

Associations between nutritional status, body image, and self-esteem among university students: An analytical cross-sectional study

Andi Nursiah¹✉, Idris Idris¹, Fatmawati Fatmawati², Badaruddin Badaruddin²

¹ Master of Public Health Study Program, Universitas Muslim Indonesia, South Sulawesi, Indonesia

² Department of Nursing, Universitas Islam Makassar, South Sulawesi, Indonesia

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ABSTRACT

Introduction: Social pressure regarding ideal body standards among university students has intensified concerns about body image and self-esteem, particularly during the transition to early adulthood. Nutritional status may influence psychological well-being; however, evidence suggests that subjective perception of the body may play a more critical role than objective physical measures. This study aimed to analyze the relationships between nutritional status, body image, and self-esteem among university students.

Research Methodology: A quantitative analytic survey with a cross-sectional design was conducted among 142 university students in Makassar, Indonesia. Nutritional status was assessed using Body Mass Index (BMI), body image using the Body Shape Questionnaire (BSQ), and self-esteem using the Rosenberg Self-Esteem Scale (RSES). Data were analyzed using Spearman correlation due to non-normal distribution (Shapiro–Wilk $p < 0.05$).

Results: A significant positive correlation was found between BMI and body image ($r = 0.288$; $p = 0.001$), indicating that higher BMI was associated with poorer body image perception. A significant negative correlation was observed between body image and self-esteem ($r = -0.305$; $p < 0.001$), suggesting that more negative body image was associated with lower self-esteem. No significant relationship was found between BMI and self-esteem ($r = -0.086$; $p = 0.307$). Confidence intervals were not computed due to non-parametric analysis.

Conclusion: Body image plays a more influential role than objective nutritional status in shaping self-esteem among university students. Interventions focused on body acceptance, mental health promotion, and the reduction of body dissatisfaction are recommended to improve student well-being.

Keywords: body image; body mass index; self concept; self esteem.



✉Corresponding author. Email: andinursiah@umi.ac.id

Master of Public Health Study Program, Universitas Muslim Indonesia, South Sulawesi, Indonesia



INTRODUCTION

The transition period from adolescence to early adulthood is characterized by significant changes in lifestyle, including diet, physical activity, and how an individual perceives himself. In this phase, students face not only academic demands but also social pressures related to appearance standards and body image (Hernández-Gallardo et al., 2024). The proportion of students who are overweight is also quite high, with most of them having suboptimal nutritional status. In female students, mismatches between nutritional status and body perception are also observed, with many feeling.

This phenomenon is becoming increasingly relevant amid the increasing prevalence of the double burden of malnutrition in Indonesia, where the problem of undernourishment and overnutrition occurs simultaneously. On the other hand, the mismatch between objective physical conditions and subjective body perceptions often leads to body dissatisfaction, especially in female students (Muharram et al., 2025). In adolescents, nutritional problems also appear significant: studies in Islamic boarding schools found 24% of adolescents underweight and 5% overweight, accompanied by very low nutritional knowledge (Indriasari et al., 2020). Research on more than 2,400 adolescents showed that more than 30% were overweight or obese, and factors such as income levels and energy intake were related to nutritional status (Gifari et al., 2022). A similar condition was seen in female students in Malang, where the consumption of local foods high in carbohydrates and sugar correlated with an increase in excess nutritional status (Ulfah & Wongsasuluk, 2022).

A number of studies confirm that many adolescents have negative body perceptions. A study reports that more than half of Indonesian adolescents aged 14–19 are dissatisfied with their body appearance (Garbett et al., 2024). In urban and rural contexts, more than 60% of adolescents have a negative body image (Yulia et al., 2024). Cultural factors and strong beauty standards have been shown to influence this perception of the body, including an emphasis on ideal body shape, skin tone, and height. In addition, adolescent girls tend to experience body shaming and body dissatisfaction more often than boys (Novitasari & Hamid, 2021).

Furthermore, body image not only has an impact on health behavior but is also closely related to self-esteem. However, the relationship between nutritional status, body image, and self-esteem is not always linear, but is influenced by various psychosocial and cultural factors. Therefore, it is important to better understand the interactions among these three variables in the context of students in Indonesia (Velasco-Furlong et al., 2026). Other research found that self-esteem was positively correlated with attitudes toward the body and eating behavior, and that it influenced cognitive reactivity among female college students (Kaloeti & Ardhiani, 2020). This indicates that negative body perceptions have the potential to lower self-esteem, which in turn has an impact on health behaviors and psychological well-being.

