



Relationship Between Self-Efficacy and the Incidence of Obesity Among Adolescents in Medan City in 2025

Rini Anggraini¹, Etti Sudaryati², Evawany Yunita Aritonang³

¹Master Student, Faculty of Public Health, Universitas Sumatera Utara, Medan, Sumatera Utara, Indonesia

^{2,3} Faculty of Public Health, Universitas Sumatera Utara, Medan, Sumatera Utara, Indonesia

Email : anggrainirini312@gmail.com

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Abstract

Obesity is a risk factor for non-communicable diseases, with its prevalence among adults in Indonesia continuing to rise. It is projected to reach 50 percent by 2030 if no effective interventions are implemented. Preventive efforts during adolescence are crucial, as adolescents with obesity are at a high risk of

becoming obese adults. This study aims to analyze the relationship between self-efficacy with the incidence of obesity among senior high school adolescents in Medan City in 2025. The study employed a matched case-control design with a 1:1 ratio, in which age and sex were used as matching variables. The total sample consisted of 100 adolescents in the case group and 100 in the control group. Bivariate analysis using McNemar's test showed significant associations between total self-efficacy ($p = 0.007$), self-efficacy toward healthy eating behavior ($p = 0.004$), and self-efficacy toward maintaining a healthy body weight ($p < 0.001$) with obesity incidence. These findings highlight the importance of obesity prevention strategies focusing on improving adolescents' self-efficacy, along with fostering a supportive family environment for healthy living.

keywords : Obese, adolescents, self-efficacy

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Introduction

Obesity is one of the health problems that requires serious attention and intervention, as its prevalence continues to increase year by year. Addressing obesity is one of the targets of the 3rd Sustainable Development Goal (SDG), namely "Good Health and Well-being." One of the specific aims is to prevent the prevalence of obesity from exceeding 21.8 percent by 2030. This target can be achieved if appropriate interventions are implemented (Ministry of National Development Planning, 2017). However, data from SKI 2023 shows that the prevalence of obesity among adults increased to 23.4 percent in 2023 (Ministry of Health of the Republic of Indonesia, 2023).

Obesity occurs due to the accumulation of excess body fat and results from a prolonged imbalance between energy intake and energy expenditure. One key indicator of this imbalance is diet. Diet refers to the regulation of the amount and type of food consumed for specific purposes and can influence long-term eating habits. An unhealthy diet characterized by high intake of sugar, salt, and fat is a major contributor to obesity. In addition to poor diet, other contributing factors include low physical activity, environmental influences, stress, and limited knowledge of nutrition (Andrie et al., 2021).

Obesity is a known risk factor for non-communicable diseases such as heart disease, hypertension, liver disease, and diabetes mellitus. These conditions are the leading causes of death globally, accounting for 75 percent of deaths or 43 million people in 2021. In Indonesia, non-communicable diseases contributed to 73 percent of all deaths, equivalent to three out of four fatalities. Furthermore, obesity accompanied by non-communicable diseases can lead to significant economic burdens due to high treatment costs and reduced productivity from illness-related work absences (WHO, 2018, 2024).

The prevalence of overweight and obesity among adolescents in North Sumatra increased from 2013 to 2018, but showed a decline in 2023, reaching 2.2 percent for obesity and 9.6 percent for overweight—down from 4.01 percent and 10.91 percent, respectively, in 2018. Among adults, the prevalence of obesity decreased from 25.8 percent in 2018 to 24.3 percent in 2023, while the prevalence of overweight rose from 14.8 percent to 16.6 percent during the same period. Although obesity among adolescents has declined, its prevalence still exceeds the national average for adult overweight and obesity in 2023. In Medan City, one of the districts in North Sumatra, the prevalence of adolescent obesity rose from 2.5 percent in 2013 to 6.56 percent in 2018. In 2023, the prevalence of adolescent obesity was higher in urban areas (3.8%) compared to rural areas (2.6%) (Ministry of Health of the Republic of Indonesia, 2019, 2023).

