







RESEARCH ARTICLE

Perceived stress and body image perception as correlates of eating disorders among pharmacy students in a Nigerian university: A cross-sectional survey

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Keywords

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Abstract

Background: High perceived stress and concerns about body image can potentially trigger eating disorders (ED) among university students. This study aimed to investigate the relationship between EDs and perceived stress and body image among pharmacy students in a Nigerian public university. **Methods:** A descriptive cross-sectional study was conducted among all undergraduate pharmacy students in a Nigerian public university. The Body Shape Questionnaire, Eating Attitudes Test, and Perceived Stress Scale were used for data collection. Data were analysed using descriptive statistics, chi-square test and Pearson correlation tests. The level of significance was set at $p < 0.05$. **Results:** Out of the 417 respondents, more than half were male (52.3%) and aged 21-25 years (53.7%). About 62.6% of the students had a high risk of ED. Although most students (94.5%) had no body shape concern, 87.3% were moderately stressed. Body image perception ($r = 0.650, p < 0.001$) and perceived stress ($r = 0.151, p = 0.002$) had a positive correlation with the risk of ED. **Conclusion:** Higher stress levels and more negative body image perceptions were associated with a higher risk of ED among pharmacy students. Appropriate interventions to reduce stress levels and address body image concerns among pharmacy students are recommended.

Introduction

Eating disorders (ED) are complex mental health issues characterised by abnormal eating behaviours and preoccupation with body weight and shape (American Psychological Association, 2024). In 2019, ED affected 14 million people worldwide, including nearly three million children and adolescents (World Health Organisation, 2022). The pooled lifetime prevalence of ED was 0.91%, while the 12-month prevalence was 0.43% (Qian *et al.*, 2022). The causes of ED seem to be multifactorial, as the problem has been linked to genetic, environmental, psychological, and sociocultural influences. Among university students,

particularly those in demanding academic programmes such as medicine and pharmacy, the prevalence of ED can be notably high due to the unique stressors they face (Karir *et al.*, 2023).

Pharmacy students in Nigerian universities experience significant academic pressure, which may contribute to elevated levels of perceived stress (Al Rasheed *et al.*, 2017; Opoku-Acheampong *et al.*, 2017). This stress can stem from rigorous coursework, clinical rotations, and the need to maintain high academic standards. The competitive nature of the field and the demanding curriculum can exacerbate feelings of stress, potentially leading to maladaptive coping mechanisms, including disordered eating behaviours (Sahir *et al.*, 2017).

Previous studies demonstrated that the prevalence of ED was common among university students, especially medical and pharmacy students (Tavolacci *et al.*, 2015; Lipson & Sonnevile, 2017; Sahir *et al.*, 2017). A study among Malaysian university students reported that the prevalence of EDs was 13.9%, with the majority of affected individuals aged 20 to 21 years and 51.1% being female (Chan *et al.*, 2020). A national cross-sectional study conducted in Lebanon among health science students and healthcare practitioners revealed a 22.5% prevalence of ED risk among the participants (Hoteit *et al.*, 2022), with 17.7% prevalence recorded among the pharmacy students (Hoteit *et al.*, 2022).

In Nigeria, cultural factors also play a significant role in shaping body image perception. The cultural context can influence the ideal body image, with varying standards of beauty and body size preferences. Additionally, exposure to Western media and its portrayal of thinness as the perfect body type may further impact the body image perceptions of Nigerian students, contributing to the internalisation of these ideals and increasing the risk of EDs (Warren *et al.*, 2012). The intersection of perceived stress and body image perception in the context of EDs among Nigerian undergraduate pharmacy students has been under-researched. Understanding how these factors correlate can provide valuable insights into the underlying mechanisms that contribute to the high prevalence of EDs in this population. Moreover, it could be beneficial in designing targeted interventions and support systems to mitigate these issues.

Previous studies have demonstrated a significant correlation between perceived stress and EDs (Chan *et al.*, 2020; Yan *et al.*, 2022; Karir *et al.*, 2023). For instance, students who report higher levels of stress are more likely to engage in emotional eating or develop unhealthy eating patterns as a coping mechanism. Similarly, negative body image perception has been consistently linked to EDs, with individuals who perceive themselves as overweight or who are dissatisfied with their bodies being more prone to develop disordered eating behaviours. Given the demanding nature of the pharmacy programme and the unique stressors faced by students in this field, it is crucial to examine these variables within the specific context of a Nigerian university. Understanding how the risk of EDs relates to perceived stress and body image among pharmacy students could provide the basis for targeted interventions to promote the mental health and overall well-being of the students, thus likely enhancing their academic performance and professional competency. Therefore, this study investigated the relationship between EDs and perceived stress and body image among pharmacy students in a Nigerian public university.

Methods

Study design, population and setting

A quantitative descriptive cross-sectional survey was conducted among undergraduate pharmacy students at the Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Enugu State, Nigeria. The participants were all undergraduate students, ranging from the first to fifth year of study. The Faculty of Pharmaceutical Sciences of the university currently offer a six-year undergraduate programme culminating in the award of a Doctor of Pharmacy (PharmD) degree. The programme curriculum includes classroom lectures, seminars, practical laboratory sections, clinical rotations, research projects and industrial field trips. The students are exposed to core clinical courses starting in their third year of study.