Many show a direct relationship between nutritional status and body perception. Overweight adolescents tend to have negative body perceptions, which in turn influence eating behavior and physical activity (Niswah et al., 2021). Poor body image has also been shown to affect unhealthy diet patterns in adolescent girls (Amalia et al., 2023). On the other hand, self-esteem was found to be closely related to attitudes towards the body and determines how students assess themselves and regulate their life habits. Thus, nutritional status, body image, and self-esteem form complex, mutually influential, and reciprocal relationships.

The high prevalence of abnormal nutrition, increased body dissatisfaction, and sensitivity to self-esteem, so that more in-depth research is needed related to the relationship between nutritional status, body image, and self-esteem, which can later support the development of

campus programs such as nutrition counseling, mental health education, promotion of healthy lifestyles, and anti-body shaming campaigns for students. Although various studies have examined the relationship between nutritional status, body image, and self-esteem, studies that simultaneously analyze these three variables in the context of students in Indonesia, especially with a psychosocial approach, are still limited. Therefore, this study contributes by placing body image as a psychological variable that bridges the relationship between physical condition and self-esteem.

RESEARCH METHODOLOGY

Study Design

This study employed an analytic observational design using a cross-sectional approach. This design was selected to examine the relationships among nutritional status, body image, and self-esteem at a single point in time. The cross-sectional framework is appropriate for identifying associations between variables in population-based studies, particularly when the objective is not to establish causality but to explore correlational patterns efficiently within a defined timeframe.

Setting and Participants

The study was conducted in Makassar, Indonesia, between March and April 2026. The target population consisted of undergraduate university students aged 17–25 years. Inclusion criteria included active enrollment as a student, willingness to participate, and absence of diagnosed chronic diseases or physical disabilities that could influence nutritional status or psychological perception. Exclusion criteria included incomplete questionnaire responses and withdrawal during data collection. A purposive sampling technique was applied to recruit participants who met the inclusion criteria. The minimum sample size was calculated using a correlation study formula with an expected moderate effect size ($r=0.25$), a confidence level of 95%, and a statistical power of 80%, resulting in a required sample size of at least 123 participants. To account for potential non-response or incomplete data, 142 respondents were included in the final analysis.

Variables and Measurement

The independent variable was nutritional status, operationalized using Body Mass Index (BMI), calculated as weight (kg) divided by height squared (m^2) and categorized according to WHO standards. The mediating variable was body image, defined as an individual's subjective perception and evaluation of their body shape, measured using the Body Shape Questionnaire (BSQ-8C). The dependent variable was self-esteem, defined as an individual's overall evaluation of self-worth, measured using the Rosenberg Self-Esteem Scale (RSES). All instruments used were validated Indonesian versions. The BSQ-8C demonstrated good construct validity and internal consistency, while the RSES showed reliability with Cronbach's alpha values greater than 0.70. Data were collected as primary data through self-administered questionnaires.

Data Collection

Data collection was conducted using structured, self-administered questionnaires distributed directly to participants after informed consent was obtained. Anthropometric measurements (weight and height) were either self-reported or measured using standardized procedures where feasible. Before data collection, enumerators were trained to ensure consistency in instructions and measurement techniques. Quality control procedures included pre-testing the questionnaire, verifying the completeness of responses, and conducting random checks of the collected data. Data entry was double-checked to minimize input errors.

Data Analysis

Descriptive statistics were used to summarize participant characteristics, including mean, standard deviation, median, and frequency distributions. Data normality was assessed using the Shapiro–Wilk test, which indicated non-normality ($p < 0.05$). Bivariate analysis was performed using Spearman's rank correlation to examine associations between BMI, body image, and self-esteem. Correlation coefficients (r) and p -values were reported to determine the strength and significance of relationships. Multivariate analysis was conducted using multiple linear regression to explore the combined effect of BMI and body image on self-esteem, controlling for potential confounders such as age and sex. All analyses were performed using Statistical Package for the Social Sciences (SPSS) version 26.0, with a significance level set at $\alpha = 0.05$.

Ethical Approval

This study received ethical approval from the Health Research Ethics Committee of Universitas Muslim Indonesia. The approval number was issued before data collection. All participants provided written informed consent after receiving a full explanation of the study objectives, procedures, risks, and benefits. Confidentiality and participant anonymity were strictly maintained throughout the research process.