One of the key factors influencing adolescent obesity is self-efficacy an individual's belief in their ability to perform certain behaviors. Self-efficacy in consuming healthy foods (i.e., the



ability to consistently choose nutritious options) and in maintaining a healthy weight (i.e., the belief in achieving and sustaining an ideal body weight) significantly influences obesity outcomes, particularly in adolescents. The Indonesian Ministry of Health has issued various guidelines and educational materials on weight management, including posters and guidebooks under initiatives such as GERMAS (Healthy Living Community Movement), GENTAS (Nusantara Movement to Reduce Obesity Rates), balanced nutrition guidelines, recommended limits on sugar, salt, and fat intake, physical activity recommendations, and how to read nutrition labels. These resources are easily accessible online but are often underutilized by adolescents.

Public high schools in Indonesia implement a zoning system in the student admission process, which allows each school to reflect the health conditions such as obesity of students in a given area. A preliminary survey conducted at SMA Negeri 1 Medan and SMA Negeri 16 Medan found that 42 out of 127 students were overweight or obese. Based on these findings, the researchers became interested in exploring the factors associated with adolescent obesity, particularly the role of self-efficacy.

Methods

The type of research used in this study is observational, employing a matched case-control study design. The research sample was divided into a case group and a control group, with matching based on gender and age to minimize potential confounding bias. The study was conducted at a public senior high school in Medan City, from October 2024 to May 2025.

The study population consisted of all students enrolled in public senior high schools (SMA) in Medan City, which comprises 6 schools. The sample size was determined using the proportion of exposure between the case and control groups, based on a reference study conducted by Bhuiyan M.U. et al. The formula used to calculate the sample size is as follows:

$$N = [Z_{1-\alpha/2} + Z_{1-\beta}]^2 \times P \times q \times [r + 1] / [(P_1 - P_2)^2 \times r]$$

With an exposure proportion of 59% in the case group and 40% in the control group, and using a Type I error rate of 5%, a Type II error rate of 20%, and a 1:1 ratio between cases and controls, the required sample size was calculated to be 100 cases and 100 non-obese controls. This study has received ethical approval from the Health Research Ethics Committee of Universitas Sumatera Utara with the reference number: 144/KEPK/USU/2025.

This study involves an independent variable self-efficacy and a dependent variable obesity incidence. Self-efficacy is assessed using the *Healthy Eating and Weight Self-Efficacy (HEWSE)* instrument, which has been translated into Indonesian from its original English version. The



instrument, developed by Wilson-Barlow et al. (2014), consists of eleven statements that address two main aspects: self-efficacy in healthy eating behaviors and in healthy weight management. Each statement is rated using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Univariate analysis is performed to describe the distribution of the data using frequency and distribution tables for each variable. Bivariate analysis is conducted to determine the relationship between the independent and dependent variables. Statistical analysis is carried out using a computer program and the McNemar test.

Results

Univariate Analysis

Respondent Characteristics. The respondent characteristics data include gender and age. The results of the study show that the gender and age distributions in the case and control groups were identical, as both variables were used for one-to-one matching. A total of 92 respondents (46.0%) were male adolescents, and 108 respondents (54.0%) were female adolescents. The majority of respondents were 17 years old (37.0%), followed by those aged 18 years (30.0%). The frequency distribution of respondent characteristics is presented in the following table:

Table 1. Frequency Distribution of Respondent Characteristics by Group and Age

Respondent Characteristics	Case		Control	
	n	%	n	%
Gender				
Man	46	46.0	46	46.0
Woman	54	54.0	54	54.0
Age				
15 years	11	11.0	11	11.0
16 years	22	22.0	22	22.0
17 years	37	37.0	37	37.0
18 years	30	30.0	30	30.0

Self-efficacy. Respondents' self-efficacy was assessed using a questionnaire consisting of seven self-efficacy questions on healthy eating patterns and four questions related to self-efficacy on healthy weight. The results showed differences in self-efficacy between the case and control groups related to healthy eating patterns. The control group (33%) had a higher percentage in the



very confident and confident categories in terms of consuming vegetables and fruits compared to the case group (11%). Some respondents in both groups (36%) were included in the confident category in terms of "being able to eat a variety of healthy foods so that my diet remains balanced".