Sample size and sampling technique

The sample size was determined using Yamane's sample size formula for cross-sectional studies with a finite population, as cited in Osian *et al.* (2020). The total student population in the Faculty of Pharmaceutical Sciences was 1,676 at the time of the study. The formula for the sample size calculation is shown below.

$$n = \frac{N}{1 + Ne^2}$$

where n = required sample size, N = population size = 1,676 students, and e = margin of error = 5% = 0.05.

$$\frac{1676}{1 + 1676 \times 0.05^2} \approx 323 \text{ students}$$

Therefore, the minimum sample size required for the study was 323 respondents. However, 10% of the calculated sample size (33 students) was added to compensate for possible non-responses. The total minimum sample size was then obtained and, finally, adjusted to approximately 356 students. The study respondents were recruited following a simple random sampling technique with the aid of computer-generated random numbers and the official class lists. The respondents were proportionately drawn from the different classes or years of study.

Eligibility criteria

The study respondents were recruited based on the following eligibility criteria: (1) Being an undergraduate pharmacy student within the first to the final year of the programme, (2) Either male or female sex, (3) Being willing to adhere to the study protocol, and (4) Being willing to provide informed consent to participate in the research.

Study instruments

The study instrument used for data collection had four sections. The first section contained the sociodemographic characteristics of the respondents. They include gender, age, marital status, academic year, place of residence, alcohol use, financial status, body weight, and height. The next three sections contained validated questionnaires, including the Body Shape Questionnaire 16 (BSQ-16), Eating Attitudes Test (EAT-26), and Perceived Stress Scale (PSS-10) (Alshagga et al., 2015; Chan et al., 2020; Fernandes et al., 2023).

The BSQ-16 is a self-reported survey instrument used for assessing an individual's concerns with their weight and body shape. It focuses on the extent of a person's obsession with body image. The shortened version of the original BSQ-34 consists of sixteen items that are scored on a six-point Likert scale, from "never" to "always." Psychometric properties of these shorter versions had shown a high correlation with BSQ-34 (Fernandes et al., 2023). Greater dissatisfaction and concern with body shape are indicated by higher scores, which are calculated by adding up all of the responses. The aggregate scores were interpreted as follows: scores between 0 and 38 implied "no concern", 39 to 51 represented "mild concern", 52 to 66 represented "moderate concern", and scores above 66 indicated "marked concern". This tool is frequently used to measure the severity of body image disorders and to monitor changes over time or in response to therapies in clinical and research settings.

The EAT-26 questionnaire was used to assess the risk of ED. The EAT-26 is a widely used screening tool designed to identify individuals at risk for EDs and problematic behaviours (Chan et al., 2020). The EAT-26 evaluates the symptoms, concerns, and characteristics related to eating disorders for the past months, with 6-point Likert scale responses ranging from "never", "rarely", "sometimes", "often", "usually" to "always." The EAT-26 had three subscales namely dieting, bulimia and food preoccupation, and oral control. In the scoring of the responses on EAT-26, "never", "rarely", and "sometimes" are assigned a score of zero, while "often", "usually", and "always" were assigned 1, 2, and 3, respectively. The possible aggregate score of responses on EAT-26 ranged from 0 to 78. The total score was computed by adding all the items together, and then a cut-off point of 20 was used to categorise the risk of EDs among the participants into "No risk of ED" (scores < 20) and "High risk of ED" (scores ≥ 20). Therefore, an aggregate score of 20 or higher indicated a potential risk for EDs, suggesting the need for further medical evaluation (Campo-Arias & Villamil-Vargas, 2012).

Perceived Stress Scale (PSS-10) was a ten-item questionnaire that was used to assess the extent to

which individuals perceive their lives as stressful (Alshagga et al., 2015), within the last four weeks. It contains both positively and negatively worded statements. Participants were expected to respond to each question on a 5-point Likert scale ranging from "never = 0 to very often = 4." Items 4, 5, 7, and 8 were positively worded and so were reverse-scored. The aggregate score reflected how frequently the respondent had experienced stress in the past month. Total scores ranged from 0 to 40, with higher scores indicating greater perceived stress. The total score was computed and categorised into "low stress" (score < 14), "moderate stress" (score range of 14 to 26) or "high" (score > 26).

Data collection

Printed self-administered questionnaires were used for the data collection. The eligible participants were approached after the usual class lectures. The questionnaires were distributed after explaining the purpose of the study to the students. Each respondent completed the questionnaires independently, and clarifications were provided to the respondents by the research team where necessary. The weight and height of each student were measured and recorded with the aid of a weighing balance and calibrated tape. To get the accurate weight of each participant, the students were instructed to wipe off beneath their feet before stepping onto the weighing balance because dirty foot pads could affect the conductivity of the scale. Accurate height measurements were obtained by having each participant stand barefoot on a flat surface while the zero end of a measuring tape was placed on the floor, and the reading was then taken. The completed questionnaires were collected from the respondents and preserved in an envelope. A total number of 417 completed questionnaires were gathered. Data collection lasted for three months, from March to May 2024.

Data analysis

The collected data were coded and entered into Microsoft Excel, checked, and cleaned for errors. It was then transferred to IBM SPSS software version 27.0 for statistical analysis. Descriptive statistics (frequencies, percentages, mean, and standard deviation) were used to summarise respondents' socio-demographic characteristics, their body shape concerns, risk of ED, and perceived stress levels. Pearson correlation test was employed to investigate the relationship between BMI, body shape perception, risk of ED, and perceived stress level. The Chi-square test (χ^2) was used to examine the association between the participants' sociodemographic

characteristics and the risk of ED. The level of significance was set at $p < 0.05$.

