

RESEARCH ARTICLE

The Relationship Between *Self-Esteem* and Body Mass Index (BMI) Levels in Female High School Students at Muhammadiyah 2 Private High School in Medan

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Abstract: Self-esteem refers to an individual's perception of how they evaluate or value themselves. This evaluation can be either positive or negative. Body Mass Index (BMI) is the ideal body weight calculated from an individual's weight and height. Weight is used as an indicator to assess nutritional status and the growth and development of children. This study is a descriptive analytic research with a cross-sectional design. The research examines the relationship between self-esteem and Body Mass Index (BMI) levels in adolescent female students by administering the Rosenberg Self-Esteem Scale (RSES) questionnaire as a measurement tool. The study sample consists of 80 participants, divided into three strata. Data analysis was performed using univariate and bivariate Chi-Square tests. The results of the test showed a significant relationship between self-esteem and Body Mass Index (BMI) levels in adolescent female students at Muhammadiyah 2 Private High School in Medan, with a significant p-value of <0.001 ($p<0.05$). In addition, the study also assessed demographic characteristics to understand the proportion of self-esteem and BMI levels in adolescent female students at Muhammadiyah 2 Private High School in Medan. A significant relationship was found between self-esteem and Body Mass Index (BMI) levels in adolescent female students at Muhammadiyah 2 Private High School in Medan.

Keywords: Weight, Body Mass Index, Self-esteem.

INTRODUCTION

Body weight is the most important anthropometric measurement used for health checks across all age groups. Body weight is used as an indicator to assess nutritional status and the growth and development of children.¹ Body weight is measured using a weighing scale with the unit of measure being kilograms (kg). By knowing an individual's body weight, we can estimate their health or nutritional status. Developing countries are a group of countries where the prevalence of overweight individuals reaches 27%.² According to the 2018 Basic Health Research (Risikesdas), individuals over 18 years of age show 13.5% being overweight and 21.8% being obese, which indicates an increase compared to 2013 when the prevalence of overweight was 11.5% and obesity was 14.8%.³

Adolescence is a transitional phase from childhood to adulthood. During adolescence, significant physical changes and socio-emotional development occur. Biologically, physical changes in adolescents are marked by puberty, where each individual's body matures rapidly, including changes in body shape and hormones. As physical changes occur during adolescence, it is not uncommon for individuals to accept and feel dissatisfied with the changes happening in their bodies. Therefore, adolescents begin to pay attention to and become aware of their appearance, including their perception of body image. Body image is a reflection of an individual's

cognition, affection, and attitude toward their own body.⁴ Nearly 40% of women aged 15-24 feel that their weight is higher than the normal BMI (Body Mass Index), and more than 27% of them have a normal weight.⁵ This results in negative impacts on nutritional status and affects the adolescents' eating habits. This is also consistent with research data stating that 86% of obese adolescents believe and perceive that they are above average in weight, and 25.3% of them are making efforts to lose weight.⁶

There are several factors that can affect BMI, namely: (1) age, the prevalence of obesity increases continuously from the ages of 20 to 60 years. After the age of 60, the rate of obesity decreases; (2) gender, males are more likely to experience overweight than females. The distribution of body fat also differs between males and females, with males tending to have more visceral obesity than females; (3) genetics, some studies suggest that genetic factors influence an individual's body weight. Research also proves that obese parents result in the highest proportion of obese children; (4) eating habits, fast food consumption is also linked to the epidemiology of obesity. In addition, factors that contribute to the increase in obesity include increased portion sizes; (5) physical activity, in recent times, the level of physical activity has drastically decreased over the past 50 years, along with the increased use of household appliances, the replacement of

manual labor with machines, and the rise of transportation and recreational activities.⁷

In general, self-esteem is related to social skills, academic abilities, and physical appearance. According to Branden, self-esteem is: (1) the belief and ability to act and face life's challenges, and (2) the belief in the right to be happy, a sense of worthiness, the ability to assert our needs and desires, and to enjoy the fruits of hard work. Self-esteem is an individual's perception of how they evaluate or value themselves, and a person's self-assessment can be either positive or negative.⁸

A study on 113 children and adolescents in El Salvador, America, stated that high BMI (Body Mass Index) is related to body dissatisfaction, low self-esteem, and efforts to reduce body weight. Body dissatisfaction has a significant relationship with self-esteem.⁹ Guiney and Furlong stated that dissatisfaction among female adolescents with their bodies impacts lower self-esteem compared to other female adolescents. Deep dissatisfaction with oneself, which escalates into self-hatred, is an expression of low self-esteem. Another impact on individuals experiencing obesity is the inability to accept their condition, as they feel there are shortcomings that cause adolescents to feel inferior in social interactions and withdraw from their peer groups.¹⁰

A study conducted by Siti showed a significant relationship between self-esteem and body image among adolescents in

Tanjung Barangan, Palembang, with the contribution of the self-esteem variable to body image being 21.3%.¹¹ Based on this, the researcher is interested in conducting a similar study on female high school students at Muhammadiyah 2 Private High School in Medan. This study aimed to determine the relationship between self-esteem and body mass index (BMI) on female students at Muhammadiyah 2 Private High School in Medan.

