

# A Cross-Sectional Study Exploring the Relationship Between BMI and Nursing Students' Emotional Well-Being During the COVID-19 Pandemic

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**Background:** Having a weight problem can cause emotional distress, especially in students, who suffer from both issues at a high rate. As a result of the COVID-19 pandemic's negative impact on society, these problems can be significantly impacted. The study aims to investigate the relationship between nursing students' BMI and their mental well-being.

**Methods:** A cross-sectional study was conducted on 423 students from the second through fourth baccalaureate years of Science of Nursing program – KSA. The instrument for the study was an online questionnaire distributed to the students via Google Forms during the academic year 2021–2022 to collect data on the emotional state of students directly as a result of COVID-19 restrictions and limitations. The statistical analysis was carried out through Chi-square test was used to compare categorical data between groups and the Pearson coefficient is used to determine the correlation between two quantitative variables with normal distribution.

**Results:** There is a significant correlation between BMI with depression score, anxiety score and stress score. Higher BMI indicated 6.4 times more likeliness to have depression than lower BMI (OR = 6.4). Students who had higher BMI were 2.7 times more likely to have anxiety than those who had lower BMI (OR = 2.7), and 9.4 times more likely to have stress than those who had lower BMI (OR = 9.4).

**Conclusion:** Study findings indicate that nursing students' BMI increases as depression, anxiety, and stress increase. During the COVID-19 pandemic, participants reported increased weight due to increased stress levels and increased eating. Students in nursing should be aware of the importance of adopting healthy habits and following a healthy lifestyle.

**Keywords:** nursing students, BMI, emotional distress, COVID-19, pandemic

## Introduction

Over time, it has been discovered that being overweight or obese is linked to behavioral, social, and increasing intake of calorie-dense foods such as fast food. This is frequently seen as aggravating multiple factors, including biological, economic, and social problems. The weight problems have resulted in emotional distress, especially among students, as they are particularly vulnerable to high prevalence rates of both issues. Due to its detrimental effects on society, COVID-19's emergence as a pandemic has the potential to dramatically affect these issues. Since the pandemic was not fully recognized, COVID-19 has had a particularly negative impact on public health policy as well as crippled numerous healthcare delivery systems globally.<sup>1</sup> The COVID-19 pandemic has also had an impact on nursing practice and research, with students experiencing more stress in their classrooms.<sup>2</sup> As the predominance of anxiety may lead to compulsive overeating and the inability to control one's appetite, psychological stress can significantly contribute to obesity or weight gain. Overweight causes behavioral and emotional changes due to the subsequent environmental interactions that affect the individual's well-being.<sup>3</sup> Further, BMI is frequently a sign of issues with weight, including underweight, overweight, obesity, mental stress, and physical and psychological difficulties. As the main objective of this study, we intend to lay the groundwork for further research on the relationship between body mass index (BMI) and emotional distress among nursing students in a more extensive study population, as well as the potential impact of pandemics like COVID-19 on these relationships.

In everyday life, stress is frequently represented by outward behaviors and certain personalities. Due to pressure and demanding conditions connected with one's personal, social, and intellectual elements of life, stressors may come from several scenarios. These worries, adjustments, and distress could lead to stress and have detrimental effects on one's health if they are not addressed. The time between adolescence and adulthood is crucial in the lives of young people. They experience significant changes in their way of life, including leaving their homes and familiar environments, choosing careers, and forming relationships. Additionally, the dynamics of this phase of transition are influenced by a combination of psychological, social, and biological factors of an individual's life, which leaves students susceptible to emotional difficulties and behavioral issues including unhealthy eating patterns. Nursing students frequently encounter challenging circumstances, such as being overworked.<sup>4</sup> Interpersonal ties as well as those at work, school, and with family and friends are important in determining physical tiredness and distress, which in turn contributes to stress.<sup>5</sup> However, the scholastic expectations and uncertainties related to the nursing profession may cause a major psychological burden that results in alterations in behavior and way of life. Taking part in strenuous activities encourages students to consume more food, primarily outside of the home.<sup>6</sup> Long-term risks of obesity and weight gain increase for Students who do not eat balanced diets.