Ethical considerations

Ethical approval was obtained on February 29, 2024, from the Research Ethics Committee at the Department of Clinical Pharmacy and Pharmacy Management, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Enugu State, Nigeria, with the reference number CPPM/HREC/24/UG/0046. The whole study protocol adhered closely to relevant laws guiding the research involving human subjects. Informed consent was obtained from all the study respondents. The questionnaires were anonymised and assigned study identity codes. All collected data were treated with the utmost confidentiality.

Results

Sociodemographic characteristics of the pharmacy students

Table I shows the demographic characteristics of the study respondents. A total of 417 pharmacy students participated in the study, representing a 100% response rate. Slightly more than half of the students were male ($n = 218$, 52.3%) and were aged 21-25 years ($n = 224$, 53.7%). The age range of the students was 16 to 33 years. A vast majority of the students were single ($n = 404$, 96.9%). Most of the students have a normal or healthy weight ($n = 304$, 72.9%), characterised as a body mass index (BMI) of 18.5 to 24.9 kg/m². More than half of the students ($n = 252$, 60.4%) do not take alcoholic beverages.

Body shape concerns, risk of ED and perceived stress level

Table II contains the respondents' body shape concerns, risk of EDs, and perceived stress levels. The findings reveal that the majority of the students were classified as having no concern with their body shape ($n = 394$, 94.5%). More than half of the students were at a high risk of having ED ($n = 261$, 62.6%), while the majority of the students have moderate stress levels ($n = 364$, 87.3%) and about 22 (5.3%) have high stress levels.

Table I: Sociodemographic characteristics of the pharmacy students (n = 417)

Variables	Frequency (n)	Percentage (%)
Gender		
Male	218	52.3
Female	199	47.7
Age (years)[†]		
16 – 20	166	27.8
21 – 25	224	53.7
26 – 30	61	14.6
> 30	16	3.8
Marital status		
Single	404	96.9
Married	13	3.1
Academic year		
First	70	16.8
Second	96	23.0
Third	54	12.9
Fourth	98	23.5
Fifth	99	23.7
Residence		
Hostel	152	36.5
Off-campus	265	63.5
Body mass index		
Underweight	21	5.0
Normal/healthy weight	304	72.9
Overweight	72	17.3
Obesity	16	3.8
Do you drink alcoholic beverages?		
Yes	165	39.6
No	252	60.4

[†]Age range = 16 – 33 years

Table II: Body shape concerns, risk of eating disorders and perceived stress levels among the pharmacy students (n = 417)

Variable	Frequency (n)	Percentage (%)
Body shape concerns		
No concern with body shape	394	94.5
Mild concern with body shape	16	3.8
Moderate concern with body shape	5	1.2
Marked concern with body shape	2	0.5
Risk of eating disorders		
No risk of ED	156	37.4
High risk of ED	261	62.6
Perceived stress levels		
Low stress	31	7.4
Moderate stress	364	87.3
High stress	22	5.3

Relationship between BMI, body shape perceptions, risk of ED and perceived stress level

Table III shows the relationship between students' BMI, body shape perceptions, risk of ED, and perceived stress level. The findings reveal that students' BMI had a weak positive correlation with body shape perception ($r = 0.294$, $p < 0.001$) and the risk of ED ($r = 0.149$, $p = 0.002$). This implies that as the BMI of the students

increases, the more negative perceptions they have about their body shape and the higher their risk of ED. On the other hand, body shape perception had a strong positive correlation with the risk of ED ($r = 0.650$, $p < 0.001$). Additionally, perceived stress level had a weak positive relationship with the risk of ED ($r = 0.151$, $p = 0.002$). This finding suggests that higher perceived stress levels among pharmacy students might likely increase the risk of ED.

Table III: Relationship between body mass index, body shape concern, perceived stress level and risk of eating disorder[†]

S/N	Variables	1 (BMI)		2 (BSC)		3 (ED)		4 (PS)	
		r	P-value	r	P-value	r	P-value	r	P-value
1	Body mass index (BMI)	-	-	0.294	< 0.0001 [†]	0.149	0.002 [†]	0.008	0.865
2	Body shape concern (BSC)	-	-	-	-	0.650	< 0.0001 [†]	0.206	< 0.001 [†]
3	Eating disorder (ED)	-	-	-	-	-	-	0.151	0.002 [†]
4	Perceived stress (PS)	-	-	-	-	-	-	-	-

[†]Correlation is significant at the 0.01 level (two-tailed)

Sociodemographic factors associated with the risk of ED

Table IV shows the association of the risk of ED with the students' sociodemographic characteristics. The result demonstrated that students' age ($X^2 = 17.44$, $p = 0.001$) and financial status ($X^2 = 10.446$, $p = 0.015$) were significantly associated with the risk of ED. Specifically,

students aged 21 to 25 ($n = 147$, 56.3%) were at a higher risk of developing ED. Additionally, a higher proportion of students with insufficient financial resources were more likely to be at risk of an ED. There was no statistically significant association between the risk of ED and the student's gender, marital status, year of study, BMI, or alcohol intake ($p > 0.05$).