METHOD

This study is categorized as a descriptive analytic study with a cross-sectional design. The research method involves analyzing the relationship between self-esteem and Body Mass Index (BMI) levels in female adolescents by administering a questionnaire as a measurement tool. The sample for this study was selected using proportionate stratified random sampling, which is used when the population is heterogeneous and stratified proportionally. The study involved 80 female adolescents, with 28 adolescents from grade X, 25 adolescents from grade XI, and 27 adolescents from grade XII.

After data collection and processing, the next step is data analysis. Univariate analysis is conducted to assess the proportion of each variable, namely self-esteem and Body Mass Index (BMI) levels. After that, bivariate testing is performed to test the hypothesis of the study, which is whether there is a relationship between self-

esteem and BMI levels in female students at Muhammadiyah 2 Private High School in Medan. In this study, a Chi-Square bivariate test will be performed. The interpretation of the results uses a significance level of P alpha of 5%, with the note that if $p < 0.05$, then H1 is accepted, meaning there is a relationship between the independent and dependent variables. On the other hand, if $p > 0.05$, then H1 is rejected, meaning there is no relationship between the independent and dependent variables.

RESULT

In this study, the demographic characteristics of the sample were identified, specifically the age of the sample. This step was carried out to evaluate the characteristics of each component as an assessment of the sample group. Below are the results of the frequency distribution of the demographic characteristics of the sample in the form of a table.

Table 4.1 Respondent' Characteristics

Respondent Characteristics	Frequency (n)	Percentage (%)
Respondent Age		
15 years old	8	10.0
16 years old	33	41.3
17 years old	33	41.3
18 years old	6	7.5
Total	80	100.0
Respondent Class		
X	28	35.0
XI	25	31.3
XII	27	33.8
Total	80	100.0

Based on the table, out of the total sample of 80 female adolescents, the most

represented age group is the 16-17 years old range.

Table 4.2 Proportion of Respondents' Self-Esteem

Variable	Frequency (n)	Percentage (%)
Low	16	20.0
Normal	36	45.0
High	28	35.0
Total	80	100.0

According to the table above, it can be seen that the majority, consisting of 36 respondents (45%), have a score that falls within the normal range. Meanwhile, 16 respondents (20%) have a low self-esteem score, and 28 other respondents (35%) have a high self-esteem score.

Tabel 4.3 Proportion of Respondents' Body Mass Index (BMI)

Variable	Frequency (n)	Percentage (%)
Underweight	24	30.0
Normal	28	35.0
Overweight/Obesitas	28	35.0
Total	80	100.0

Based on the table above, it can be seen that the majority, with 28 respondents each (35%), have Body Mass Index (BMI) scores categorized as normal and overweight/obese. Meanwhile, 24 other respondents (30%) have BMI scores categorized as underweight.

Table 4.4 Relationship Between Self-Esteem and Body Mass Index (BMI) Levels

Grade	Variable	RSES Level		Total	P-Value
		Low	Normal-High		
	Underweighth-Normal	2(3.8%)	50(96.2%)	52(100%)	

IMT	Overweight/ Obesity	14(50%)	14(50%)	28(100 %)	<0.001 *
	Total	16(20%)	64(80%)	80(100 %)	

*Chi-square Test

Based on the Chi-Square statistical test results, the Body Mass Index (BMI) category of underweight-normal is predominantly represented by the normal-high self-esteem level, with 50 respondents (96.2%). Meanwhile, the overweight/obese BMI category has both low and normal-high self-esteem levels, with 14 respondents (50%). Therefore, a p-value of <0.001 was obtained. It can be concluded that H1 is accepted and H0 is rejected, meaning there is a significant relationship between self-esteem and Body Mass Index (BMI) levels in female students at Muhammadiyah 2 Private High School in Medan.

DISCUSSION

According to the univariate test that evaluates the demographic characteristics of the respondents, the age range of the respondents was found to be 15-18 years, with the majority, consisting of 33 respondents each (41.3%), being 16 and 17 years old. The respondents are female high school students, with the majority being 28 respondents (35%) from grade X, 25 respondents (31.3%) from grade XI, and 27 respondents (33.8%) from grade XII.