Students with higher BMIs are more likely to experience weight-related prejudice, which can cause emotional issues. Low self-esteem can cause serious depressive symptoms and persistent weight gain from emotional eating of comfort foods, which frequently have high-calorie counts.<sup>7</sup> As there is little literature and research on the relationship between nursing students' BMI and their emotional state, particularly during the COVID-19 pandemic outbreak, the stakeholders must understand the significant burden of weight problems and emotional challenges experienced by nursing students. The previous research has shown a substantial association between obesity and emotional health. In a research published in 2023, Hamurcu explored the link between perceived body weight or obesity and psychological suffering in college students.<sup>8</sup> They discovered that increased BMI was linked to higher levels of anxiety and despair. This is consistent with the present study's emphasis on nursing students' mental health concerning BMI. The COVID-19 pandemic is acknowledged as a severe stressor that may impact BMI and mental health. The psychological effects of the pandemic on the general population were examined in research.<sup>9</sup> They discovered greater stress and anxiety levels were linked to more emotional eating and weight gain. This shows that the present study's findings of changes in BMI and emotional well-being among nursing students may be influenced by pandemic-induced stress.

Also, Sánchez-Sánchez et al investigated how stress and eating patterns changed in Spain during the COVID-19 pandemic. They identified a significant link between high-stress levels and poor eating habits, including more high-calorie items.<sup>10</sup> The research strongly emphasized how academic stress influences food choices, which may affect BMI and psychological health. The present research aims to determine the association between emotional distress and BMI in nursing students, and this understanding complements that goal. Moreover, another study conducted by Auny et al explored weight-based stigma and mental health.<sup>11</sup> According to their study, societal stigma diminishes self-esteem and increases depression risk in persons with higher BMI. This supports the present study's emphasis on emotional well-being, particularly the possible emotional discomfort experienced by nursing students with higher BMI owing to weight-related stigma.

Although earlier research has assessed the connection between BMI, mental health, and stress, there is a significant vacuum in the body of knowledge about nursing students. Demanding academics, clinical obligations, and patient care are just a few challenges nursing students must deal with.<sup>12</sup> Limited Exploration During a Pandemic and only few research has examined these dynamics in the context of a worldwide pandemic such as COVID-19, even though the influence of stress on eating habits and BMI is well acknowledged. Lockdowns, distant learning, and more serious health problems were all unheard-of pressures brought on by the epidemic. These elements could make the link between BMI and mental health worse. This vacuum is partly filled by the present study's emphasis on the COVID-19 pandemic and its implications on nursing students' mental health and BMI. Compared to the general population or other student groups, these characteristics may have distinct interactions with BMI and mental health. The present research aims to bridge this knowledge gap by offering insights into this particular group of people.

However, measures of emotional well-being and self-reported BMI were often used in earlier studies. However, a thorough evaluation could also include other metrics, including food habits, levels of physical activity, and social

support networks. These elements may impact the intricate relationship between BMI and mental health. This association is better understood because of the cross-sectional strategy used in the present research, which also includes several quantitative measurements. Thus, this study examined how BMI correlates with emotional states among nursing students.

## Materials and Methods

### Study Design and Population

During the 2021–2022 academic year, a cross-sectional study was conducted on all nursing students from the second through fourth baccalaureate year, at Nursing College of Princess Nourah bint Abdulrahman University (PNU), Riyadh – KSA. Due to their limited participation in nursing studies until after their foundational year, first-year students were excluded from the study.

About 423 out of the 448 total students agreed to take part in the study. The faculty management gave written authorization to permit the lawful collection of student data. In addition, a pilot study was conducted on 10% of students who did not participate as study subjects in order to test the applicability and transparency of the same tool used in the full research and identify any potential problems that might interfere with data collection. The internal consistency of the tool was also evaluated through the use of Cronbach's alpha coefficient test to assess the reliability of the questionnaire ( $\alpha = 0.954$  at  $p \leq 0.05$ ).

### Research Instruments

To fulfill the needs of the study, a questionnaire was curated and distributed to the students via Google Forms for the year 2021–2022. This was done to collect data such as:

### Personal Data

Students were mostly requested to provide general information like their age and academic year.