Table IV: Sociodemographic factors associated with the risk of EDs

Characteristics	Risk of eating disorder (ED)		χ^2 (df)	P-value
	No risk of EDs n(%)	High risk of EDs n(%)		
Gender				
Male	86 (55.1)	132 (50.6)	0.8111 (1)	0.368
Female	70 (44.9)	129 (49.4)		
Age (years)[*]				
16 – 20	35 (22.4)	81 (31.0)	17.443 (3)	0.001 [†]
21 – 25	77 (49.4)	147 (56.3)		
26 – 30	33 (21.2)	28 (10.7)		
> 30	11 (7.1)	5 (1.9)		
Marital status				
Single	151 (96.8)	253 (96.9)	0.006 (1)	0.937
Married	5 (3.2)	8 (3.1)		
Academic year				
First	21 (13.5)	49 (18.8)	5.800 (4)	0.215
Second	35 (22.4)	61 (23.4)		
Third	16 (10.3)	38 (14.6)		
Fourth	44 (28.2)	54 (20.7)		
Fifth	40 (25.6)	59 (22.6)		

Characteristics	Risk of eating disorder (ED)		χ^2 (df)	P-value
	No risk of EDs n(%)	High risk of EDs n(%)		
Residence				
Hostel	60 (38.5)	92 (35.2)	0.435 (1)	0.510
Off-campus	96 (61.5)	169 (64.8)		
Body mass index				
Underweight	7 (4.5)	14 (5.4)	1.875 (3)	0.599
Normal/healthy weight	120 (77.4)	184 (71.3)		
Overweight	23 (14.8)	49 (19.0)		
Obesity	5 (3.2)	11 (4.3)		
Do you drink alcoholic beverages?				
Yes	68 (43.6)	97 (37.2)	1.686 (1)	0.194
No	88 (56.4)	164 (62.8)		
Financial status				
Grossly insufficient	19 (12.2)	37 (14.2)	10.446 (3)	0.015 [†]
Fairly insufficient	30 (19.2)	71 (27.2)		
Fairly sufficient	77 (49.3)	129 (49.4)		
Highly sufficient	30 (19.2)	24 (9.2)		

[†]Significant at $p < 0.05$.

Discussion

The present study sought to evaluate the risk of ED among pharmacy students and its relationship with body shape perceptions and perceived stress levels. The key findings of the current study demonstrated that most pharmacy undergraduate students are not bothered with their body shape, while more than half have a high risk of developing ED. Most students have moderate perceived stress levels, with a few severe cases. There is a positive relationship between perceived body shape and the risk of ED. Likewise, as the perceived stress levels increase among the students, the more likely the risk of ED will increase correspondingly.

The findings demonstrated that more than half of undergraduate pharmacy students were at risk of ED. In contrast, a lower prevalence of ED, ranging from 2.2% to 46.0%, has been reported in several studies (Kugu *et al.*, 2006; Pengpid *et al.*, 2015; Manaf *et al.*, 2016; Naeimi *et al.*, 2016; Azzouzi *et al.*, 2019; Chan *et al.*, 2020; Tavalacci *et al.*, 2020; Ghafouri *et al.*, 2021; Karir *et al.*, 2023; Rasolofotsialonina *et al.*, 2024). Unlike the above studies, which estimated the prevalence of ED among pharmacy students within a specific time frame, the present study examined the risk of ED, which could explain why the findings of those studies differ from the current study. The prevalence of ED measures the actual burden of ED in a given population at a particular time frame, while the risk of ED assesses the likelihood that a person or population will develop ED over time (Fajardo-Gutiérrez, 2017). Additionally, the disparity in the prevalence of ED risk could be attributed to the

characteristics of the study group, such as BMI and the survey instrument used for the data collection. Using the EAT-26 instrument, the risk of ED among medical students with normal weight was 64.47%, while with the SCOFF instrument, the risk was 23.5% (Vijayalakshmi *et al.*, 2017). The high prevalence of ED reported in the current study could be due to increased exposure to Western culture, cultural transition, globalisation, modernisation, urbanisation, and media promoting the Western beauty ideal (Suhail & Zaib-u-Nisa, 2002; Smink *et al.*, 2012;). Additionally, the consumption of more food and beverages may result from appealing mass media campaigns (Becker *et al.*, 2011).

The majority of pharmacy students in the current study had no concern with their body shape. This finding might imply that pharmacy students feel less stressed and anxious about their bodies, which could be good for their general mental health and well-being. Furthermore, as they are less likely to be sidetracked or adversely impacted by body image difficulties, individuals with a healthy body image may have improved academic performance and professional interactions (Zainal *et al.*, 2021). While present body positivity activities are helpful, they should be supported and possibly expanded to ensure all students retain a healthy self-perception. This information could guide university wellness programmes. Similarly, Karir *et al.* (2023) and Gailledrat *et al.* (2016) reported that about 53.3% and 43.1% of the study participants had no concern with their body shape. The lower percentages found in other studies could be explained by the belief that students with low or normal BMI might likely report satisfaction

with their body shape (Gailledrat *et al.*, 2016). Most of the students in the present study had normal or healthy BMI. Consequently, this could have affected the way they perceive their body shape to a large extent. Furthermore, patients with ED may acknowledge being thin but still fixate on specific body parts, such as the abdomen, buttocks, or thighs, leading to an underestimation of body shape concerns when using self-questionnaires. A recent literature review concluded that patients with anorexia nervosa tend to focus on symptom-specific details like body parts (Madsen *et al.*, 2013). People with ED, particularly those with anorexia nervosa, often lack insight into or deny the problem. Previous research has shown that patients in denial about their ED are more likely to report lower body and weight concern scores on self-assessment measures (Couturier & Lock, 2006).