Most respondents in both the case group (44%) and the control group (40%) expressed doubts about the statement "Based on my knowledge of nutrition, I am able to choose healthy food in restaurants and shops," namely 44% in the case group and 40% in the control group. The same thing happened to the statement "I am able to change cooking recipes or types of processed food to be healthier" showing that most respondents from the case group (35%) and the control group (38%) felt doubtful. The percentage of those who stated that they were very confident showed a larger number in the control group (24%) compared to the case group (16%)

Most respondents in both the case group (29%) and the control group (34%) stated that they were hesitant about the statement "I am able to choose recipes or types of processed food based on their nutritional value" and stated that they were very confident with the same percentage (19%). In the statement "if I choose to consume less healthy food, I am able to adjust my food intake next time", the case group (31%) and the control group (32%) showed almost similar percentages.

Most respondents in both the case group (39%) and the control group (46%) expressed doubt about the last statement, namely "When I feel hungry, I can easily choose healthy food over unhealthy food". The control group (36%) showed a higher percentage of self-confidence compared to the case group (29%). The following is a table of the frequency distribution of answers to the self-efficacy questionnaire on healthy eating patterns for both respondents.

Table 2. Distribution of Frequency of Answers to the Self-Efficacy Questionnaire for Healthy Eating Patterns

Question	Case		Control	
	n	%	n	%
I am able to consume fruits and vegetables in most of my meals.				
Very Confident	45	45.0	35	35.0
Self-confident	35	35.0	35	35.0
Doubtful	11	11.0	22	22.0
Not confident	3	3.0	8	8.0
Very Unconfident	6	6.0	0	0.0
I am able to eat a variety of healthy foods to keep my diet balanced.				
Very Confident	34	34.0	31	31.0



Table 2. Distribution of Frequency of Answers to the Self-Efficacy Questionnaire for Healthy Eating Patterns

Question	Case		Control	
	n	%	n	%
Self-confident	36	36.0	36	36.0
Doubtful	23	23.0	20	20.0
Not confident	5	5.0	12	12.0
Very Unconfident	2	2.0	0	0.0
Based on my knowledge of nutrition, I am able to choose healthy foods in restaurants and stores.				
Very Confident	20	20.0	16	16.0
Self-confident	19	19.0	34	34.0
Doubtful	44	44.0	34	34.0
Not confident	15	15.0	14	14.0
Very Unconfident	2	2.0	2	2.0
I am able to modify recipes to make them healthier.				
Very Confident	16	16.0	24	24.0
Self-confident	25	25.0	23	23.0
Doubtful	33	33.0	30	30.0
Not confident	15	15.0	18	18.0
Very Unconfident	11	11.0	5	5.0
I am able to choose recipes based on their nutritional value.				
Very Confident	19	19.0	19	19.0
Self-confident	25	25.0	32	32.0
Doubtful	29	29.0	34	34.0
Not confident	20	20.0	13	13.0
Very Unconfident	7	7.0	2	2.0
If I choose to indulge in unhealthy foods, I am able to appropriately compensate later				
Very Confident	21	21.0	22	22.0
Self-confident	31	31.0	32	32.0
Doubtful	30	30.0	32	32.0
Not confident	13	13.0	12	12.0
Very Unconfident	5	5.0	2	2.0



Table 2. Distribution of Frequency of Answers to the Self-Efficacy Questionnaire for Healthy Eating Patterns

Question	Case		Control	
	n	%	n	%
When I feel hungry, I am able to easily choose healthy foods over less healthy options.				
Very Confident	19	19.0	14	14.0
Self-confident	14	14.0	26	26.0
Doubtful	39	39.0	46	46.0
Not confident	24	24.0	13	13.0
Very Unconfident	4	4.0	1	1.0

This study also assessed respondents' confidence in managing their weight as part of their self-efficacy related to maintaining a healthy body weight. Respondents in the control group generally showed a higher level of self-confidence compared to those in the case group in terms of their ability to lose, control, and maintain their weight.