### Anthropometric Measurements

Each participant's height (m) and weight (kg) were reported. Using the BMI for age and sex Z-scores (overweight:  $> + 1$  SD, obesity:  $> + 2$  SD, and thinness:  $- 2$  SD), the BMI was computed (body weight in kg/height in m<sup>2</sup>)<sup>13</sup> and categorized in students aged 17 to 19 years.<sup>14</sup> BMI less than 18.5 kilograms per square meter for adults (Z 19 years) was categorized as underweight, 25–29.9 as overweight, and more than 30 as obese.

### Depression Anxiety Stress Scales (DASS-21)

Translated version of Depression Anxiety Stress Scales (DASS-21) was administered to the participants,<sup>15</sup> a collection of three self-report scales originally designed to measure the negative emotional states of anxiety, depression, and stress. A four-point Likert scale was used to evaluate seven items from each DASS for severity and frequency to determine the degree to which participants experienced each state during the preceding week. The scores for the relevant items (on each scale) will be added up, and the total will be multiplied by two to determine the ratings for anxiety, depression, and stress. Three emotional states were categorized as clinically significant and nonsignificant symptoms. Cutoff scores of 14/15 for anxiety, 20/21 for depression, and 25/26 for stress are used to identify students with clinically significant symptoms (severe/extremely severe). This study created a special DASS-21 version to determine how COVID-19 affected the participants' emotional states.

### Ethical Consideration

The Institutional Review Board (IRB) of PNU, gave ethical approval to this study with the IRB Log Number: 22–0014. Each participant provided voluntary, informed consent before participating. There were no participants under the age of 18 in the study sample, thus there was no requirement that they obtain parental consent. In addition, all study participants were informed that their anonymity would be maintained and that they could withdraw from the study at any time.

## Data Analysis

Statistical analyses were conducted using IBM SPSS version 21.0. The significance of the results was determined to be  $p \leq 0.05$ . Chi-square test was used to compare categorical data between groups. When more than 20% of the cells have an anticipated count of less than 5, Fisher's exact adjustment is applied to the chi-square test. An event's probability of occurring in one risk group compared to its probability in a non-risk group can be calculated using the odds ratio (OR). The Pearson coefficient is used to determine the correlation between two quantitative variables with normal distribution.

The dependent variables in this study are the three emotional states (labeled clinically significant and nonsignificant symptoms), while the independent variables were the BMI categories.

## Results

In the academic year 2021–2022, 423 out of 448 students responded. About 29.6% of the students were enrolled in their second year, 34.0% were in their third year, and 36.4% were in the fourth year. In regard to age in years, almost a fifth of the students (19.9%) were under the age of 20, more than half (59.3%) were between the ages of 20 and 21, and more than one-fifth (20.8%) were aged 22 or older (Table 1). Regarding the mental health of students during the Covid-19 pandemic, 40.2% were found to be suffering from severe and extremely severe anxiety. Moreover, 39.9% were feeling depressed and 33.8% were stressed (Figure 1). According to the BMI data, 14.7% of students were underweight, 45.2% were normal weight (18.5–24.9), 28.8% were overweight (25–29.9), and 11.3% were obese (30.0–34.9).

Table 2 shows the correlation between students' mental health scores and BMI. BMI exhibited a statistically significant positive connection with stress, anxiety, and depression scores ( $p \leq 0.05$ ).

Regarding the relationship between students' BMI and mental health during the COVID-19 pandemic, as seen in Table 3, BMI was found to have a statistically significant correlation with anxiety, stress, and depression scores. As a result, students with higher BMIs were 6.4 times more likely than those with lower BMIs to experience depression (OR = 6.4). Higher BMI students were 2.7 times more likely to experience anxiety than lower BMI students (OR = 2.7). Higher BMI students were 9.4 times more likely to experience stress than lower BMI students (OR = 9.4).