Most pharmacy students in the present study had moderate stress levels. This finding was consistent with the reports of Karir *et al.* (2023) and Sohail (2013) where 79.6% and 71.6% of the medical students were observed to have moderate stress levels, respectively. However, a study by de Matos *et al.* (2021) revealed that only 53.3% of the university students showed mild to moderate stress levels. The results of the current study suggest that although these students do experience some stress, it is not at a severe level. This might be explained by the rigorous academic workload they have to complete, which consists of challenging coursework, clinical rotations, and pressure to do well in an extremely competitive field (Auwal *et al.*, 2021). Even while it's controllable, moderate stress can nonetheless have an impact on a student's general well-being, mental health, and academic performance. It emphasises how important it is for kids to have efficient stress management techniques so they can handle their pressures without being seriously unmanageable. Therefore, establishing environments that encourage work-life balance, stress management courses, and access to mental health resources are just a few ways that universities can improve their support networks (Baik *et al.*, 2019). Knowing that moderate stress is common among students may motivate them to take preventative steps to reduce their stress levels, such as managing their time well, asking for help from peers, and getting regular exercise. Through appropriate management of moderate stress, students' academic performance, personal development, and general quality of life can all be enhanced, and severe stress can be avoided (Masilamani *et al.*, 2019).

Students' age was related to the risk of an ED. A higher proportion of pharmacy students aged 21 to 25 have a high risk of ED. A similar finding was reported by Banna and colleagues in their study of the risk of ED and its associated factors among undergraduate students in a

Bangladeshi public university (Al Banna *et al.*, 2021). The study observed that age significantly predicted the risk of ED among university students. University students aged 17-21 had about two times higher odds of developing ED compared to those between the age of 21-25 years (Al Banna *et al.*, 2021). Another study in Saudi Arabia among university students found that students aged 22 years or less have a higher risk of developing ED compared to those older than 22 years (Alhazmi & Al Johani, 2019). Additionally, an Iranian study on the prevalence of ED among adolescents observed that age significantly predicted the likelihood of developing ED (Rauof *et al.*, 2015). The authors noted that adolescents aged 15 years or less were more vulnerable to ED compared to their older ones (Rauof *et al.*, 2015). However, some studies found no association between age and the risk of ED (Safer *et al.*, 2020; Ghamri *et al.*, 2022). The present study finding indicates that younger pharmacy students are more vulnerable to developing ED compared to their older counterparts. A possible explanation for this finding could be the effect of sudden lifestyle changes as younger students transition from living with their parents or guardians to living alone or with other peers while pursuing higher education.

Furthermore, the risk of ED was associated with the student's financial status. Students in Nigerian universities typically depend on their parents and guardians for financial support. Comparable findings are well documented in the literature (Alhazmi & Al Johani, 2019; Al Banna *et al.*, 2021). Undergraduate students might begin to seek a more independent lifestyle and take on greater financial and academic obligations in the course of their programme. Hence, pressure to make ends meet can result in stress, anxiety, and harmful coping strategies, including disordered eating (Al-Awwad *et al.*, 2021; Seto *et al.*, 2023). These findings have important policy and educational institution implications. Universities should improve their support services to help students with their emotional and financial needs (Dial *et al.*, 2023). This might entail expanding the availability of financial aid, supplying financial literacy courses, and giving reasonably priced meal plans. Also, easily accessible mental health services that are personalised to meet the particular needs of students with financial difficulties should be provided, with special attention to those who may be at risk of an ED (Assari, 2018). In addition to focusing on solutions that lessen financial pressures, such as improving funding for grants and scholarships, policymakers should take into account the larger effects of students' financial insecurity.

Study limitations

This study has some limitations that should be considered when interpreting its findings. First, the survey was conducted in a single school of pharmacy, hence the application of its findings beyond the study population is limited. However, the study setting is among the premier public universities in Nigeria, with the student population reflecting the six geopolitical zones in the country. Secondly, since ED is a form of mental disorder associated with some level of social stigma, some respondents might have provided socially desirable responses to the survey questions, even though the questionnaires were anonymised to encourage honest answers. Lastly, as a result of the cross-sectional study design, a cause-effect relationship between the variables could not be established. Meanwhile, future studies exploring whether the stress levels among pharmacy students are consistent across all academic years and their relationship with body shape concerns and risk of ED are recommended.

Conclusion

The present study revealed that more than half of pharmacy students were at a high risk of eating disorders, while the majority of the students had no concern with their body shape and showed moderate stress levels. Further, BMI and perceived stress level were positive weak correlates of eating disorders risk, while body image perception was a positive strong correlate of eating disorders risk. This holds clinical significance for healthcare professionals, particularly pharmacy students, to actively participate in early primary and secondary prevention of mental health disorders, such as eating disorders, stress, and body image dissatisfaction. Raising awareness of these mental health issues among pharmacy students can aid in identifying at-risk individuals and encourage them to seek timely medical support.

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Conflict of interest

The authors declare no conflict of interest.