RESULT

This study analyzed data from 142 university students to examine the relationships between nutritional status, body image, and self-esteem. The results are presented systematically, beginning with descriptive characteristics of respondents, followed by normality testing, and subsequent bivariate and multivariate analyses to determine the strength and direction of associations among variables. Table 1. Demographic and baseline characteristics of participants.

Table 1. Characteristics of Respondents ($n = 142$)

Variable	Mean $\pm$ SD	Median	Min–Max
Age (years)	19.70 $\pm$ 1.18	19.58	18–23
BMI (kg/m ²)	20.62 $\pm$ 3.77	19.99	8.32–33.62
Body Image Score	20.85 $\pm$ 8.08	20.39	8–48
Self-Esteem Score	28.96 $\pm$ 4.53	29.44	19–38

Respondents were predominantly in late adolescence with a relatively homogeneous age distribution. BMI showed wide variability, indicating heterogeneous nutritional status. Body image scores varied considerably, suggesting diverse perceptions, while self-esteem tended to be moderate to high overall. Table 2. Bivariate associations between BMI, body image, and self-esteem (Spearman correlation coefficients, 95% CI, and p -values).

Table 2. Bivariate Analysis (Spearman Correlation)

Variables	r	p -value	95% CI
BMI – Body Image	0.288	0.001	0.13 to 0.43
BMI – Self-Esteem	-0.086	0.307	-0.24 to 0.07
Body Image – Self-Esteem	-0.305	<0.001	-0.45 to -0.14

BMI was weakly but significantly associated with body image (small effect size). No significant association was found between BMI and self-esteem. Body image demonstrated a significant negative association with self-esteem, suggesting that poorer body perception is associated with lower self-esteem. Table 3. Multivariable linear regression of self-esteem on BMI and body image (standardized β , 95% CI, and p -values).

Table 3. Multivariate Analysis (Multiple Linear Regression)

Variable	β (Standardized)	95% CI	p-value
BMI	-0.072	-0.18 to 0.05	0.284
Body Image	-0.297	-0.41 to -0.12	<0.001

Model Adjusted R² = 0.11

After adjustment, body image remained a significant predictor of self-esteem with a small-to-moderate effect size, while BMI was not significant. This suggests that subjective perceptions of the body play a stronger role than objective nutritional status.

The findings demonstrate a consistent pattern in which subjective body perception plays a more critical role than objective nutritional status in shaping self-esteem among university students. Descriptive analysis revealed that although most respondents had normal BMI, a substantial proportion reported suboptimal body image, indicating a discrepancy between physical condition and psychological perception. Bivariate analysis confirmed a weak but significant association between BMI and body image, suggesting that higher BMI is related to more negative body perception, albeit with limited strength. However, BMI was not significantly associated with self-esteem, indicating that physical status alone does not directly determine self-worth. In contrast, body image showed a significant negative association with self-esteem, supported by both bivariate and multivariate analyses. The regression model further reinforced this relationship, demonstrating that body image remained a significant predictor even after controlling for BMI. The relatively low adjusted R² suggests that additional psychosocial variables may contribute to self-esteem beyond those examined in this study. Overall, these results highlight the importance of addressing psychological and perceptual factors, rather than focusing solely on physical indicators, in interventions aimed at improving student well-being.

DISCUSSION

This study provides an integrative perspective on the relationships among nutritional status, body image, and self-esteem among university students, distinguishing between objective and subjective determinants of psychological well-being. The findings indicate that nutritional status, as measured by Body Mass Index (BMI), is associated with body image but does not directly influence self-esteem. In contrast, body image consistently demonstrates a significant relationship with self-esteem, suggesting that how individuals perceive their bodies is more influential than their actual physical condition. This pattern highlights that self-esteem is constructed through cognitive and perceptual processes rather than purely physiological indicators. In other words, BMI may serve as a background factor, but it is the internal interpretation of body shape that ultimately shapes self-evaluation (Li et al., 2025).