Most respondents in the control group (30%) stated they were *very confident* in response to the statement: *"If my weight increases, I am able to lose it in a timely manner,"* whereas the majority of respondents in the case group (27%) stated they were *not confident*. For the statement: *"I am able to control my weight,"* the percentage of *very confident* (28%) and *confident* (29%) responses was higher in the control group. In contrast, the percentages of *very not confident* (16%) and *not confident* (19%) were higher in the case group.

Similar trends were observed in responses to the statements: *"I am able to maintain weight changes so that they do not exceed 4.5 kg from my ideal or target weight"* and *"I believe I can achieve and maintain my ideal weight."* Both statements had higher percentages of *very confident* and *confident* responses in the control group, while the *not confident* and *very not confident* responses were more prevalent in the case group.

The frequency distribution of responses to the self-efficacy questionnaire on healthy weight is presented in the following table:



Table 3. Frequency Distribution of Responses to the Self-Efficacy Questionnaire on Healthy Body Weight

Question	Case		Control	
	n	%	n	%
If I gain weight, I am able to lose it in time (recommended weight loss is 0.5-1.0 kg/week).	28			
Very Confident	18	18.0	30	30.0
Self-confident	13	13.0	21	21.0
Doubtful	21	21.0	26	26.0
Not confident	27	27.0	16	16.0
Very Unconfident	21	21.0	7	7.0
I am able to control my body weight.				
Very Confident	14	14.0	28	28.0
Self-confident	18	18.0	29	29.0
Doubtful	33	33.0	31	31.0
Not confident	19	19.0	6	6.0
Very Unconfident	16	16.0	6	6.0
I am able to maintain my weight within 4.5 kg of my ideal or target weight				
Very Confident	18	18.0	23	23.0
Self-confident	12	12.0	33	33.0
Doubtful	23	23.0	24	24.0
Not confident	23	23.0	14	14.0
Very Unconfident	24	24.0	6	6.0
I believe that I can achieve and maintain my ideal weight.				
Very Confident	24	24.0	30	30.0
Self-confident	18	18.0	33	33.0
Doubtful	28	28.0	26	26.0
Not confident	11	11.0	6	6.0
Very Unconfident	19	19.0	5	5.0

Assessment of the indicators in the self-efficacy questionnaire produced self-efficacy levels in two domains: self-efficacy related to healthy eating patterns and self-efficacy related to maintaining a healthy body weight. Overall, the proportion of respondents with good self-efficacy was higher in the control group (62%) compared to the case group (42%).



A similar pattern was observed in the domain of healthy eating patterns, where 61% of respondents in the control group demonstrated good self-efficacy, compared to only 40% in the case group. A more striking difference was found in self-efficacy related to healthy body weight: 70% of control group respondents had good self-efficacy, while only 33% of the case group did.

These results suggest that better self-efficacy is more likely to be found among non-obese respondents. The following table presents the frequency distribution of self-efficacy levels among respondents in the case and control groups:

Table 4. Frequency Distribution of Respondents' Self-Efficacy Levels

Variables	Case		Control	
	n	%	n	%
Self Efficacy				
Good	42	42.0	62	62.0
Not good	58	58.0	38	38.0
Self-Efficacy in Healthy Eating Patterns				
Good	40	40.0	61	61.0
Not good	60	60.0	39	39.0
Self-Efficacy in Healthy Body Weight				
Good	33	33.0	70	70.0
Not good	67	67.0	30	30.0

Bivariate Analysis

This study used a matched case-control design, in which participants in the case and control groups were matched based on specific characteristics, such as gender and age. Data analysis was conducted using the McNemar test to assess the relationship between the independent variable—self-efficacy—and the dependent variable—obesity incidence.

The results of the analysis showed that overall self-efficacy (including both healthy eating patterns and weight management), self-efficacy toward healthy eating patterns, and self-efficacy toward healthy weight management were significantly associated with obesity incidence among adolescents in Medan City ($p < 0.05$).

Adolescents with low self-efficacy related to both healthy eating and weight management had a 2.111 times higher risk of obesity compared to those with high self-efficacy in these areas. Adolescents with low self-efficacy in healthy eating patterns had a 2.235 times higher risk of obesity compared to those with high self-efficacy. Additionally, adolescents with low self-efficacy in managing a healthy weight had a 5.111 times higher risk of obesity compared to their peers with high self-efficacy in this area.