Ethics approval and informed consent

Ethical approval was obtained on February 29, 2024, from the Research Ethics Committee at the Faculty of Pharmaceutical Sciences, University of Nigeria Nsukka, Enugu State, Nigeria, with the reference number CPPM/HREC/24/UG/0046. The whole study protocol adhered closely to relevant laws guiding the research involving human subjects. Informed consent was obtained from all the study respondents. The questionnaires were anonymized and assigned study identity codes. All collected data were treated with the utmost confidentiality.

References

- Al-Awwad, N. J., Al-Sayyed, H. F., Zeinah, Z. A., & Tayyem, R. F. (2021). Dietary and lifestyle habits among university students at different academic years. *Clinical Nutrition ESPEN*, *44*, 236–242. <https://doi.org/10.1016/j.clnesp.2021.06.010>
- Al Banna, M. H., Dewan, M. F., Tariq, M. R., Sayeed, A., Kundu, S., Disu, T. R., ... Khan, M. S. I. (2021). Prevalence and determinants of eating disorder risk among Bangladeshi public university students: A cross-sectional study. *Health Psychology Research*, *9*(1). <https://doi.org/10.52965/001C.24837>
- Al Rasheed, F., Naqvi, A. A., Ahmad, R., & Ahmad, N. (2017). Academic stress and prevalence of stress-related self-medication among undergraduate female students of health and non-health cluster colleges of a public sector university in Dammam, Saudi Arabia. *Journal of Pharmacy and Bioallied Sciences*, *9*(4), 251–258. https://doi.org/10.4103/jpbs.jpbs_189_17
- Alhazmi, A. H., & Al Johani, A. (2019). Prevalence and associated factors of eating disorders among students in Taiba University, Saudi Arabia: A cross sectional study. *Malaysian Journal of Public Health Medicine*, *19*(1), 172–176. <https://doi.org/10.37268/mjphm/vol.19/no.1/art.80>
- Alshagga, M.A., Nasir, N. Z. M., Behzadnia, A., Jasamai, M., Al-Absi, A., & Al-Dubai, S. A. R.. (2015). Perceived stress and sources of stress among pharmacy students in Malaysian public and private universities: A comparative study. *Pharmacy Education*, *15*(1), 64–68.
- American Psychological Association. (2024). *What are Eating Disorders?* <https://www.psychiatry.org/patients-families/eating-disorders/what-are-eating-disorders>
- Assari, S. (2018). Financial distress, anxiety, depression, and suicide among American college students. *International*

Journal of Behavioral Sciences, **12**(2), 84–90.
https://www.behavsci.ir/article_82783.html

Auwal, F. I., Tukur, Z. A., Abdu-Aguye, S. N., & Ma'aji, H. U. (2021). Perceived stress levels and stressors in undergraduate pharmacy students' at a Nigerian tertiary institution. *Nigerian Journal of Pharmaceutical Research*, **16**(2), 23–30. <https://doi.org/10.4314/njpr.v16i2.35>

Azzouzi, N., Ahid, S., Bragazzi, N. L., Berhili, N., Aarab, C., Aalouane, R., ... Rammouz, I. (2019). Eating disorders among moroccan medical students: Cognition and behavior. *Psychology Research and Behavior Management*, **12**, 129–135. <https://doi.org/10.2147/PRBM.S165114>

Baik, C., Larcombe, W., & Brooker, A. (2019). How universities can enhance student mental wellbeing: The student perspective. *Higher Education Research and Development*, **38**(4), 674–687. <https://doi.org/10.1080/07294360.2019.1576596>

Becker, A. E., Fay, K. E., Agnew-Blais, J., Khan, A. N., Striegel-Moore, R. H., & Gilman, S. E. (2011). Social network media exposure and adolescent eating pathology in Fiji. *The British Journal of Psychiatry: The Journal of Mental Science*, **198**(1), 43–50. <https://doi.org/10.1192/bjp.bp.110.078675>

Campo-Arias, A., & Villamil-Vargas, M. (2012). Risk of eating behavior disorder among medical students in Colombia [in Spanish]. *Revista Colombiana de Psiquiatría*, **41**(2), 328–339. [https://doi.org/10.1016/S0034-7450\(14\)60008-1](https://doi.org/10.1016/S0034-7450(14)60008-1)

Chan, Y. L., Samy, A. L., Tong, W. T., Islam, M. A., & Low, W. Y. (2020). Eating disorder among Malaysian university students and its associated factors. *Asia-Pacific Journal of Public Health*, **32**(6–7), 334–339. <https://doi.org/10.1177/1010539520947879>

Couturier, J. L., & Lock, J. (2006). Denial and minimization in adolescents with anorexia nervosa. *The International Journal of Eating Disorders*, **39**(3), 212–216. <https://doi.org/10.1002/eat.20241>

de Matos, A. P., Rodrigues, P. R. M., Fonseca, L. B., Ferreira, M. G., & Muraro, A. P. (2021). Prevalence of disordered eating behaviors and associated factors in Brazilian university students. *Nutrition and Health*, **27**(2), 231–241. <https://doi.org/10.1177/0260106020971136>

Dial, L. A., DeNardo, F. A., Fevrier, B., Morgan, A. L., Du, C., Tucker, R. M., ... Ludy, M. J. (2023). Comparing mental health and well-being of US undergraduate and graduate students during the early stages of the COVID-19 pandemic. *Journal of American College Health*, **71**(9), 2775–2785. <https://doi.org/10.1080/07448481.2021.1996372>