Based on the research conducted on 80 respondents, 28 respondents in the overweight/obese Body Mass Index (BMI) category were found, with each group

having a low self-esteem level, including 14 respondents (50%), and the other 14 respondents (50%) with normal-high self-esteem. This indicates a significant relationship between the self-esteem variable and Body Mass Index (BMI), with a p-value of <0.001, which is <0.05. The same variable shows a strong relationship, as seen from the correlation coefficient based on the Spearman's rho correlation analysis technique, which is 0.855. A correlation coefficient ranging from 0.50 to 1.00 indicates a large correlation.¹⁶ This indicates that self-esteem has a significant impact on the body weight of early adolescents. During early adolescence, various changes occur, especially physical changes, which lead adolescent girls to pay more attention to their bodies. The results of this study are also supported by previous research, which found that self-esteem plays an important role in the development of body image.⁴

In this study, the majority of respondents had a normal level of self-esteem. However, this study does not align with previous research by Febrina et al. in 2018, which showed a decline in self-esteem during early adolescence. There was a significant decline in global self-esteem among adolescents. In addition, the study findings indicate that low self-esteem in male adolescents is associated with lower perceived abilities or competencies.¹⁷ On the other hand, the study by Nelis et al. in 2019 indicated that an individual's self-esteem level can vary, even within a short

period, and some individuals may experience fluctuations in their self-esteem levels.¹⁸ Individuals with high self-esteem tend to show themselves as optimistic, proud, and satisfied with who they are, more accepting of negative experiences, and make efforts to improve themselves. Several factors can influence self-esteem in individuals, including social relationships, social media use, life satisfaction, social support, friendships, and other factors. In adolescents, self-esteem levels can be influenced by several factors, such as: (1) the learning environment and the adolescent's ability to interact with teachers and peers, (2) the adolescent's cognitive abilities and self-development in relation to self-esteem, and (3) the affective factors of the adolescent in relation to self-esteem. Adolescents who are often compared with their peers or close individuals who have achievements at school may develop a distortion in thinking, such as personalization, where the adolescent feels inferior and often desires to be like those with good achievements. Adolescents with low self-esteem tend to make less effort to perform well in school because they feel incompetent and lazy. Conversely, adolescents who receive support from their learning environment tend to have higher effort and determination. With high self-esteem, adolescents are more likely to avoid engaging in negative behaviors while striving for achievement. In a previous study by Udik and Sulistyono in 2020, it was shown

that distorted thinking, lack of warmth, support, expectations, and differing parenting styles from their families, as well as negative labeling from teachers and schoolmates, are factors that cause adolescents to feel worse about themselves, leading to low self-esteem.¹⁹

Several factors can influence self-esteem, including intelligence, physical condition, gender, family environment, and social environment.^{14,15} Self-esteem is influenced by gender. Females are more likely to feel that their self-esteem is lower than males, such as feeling insecure or believing that women need protection. This aligns with a study conducted by Rosani et al. in 2021, which found that self-esteem is predominantly lower in females, with 72 out of 100 students.²⁰ Females are more concerned with the satisfaction of being valued and emotionally accepted, particularly regarding their physical appearance.²¹

Physical conditions such as weight and height have a significant impact on an individual's self-confidence. For example, someone with a more attractive body shape typically has higher self-esteem compared to someone with a less attractive body shape. Nearly 40% of women aged 15-24 feel that their weight is higher than the normal BMI, and more than 27% of them have a normal weight.⁵

The most common factors contributing to an increase in Body Mass Index (BMI) in adolescents are eating habits,

physical activity, and lifestyle. The consumption of calorie-dense but low-nutrient foods has increased among children and adolescents. The habit of consuming snacks (such as fried foods and western fast food) and sugary beverages (such as carbonated drinks, soft drinks, and packaged tea) almost doubles the risk of overweight and obesity.²² In addition, a lack of physical activity and sedentary behavior are factors leading to an increase in BMI. The majority of adolescents who experience an increase in BMI engage in physical activity for less than one hour, fewer than three times a week.²³ Other triggering factors include socioeconomic status, parenting styles, and lack of knowledge about nutrition. Children from higher-income families have higher purchasing power, enabling them to buy a variety of foods, particularly calorie-dense fast food. Adolescents with good knowledge not only understand the dangers of obesity but also know how to prevent it. Good knowledge impacts healthy lifestyle choices, including selecting nutritious foods and the ability to monitor their own weight.²⁴

