https://doi.org/10.1186/1471-244X-13-24.
24. Wahid RAH, Malioy I, Fadilah PA, Rumakat N. Mental health issues impacting pharmaceutical students of Universitas PGRI Yogyakarta during COVID-19 pandemic view from Religius perspective. In: Kusuma Wardana A, ed. *Proceedings of the 2nd UPY International Conference on Education and Social Science (UPINCESS*

2023) (Vol. 812, pp. 497–501). Atlantis Press SARL; 2023. https://doi.org/10.2991/978-2-38476-176-0_71.
25. Wei P. The impact of social support on students' mental health: A new perspective based on fine art majors. *Front Psychol*. 2022;13, 994157. https://doi.org/10.3389/fpsyg.2022.99415.
26. World Health Organization. *Comprehensive Mental Health Action Plan 2013–2030*. 2021.
27. Zakeri M, De La Cruz A, Wallace D, Sansgiry SS. General anxiety, academic distress, and family distress among doctor of pharmacy students. *Am J Pharm Educ*. 2021;85(10):8522. https://doi.org/10.5688/ajpe8522.
28.. Morssinkhof, M. W. L., Van Wylick, D. W., Priester-Vink, S., Van Der Werf, Y. D., Van Den Heijer, M.. n.d., XXX.
29. Den Heuvel OA, Broekman BFP. Associations between sex hormones, sleep problems and depression: A systematic review. *Neurosci Biobehav Rev*. 2020;118:669–680. https://doi.org/10.1016/j.neubiorev.2020.08.006.
30. Robertson HD, Elliott AM, Burton C, et al. *XXX*. 2016.