Fajardo-Gutiérrez, A. (2017). Measurement in epidemiology: Prevalence, incidence, risk, impact measures. *Revista Alergia Mexico*, **64**(1), 109–120. <https://doi.org/10.29262/ram.v64i1.252>

Fernandes, H. M., Soler, P., Monteiro, D., Cid, L., & Novaes, J. (2023). Psychometric properties of different versions of the body shape questionnaire in female aesthetic patients. *Healthcare*, **11**(18), 2590. <https://doi.org/10.3390/healthcare11182590>

Gailledrat, L., Rousselet, M., Venisse, J.-L., Lambert, S., Rocher, B., Remaud, M., ... Grall-Bronnec, M. (2016). Marked

body shape concerns in female patients suffering from rating disorders: Relevance of a clinical sub-group. *PLOS ONE*, **11**(10), e0165232. <https://doi.org/10.1371/journal.pone.0165232>

Ghafouri, K. J., Qadhi, A. H., Ghaith, M. M., Azhar, W. F., Azzeh, F. S., & Habibullah, M. M. (2021). Eating disorders amongst adolescents in Makkah: Effects of stress and smoking. *Medical Science*, **25**(110), 767–775. https://www.discoveryjournals.org/medalscience/current_issue/v25/n110/A3.htm

Ghamri, R. A., Alahmari, A. M., Alghamdi, L. S., Alamoudi, S. F., & Barashid, M. M. (2022). Prevalence and predictors of eating disorders: A cross-sectional survey of medical students at King Abdul-Aziz University, Jeddah. *Pakistan Journal of Medical Sciences*, **38**(6), 1633–1638. <https://doi.org/10.12669/pjms.38.6.5033>

Hoteit, M., Mohsen, H., Bookari, K., Moussa, G., Jurdi, N., & Yazbeck, N. (2022). Prevalence, correlates, and gender disparities related to eating disordered behaviors among health science students and healthcare practitioners in Lebanon: Findings of a national cross sectional study. *Frontiers in Nutrition*, **9**, 956310. <https://doi.org/10.3389/fnut.2022.956310>

Karir, S., Mohanan, S., & Jacob, G. P. (2023). Eating disorders and its association with body image perception and stress among medical students of a tertiary care centre in North Kerala. *International Journal of Academic Medicine and Pharmacy*, **5**(6), 1121–1124. <https://doi.org/10.47009/jamp.2023.5.6.229>

Kugu, N., Akyuz, G., Dogan, O., Ersan, E., & Izzic, F. (2006). The prevalence of eating disorders among university students and the relationship with some individual characteristics. *Australian and New Zealand Journal of Psychiatry*, **40**(2), 129–135. <https://doi.org/10.1111/j.1440-1614.2006.01759.x>

Lipson, S. K., & Sonnevile, K. R. (2017). Eating disorder symptoms among undergraduate and graduate students at 12 US colleges and universities. *Eating Behaviors*, **24**, 81–88. <https://doi.org/10.1016/j.eatbeh.2016.12.003>

Madsen, S. K., Bohon, C., & Feusner, J. D. (2013). Visual processing in anorexia nervosa and body dysmorphic disorder: Similarities, differences, and future research directions. *Journal of Psychiatric Research*, **47**(10), 1483–1491. <https://doi.org/10.1016/j.jpsychires.2013.06.003>

Manaf, N. A., Saravanan, C., & Zuhrah, B. (2016). The prevalence and inter-relationship of negative body image perception, depression and susceptibility to eating disorders among female medical undergraduate students. *Journal of Clinical and Diagnostic Research*, **10**(3), VC01–VC04. <https://doi.org/10.7860/JCDR/2016/16678.7341>

Masilamani, R., Aung, M. M. T., Othman, H., Abu Bakar, A., Keat, T. C., Ravichandran, S., ... Jagajantan, S. P. (2019). Stress, stressors and coping strategies among university nursing students. *Malaysian Journal of Public Health Medicine*, **19**(2), 20–28. <https://doi.org/10.37268/mjphm/vol.19/no.2/art.168>

Naeimi, A. F., Haghghian, H. K., Gargari, B. P., Alizadeh, M., & Rouzitalab, T. (2016). Eating disorders risk and its relation to self-esteem and body image in Iranian university students

of medical sciences. *Eating and Weight Disorders*, **21**(4), 597–605. <https://doi.org/10.1007/s40519-016-0283-7>

Opoku-Acheampong, A., Kretchy, I. A., Acheampong, F., Afrane, B. A., Ashong, S., Tamakloe, B., & Nyarko, A. K. (2017). Perceived stress and quality of life of pharmacy students in University of Ghana. *BMC Research Notes*, **10**, 1–7. <https://doi.org/10.1186/s13104-017-2439-6>

Osian, E. A., Ehwarime, T. A., & Igbinoba, O. (2020). Knowledge, attitude and utilization of school health services among senior secondary school students in Egor local government area, Benin City, Edo State. *International Journal of Tropical Disease & Health*, 1–9. <https://doi.org/10.9734/ijtdh/2020/v41i1230336>

Pengpid, S., Peltzer, K., & Ahsan, G. U. (2015). Risk of eating disorders among University students in Bangladesh. *International Journal of Adolescent Medicine and Health*, **27**(1), 93–100. <https://doi.org/10.1515/ijamh-2014-0013>