The results of this study show that individuals with an overweight Body Mass Index (BMI) tend to have low self-esteem. This can be seen from the correlation coefficient found in Victoria's study, which explains that self-esteem and body image in early adolescents experiencing obesity have a significant relationship.¹⁶ This study's results are also supported by other research that shows self-esteem plays an important

role in the development of body image.⁴ Significant physical changes during adolescence can lead to unwanted psychological impacts. Physical appearance is very important to adolescents, as physical attractiveness is one of the aspects that can be observed in first impressions, which influences social support.¹³ For example, a study by Shahzadi and Rasheed in 2024 showed that there is a relationship between body image and self-esteem in both male and female adolescents who experience obesity in adulthood.²⁵ Female adolescents who experience obesity tend to have lower body image and self-esteem compared to male adolescents with obesity. Generally, boys are more inclined to face challenges, struggles, and have the drive to demonstrate their potential. In contrast, girls are more vulnerable to negative thoughts, anxiety, eating disorders, and depression compared to boys, due to emotions related to internalizing problems.²⁶ Body Mass Index (BMI) not only affects self-esteem but also has an impact on cognitive function.²⁷

In addition, hormones can also affect self-esteem, such as mood, confidence, and a person's feelings. Several types of hormones in the body are known to help enhance positive feelings, including pleasure and happiness. These hormones include serotonin, dopamine, oxytocin, and endorphins. Serotonin plays an important role in regulating mood, appetite, sleep, social behavior, and gastrointestinal motility. Serotonin is one of the hormones

found in the brain but is produced in the intestines. Nearly 95% of serotonin is found in the intestines, while only 5% is found in the brain.²⁸ Serotonin generally triggers feelings of happiness, and its production will be optimal if the balance of the gut microbiota is maintained. The gut microbiota helps maintain the integrity of the intestinal mucosal barrier and modulates motility. The gut-microbiota-brain axis is a two-way communication system involving the central nervous system (CNS) of the brain and gut microbiota, which functions in digestion, body metabolism, and connects the emotional and cognitive centers of the brain with peripheral gut function.²⁹ This axis is bidirectional because it facilitates signaling from the gut microbiota to the brain and vice versa, through neural, immune, humoral, and endocrine connections. If there is a problem in this axis, it can lead to dysbiosis, which is an imbalance in the composition and function of the gut microbiota. Dysbiosis affects psychological disorders, such as stress and depression, which can worsen symptoms.

Inflammatory Bowel Disease (IBD) occurs because the gut microbiota affects the central nervous system activity through the production of serotonin and peptides that influence an individual's behavior.³⁰ In addition, dysbiosis also affects body weight. A study by Nisrina et al. in 2021 indicated that there are differences in microbiota between lean and obese individuals. In obese individuals, a lower diversity of microbiota

and higher enzyme levels were found.³¹ Other evidence also shows a correlation between gut microbiota and obesity, which has been observed in obese individuals undergoing Roux-en-Y gastric bypass (RYGB) surgery. After this procedure, the gut microbiota changed significantly, leading to an increase in gut microbiota richness.³²

The HPA axis (hypothalamic-pituitary-adrenal) has long been considered the central system responsible for coordinating adaptive responses to various stressors. In response to stress, the following events occur: The hypothalamus secretes corticotropin-releasing factor (CRF), which stimulates the release of adrenocorticotropic hormone (ACTH) from the pituitary gland, leading to the release of cortisol from the adrenal glands, which impacts gastrointestinal activity.³⁰ In recent decades, it has been stated that gut microbiota plays a key role in regulating the gut-brain axis. Microbiota in the digestive tract is involved in maintaining the homeostasis of the gut-brain axis and its relationship with mental health.³⁰

After obtaining the research results conducted on female students at Muhammadiyah 2 Private High School in Medan, several limitations of the study were identified, these limitations include the assessment being restricted to the proportion of self-esteem on female students, the proportion of body mass index (BMI) on female students, and the description of demographic characteristics based on age at

Muhammadiyah 2 Private High School in Medan. These limitations include the presence of other variables that should be measured to assess the relationships between variables, such as male gender, stress levels, and other related factors. Therefore, it is recommended that future research focus on a more uniform class group.

CONCLUSION

Based on the data analysis results conducted in this study, several conclusions can be drawn: there is a significant relationship between self-esteem and Body Mass Index (BMI) levels in female students at Muhammadiyah 2 Private High School in Medan. The frequency distribution of self-esteem levels in female students at Muhammadiyah 2 Private High School in Medan was predominantly normal, with 36 students (45%). The frequency distribution of Body Mass Index (BMI) levels in female students at Muhammadiyah 2 Private High School in Medan was predominantly normal and overweight/obese, with each group consisting of 28 students (35%). The frequency distribution of the respondents' ages in female students at Muhammadiyah 2 Private High School in Medan was predominantly 16 and 17 years old, with 33 students (41.3%) in each age group.

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