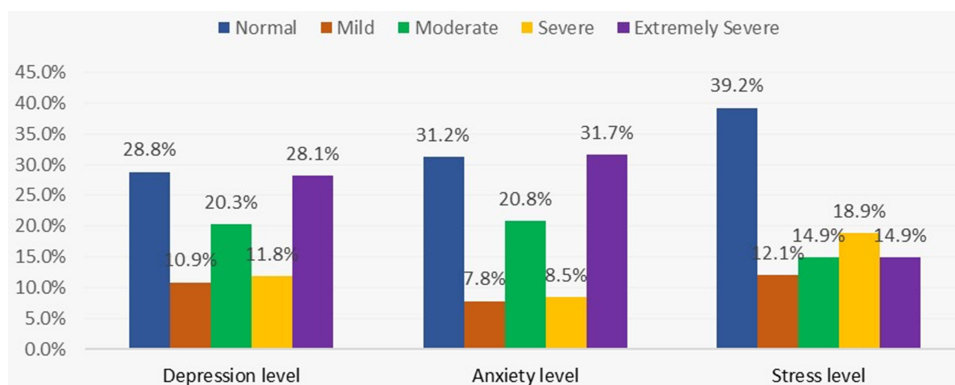
## Discussion

This study investigated the relationship between BMI and emotional well-being among nursing students during COVID-19 episode that had an impact on all humanity.

According to the results of the present study, 20.3% and 39.9% of nursing students had moderate and severe depression respectively. In terms of anxiety, 20.8% and 40.2% reported moderate and severe anxiety respectively. About 14.9% of people reported moderate stress, while 33.8% reported moderate to severe stress. A study in China done by Wang et al explored the psychological effects of the COVID-19 pandemic demonstrated that a total of 28.8% of those participating in the study had moderate to severe symptoms of anxiety, 16.5% had moderate to severe symptoms of depression, and 8.1% had moderate to severe signs of stress.<sup>16</sup> In comparison, the participants in the current study showed higher levels of depression, stress, and anxiety. This may indicate a greater need for mental health care, both preventive and curative.

**Table 1** Personal Data of Study Students

| Personal Data        | No. n=423 | %     |
|----------------------|-----------|-------|
| <b>Academic year</b> |           |       |
| 2nd                  | 125       | 29.6% |
| 3rd                  | 144       | 34.0% |
| 4th                  | 154       | 36.4% |
| <b>Age in years</b>  |           |       |
| < 20                 | 84        | 19.9% |
| 20–21                | 251       | 59.3% |
| 22+                  | 88        | 20.8% |



**Figure 1** Mental health of study students during covid-19 pandemic.

Based on this study, fourth-year students have the highest levels of anxiety, followed by third-year students. As students’ age increased, their depression levels increased as well. The mean depression score of students in the youngest age group was lower during the COVID-19 pandemic.

Conversely, in other studies, those who were younger had higher averages of depression than others and younger individuals tended to score higher on anxiety, stress, and depression scales.<sup>17–19</sup> Other studies have shown that depression did not appear to be correlated with age.<sup>20</sup> Differences in the results may be attributed to a number of factors, including social, age groups differences, cultural, and educational factors. However, in the present study the age differences between the groups were generally small, and this result was not statistically significant.

The findings of the current study revealed that the BMI of the students is closely related to their feelings of stress, anxiety, and depression, which is similar to the findings of the following studies, some of which were obtained before the COVID-19 pandemic, which is considered a cause of emotional distress in this study.

A study that was done in Saudi Arabia showed a statistically significant relationship between the obesity and mental health.<sup>16,21</sup> In addition, it was indicated in six European countries that obese people are more likely than average-weight people to be afflicted with mood disorders or other mental health conditions.<sup>22</sup>

**Table 2** Correlation Between Students BMI and Mental Health Scores

| Mental Health    | BMI   |        |
|------------------|-------|--------|
|                  | r     | p      |
| Depression score | 0.278 | 0.001* |
| Anxiety score    | 0.299 | 0.001* |
| Stress score     | 0.311 | 0.001* |