Qian, J., Wu, Y., Liu, F., Zhu, Y., Jin, H., Zhang, H., ... Yu, D. (2022). An update on the prevalence of eating disorders in the general population: a systematic review and meta-analysis. *Eating and Weight Disorders*, **27**(2), 415–428. <https://doi.org/10.1007/s40519-021-01162-z>

Rasolofotsialonina, N. H., Razafilisy J. L., Rahanitrandasana, E. O., Zafisoa, M. G., Raobelle, E. N. A., Rajaonarison, B. H., & Raharivelo, A. (2024). Assessment of the risk of eating disorders among medical students in Antananarivo, Madagascar. *World Journal of Advanced Research and Reviews*, **22**(1), 351–357. <https://doi.org/10.30574/wjarr.2024.22.1.1044>

Rauof, M., Ebrahimi, H., Jafarabadi, M. A., Malek, A., & Kheiroddin, J. B. (2015). Prevalence of eating disorders among adolescents in the northwest of Iran. *Iranian Red Crescent Medical Journal*, **17**(10), e19331. <https://doi.org/10.5812/ircmj.19331>

Safer, M., Zemni, I., Mili, M., Ghanaia, H. Ben, Salem, K. Ben, Zaafrane, F., & Abdelaziz, A. Ben. (2020). Eating disorders: Prevalence and associated factors among health occupation students in monastir university (Tunisia). *Tunisie Medicale*, **98**(12), 895–912. <https://pubmed.ncbi.nlm.nih.gov/33479992/>

Sahir, K., Tur, R. E., Husnain, R., Hafsa, S., Muhamad, S., Naureen, S., Zia, U.M., Noman, A., Khalid, H., Muhammad, T.K., Amer H.K., & Fahad, S.(2017). It's not just a "female issue": Eating attitudes and behaviors of Pakistani male and female pharmacy students. *Russian Open Medical Journal*, **6**(4), 406. <https://doi.org/10.15275/rusomj.2017.0406>

Seto, M., Usukura, H., Kunii, Y., Hamaie, Y., Kodama, E. N., Makino, Y., Kinouchi, Y., Ito, C., Ikeda, T., & Tomita, H. (2023). Mental health problems among university students under the prolonged COVID-19 pandemic in Japan: A repeated cross-sectional survey. *Tohoku Journal of Experimental Medicine*, **260**(1), 1–11. <https://doi.org/10.1620/tjem.2023.J012>

Smink, F. R. E., van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of eating disorders: incidence, prevalence and mortality rates. *Current Psychiatry Reports*, **14**(4), 406–414. <https://doi.org/10.1007/s11920-012-0282-y>

Sohail, N. (2013). Stress and academic performance among medical students. *Journal of the College of Physicians and Surgeons Pakistan*, **23**(1), 67–71. <https://pubmed.ncbi.nlm.nih.gov/23286627/>

Suhail, K., & Zaib-u-Nisa. (2002). Prevalence of eating disorders in Pakistan: Relationship with depression and body shape. *Eating and Weight Disorders: EWD*, **7**(2), 131–138. <https://doi.org/10.1007/BF03354439>

Tavolacchi, M. P., Grigioni, S., Richard, L., Meyrignac, G., Déchelotte, P., & Ladner, J. (2015). Eating disorders and behaviors among college students. *Journal of Nutrition Education and Behavior*, **47**, 412–420. <https://doi.org/10.1016/j.jneb.2015.06.009>

Tavolacci, M.-P., Déchelotte, P., & Ladner, J. (2020). Eating Disorders among college students in France: Characteristics, help-and care-seeking. *International Journal of Environmental Research and Public Health*, **17**(16), 5914. <https://doi.org/10.3390/ijerph17165914>

Vijayalakshmi, P., Thimmaiah, R., Reddy, S. S. N., Kathyayani, B. V., Gandhi, S., & BadaMath, S. (2017). Gender differences in body mass index, body weight perception, weight satisfaction, disordered eating and Weight control strategies among Indian Medical and Nursing Undergraduates. *Investigacion Y Educacion En Enfermeria*, **35**(3), 276–284. <https://doi.org/10.17533/udea.iee.v35n3a04>

Warren, C. S., Holland, S., Billings, H., & Parker, A. (2012). The relationships between fat talk, body dissatisfaction, and drive for thinness: Perceived stress as a moderator. *Body Image*, **9**(3), 358–364. <https://doi.org/10.1016/j.bodyim.2012.03.008>

WHO. (2022). *Mental disorders*. Retrieved June 18, 2024, from <https://www.who.int/news-room/factsheets/detail/mental-disorders>

Yan, J., Su, H., & Li, C. (2022). Effect of body dissatisfaction on binge eating behavior of Chinese university students: A moderated mediation model. *Frontiers in Psychology*, **13**(November). <https://doi.org/10.3389/fpsyg.2022.995301>

Zainal, N. H., Romziman, N. S., Aminuddin, B. A., Syed Idros, S. A. K., & Salem Wajih, W. A. (2021). The relationship of body image perception, self-esteem and academic performance in University of Cyberjaya (UoC) undergraduates. *Malaysian Journal of Medicine and Health Sciences*, **17**, 33–39. https://medic.upm.edu.my/upload/dokumen/2021122719112906_2021_0401.pdf