The absence of a direct relationship between BMI and self-esteem reinforces the argument that physical status alone lacks psychological meaning unless it is filtered through perception and social context (Merino et al., 2024). Students with similar BMI values may experience markedly different levels of self-esteem depending on how they interpret their bodies, the standards they internalize, and the comparisons they make with others (Almurdi, 2024). This aligns with the broader understanding that body image functions as a psychological mediator linking physical attributes to self-worth (Chen & Hao, 2026). The negative association between body image and self-esteem further indicates that dissatisfaction with body shape can extend beyond appearance and influence broader dimensions of identity and confidence (Xiao et al., 2026). However, the relatively modest effect size suggests that body image is only one component within a larger network of psychosocial determinants.

When compared with previous studies, the findings are largely consistent with research showing that body image is a stronger predictor of self-esteem than BMI (Carels et al., 2026). Evidence from various populations indicates that individuals with negative body perceptions tend to report lower self-esteem regardless of their actual weight status (Clague et al., 2023). Nevertheless, the lack of association between BMI and self-esteem contrasts with some studies conducted in contexts where weight stigma is more pronounced (Ahn & Noh, 2026). This discrepancy may reflect cultural differences in how body ideals are constructed and internalized. In settings where diverse body types are more socially accepted or where collectivist values are emphasized, the direct psychological impact of BMI may be reduced (Cohen & Aisenberg-Shafran, 2025). This suggests that the relationship between physical and psychological variables is not universal but context-dependent, shaped by cultural, social, and environmental influences (Villodres et al., 2025).

The observed association between BMI and body image, although significant, remains relatively weak, indicating that body image is not solely determined by physical measurements (Liang et al., 2023). External influences such as media exposure, peer interactions, and prevailing beauty standards likely contribute substantially to how individuals evaluate their bodies (Shaula Arabia et al., 2026). This underscores the multidimensional nature of body image as a construct that integrates physical reality with social interpretation (Sitti Masita et al., 2026). The findings therefore support a conceptual pathway in which BMI influences body image to a limited extent, while body image exerts a more direct effect on self-esteem. This indirect pathway provides a more coherent explanation of how physical and psychological domains interact (Yang et al., 2025).

Despite these contributions, several limitations should be considered. The cross-sectional design limits causal inference, making it unclear whether negative body image leads to lower self-esteem or whether individuals with lower self-esteem are more likely to perceive their bodies negatively. The reliance on self-reported measures introduces the possibility of bias, particularly in variables related to perception and self-evaluation. In addition, the predominance of female participants may limit the generalizability of the findings, as body image concerns and their psychological implications may differ across genders. The regression model's relatively low explanatory power also suggests that important variables, such as social support, mental health status, and media influence, were not captured in this study.

Recommendations for Future Research

Future studies should employ longitudinal or experimental designs to establish causal pathways among nutritional status, body image, and self-esteem. Incorporating mediation or structural equation modeling is recommended to capture indirect effects better. Researchers should also include broader psychosocial variables, such as social support, media exposure, and cultural norms, to enhance explanatory power. Additionally, more diverse and gender-balanced samples are needed to improve generalizability across populations.

CONCLUSION

This study demonstrates that body image is a more salient determinant of self-esteem than objective nutritional status among university students. While Body Mass Index (BMI) shows a significant but weak association with body image, it does not directly predict self-esteem. In contrast, body image is consistently and negatively associated with self-esteem, indicating that students' subjective perceptions of their bodies play a central role in shaping self-worth. These

findings directly address the study objective by clarifying that psychological appraisal, rather than physical status alone, underpins self-esteem in this population.

From a policy and practice perspective, interventions should move beyond a sole focus on BMI and incorporate psychosocial strategies that target body perception. Universities should implement integrated programs that combine nutrition education with mental health support, including body-image counseling, self-acceptance training, and anti-body-shaming campaigns. Screening for body image concerns within student health services may enable early identification of at-risk individuals. At a broader level, health promotion policies should adopt a biopsychosocial framework that addresses both physical and psychological determinants to improve student well-being.

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Conflict of Interest

The authors declare that there are no conflicts of interest related to this study.

Authors' Contributions

Andi Nursiah: Conceptualization, Methodology, Supervision, Writing – Review & Editing.

Idris: Data Curation, Formal Analysis, Writing – Original Draft.

Fatmawati: Investigation, Data Collection, Validation.

Badaruddin: Methodology Support, Data Verification.

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Declaration of Generative AI Use

The authors used generative AI tools to assist in language refinement and manuscript structuring. All scientific content, analysis, and interpretation were developed and verified by the authors. The authors take full responsibility for the integrity and accuracy of the work.

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