**Notes:** r: Pearson correlation coefficient. \*p ≤ 0.05 (significant).

**Table 3** Relation Between Students’ BMI and Their Mental Health During the COVID-19 Pandemic

| BMI           | Depression |       | OR (95% CI)      | Anxiety |       | OR (95% CI)      | Stress |       | OR (95% CI)      |
|---------------|------------|-------|------------------|---------|-------|------------------|--------|-------|------------------|
|               | No         | %     |                  | No      | %     |                  | No     | %     |                  |
| Underweight   | 38         | 61.3% | 0.91 (0.51–1.65) | 34      | 54.8% | 0.64 (0.85–1.14) | 30     | 48.4% | 0.80 (0.45–1.42) |
| Normal weight | 121        | 63.4% | 1                | 125     | 65.4% | 1                | 103    | 53.9% | 1                |
| Overweight    | 98         | 80.3% | 2.4 (1.4–4.0)*   | 92      | 75.4% | 1.6 (1.0–2.7)*   | 80     | 65.6% | 1.6 (1.1–2.6)*   |
| Obese         | 44         | 91.7% | 6.4 (2.2–18.5)*  | 40      | 83.3% | 2.7 (1.2–5.9)*   | 44     | 91.7% | 9.4 (3.2–20.9)*  |

**Note:** \*p ≤ 0.05 (significant).

**Abbreviations:** OR, Odds Ratio; CI, Confidence interval.

Furthermore, a systematic review found that those with depression had a higher risk of becoming obese and that over the time, those who are obese are more likely to develop depression.<sup>23</sup> In Iran, individuals with a BMI of 25 or above had a higher mean depression score, according to the findings of a study that looked into the relationship between BMI and depression.<sup>24</sup> Additionally, those who were slightly obese reported mild depression, whereas those who were obese experienced serious depression, based on a study that analyzed BMI and depression relationship among university students.<sup>25</sup>

The findings of an additional study looking at emotional eating, depression, and BMI relationship across 2534 students enrolled in seven United States universities, presented that there was a link between these behaviors and BMI values.<sup>26</sup> Also, a study done in Netherlands reported an association that was evidenced between women's depression and their BMI in a study on emotional eating, depression, and obesity.<sup>27</sup>

In Mexico, the results of a study explored association of mental health with weight gain confirmed that obesity and depression symptoms are directly linked.<sup>28</sup>

In the present study, 22.7% of respondents said that their weight had increased since the COVID-19 pandemic, and 22.5% said it had gone up significantly more than usual. This is in line with what was reported by Santos LMD. Who concluded that the pandemic drives people's stress levels to rise, and there is a high likelihood that this will lead to emotional eating on their part.<sup>29</sup> Similarly, Serin E and Koc MC in 2020 stated that there is a strong correlation between depression levels and emotional eating habits during COVID-19 among university students.<sup>17</sup>

Overall, it can be concluded that the emotional distress that rise during the COVID-19 pandemic may lead to an increase in BMI over time, and thus obesity, which in turn may increase the severity of COVID-19 and the risk of getting certain diseases such as type II diabetes and cardiovascular diseases.<sup>30,31</sup>

## Future Implications

Despite the restrictions and difficulties, various stressors for nursing students were noted, which can assist with the creation of more effective methods for students to lessen the excitement associated with being overweight. University students need to be educated about better lifestyle options, among them are a healthy diet, regular exercise, stress management, and the attendance of university events that support a healthy lifestyle. To fully understand the correlation between body weight and emotional well-being, further research is needed. In order to gather comparable data for precise future analysis, these studies should be carried out routinely and not just during difficult circumstances.

## Limitations

The study was conducted on female nursing students enrolled in one college.

## Conclusion

The present study highlights the relationship between nursing students' BMI and their emotional well-being during the COVID-19 pandemic. Based on the results of this study, several important conclusions can be drawn. Findings indicate that BMI increases with increased depression, anxiety, and stress. Furthermore, participants reported gaining weight during the COVID-19 pandemic due to elevated stress levels and increased eating under stressful circumstances. Also, higher BMI students were more likely to experience depression, anxiety, and stress. Nursing students are exposed to various stressors, so it is essential to educate them about the importance of adopting healthy habits including exercise, healthy food choices, and following a healthy lifestyle. Further studies are recommended to compare other variables and to include male students and more nursing colleges.

## Data Sharing Statement

The corresponding author can provide the data presented in this study upon request. As a result of privacy restrictions, the data cannot be made public.

## Institutional Review Board (IRB) Statement

The IRB has confirmed that this project poses minimal risk to the participants. Therefore, the proposal is considered an EXPEDITED IRB review.

## Informed Consent Statement

Informed consent was acquired from all participants. The study complies with the Declaration of Helsinki.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors report no commercial or financial relationships that could be construed as potential conflicts of interest in the research.

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