The following table presents the results of the bivariate analysis between the independent and dependent variables:

Table 5. Results of Bivariate Analysis Using the McNemar Test

Variables	<i>p-value</i>	OR	95% CI
Total Self Efficacy	0.007	2,111	1,205 – 3,699
Self-Efficacy for Healthy Eating Patterns	0.004	2,235	1,262 – 3,960
Self-Efficacy for Healthy Weight	<0.001	5,111	2,502 – 10,442

Discussion

Relationship Between Self-Efficacy and the Incidence of Obesity in Adolescents in Medan City. One of the key self-competencies that supports changes in health behavior is self-efficacy. Self-efficacy has been shown to be closely linked to motivation, behavioral control, and goal achievement (Bandura, 1997). Adolescents with high levels of self-efficacy tend to be better at controlling food intake, choosing healthier foods, and maintaining an ideal body weight, thereby reducing the risk of obesity. The results of this study indicate that self-efficacy related to healthy eating patterns and weight management is significantly associated with the incidence of obesity among adolescents ($p < 0.05$).

The study by Dzielska et al. (2020) found that increasing self-efficacy in overweight adolescents contributed to improved health behaviors, which could lead to weight loss. Similarly, research by Efthymiou et al. (2022) showed that enhancing self-efficacy among students following school-based interventions resulted in positive changes in nutritional status. Additionally, a study by Schapiro et al. (2021) demonstrated that improvements in self-efficacy following a mindfulness intervention were associated with a significant decrease in soda consumption, greater peer support, and an increase in days of physical activity.

An individual's ability to maintain healthy eating behaviors is not only influenced by the desire to change but is more strongly determined by the extent to which they believe they can consistently implement these changes over the long term. In this context, self-efficacy serves as an internal mechanism that motivates individuals to remain committed to their ideal body weight goals, even when facing social or emotional challenges such as stress, peer pressure, or easy access to unhealthy foods (Liou & Kulik, 2020).

The findings of this study are also in line with the research by Marentes-Castillo et al. (2024), which emphasized that self-efficacy in healthy eating and weight management significantly



contributes to increasing autonomous motivation—motivation driven by personal awareness and a desire to live a healthy lifestyle. Individuals with high self-efficacy face fewer barriers when choosing healthy foods and are more proactive in managing their weight through a combination of nutritious diets, regular physical activity, and emotional regulation.

In the context of adolescence, strong self-efficacy can serve as a protective factor against obesity. Adolescents with confidence in their ability to choose healthy foods and manage their weight tend to make more reflective decisions regarding daily food intake, actively seek information about proper nutrition, consider the long-term consequences of poor dietary habits, and demonstrate independence in making health-supportive choices.

The Relationship Between Self-Efficacy Toward Healthy Eating Patterns and the Incidence of Obesity in Adolescents in Medan City. Self-efficacy toward healthy eating patterns refers to an individual's belief in their ability to make healthy food choices despite external influences. According to Bandura's social cognitive theory (2006), self-efficacy influences behavior through motivation, decision-making, and the ability to overcome challenges. Individuals with high self-efficacy tend to be more confident in selecting nutritious foods, managing portion sizes, and maintaining a balanced diet, even when facing social pressure or obesogenic environments. Supporting research by Dzielska et al. (2020) found that a one-point increase in self-efficacy among overweight adolescents led to a 0.132-point increase in healthy eating behaviors ($p = 0.006$).

Healthy Eating and Weight Regulation Self-Efficacy (HEW self-efficacy) also acts as a mediator in the relationship between grit personality and engagement in moderate to vigorous physical activity among adolescents. Self-efficacy in maintaining a healthy diet and ideal body weight has been shown to contribute to increased participation in physical activity. This highlights the important role of psychosocial mechanisms, particularly self-efficacy, in promoting healthy behaviors. For self-efficacy to be effective, adolescents must be equipped with skills in healthy eating and weight management. These skills enhance self-regulation in making decisions that support a healthy lifestyle. Therefore, interest and persistence alone are not sufficient—adolescents must also believe in their ability to manage their diet and weight to promote more consistent engagement in healthy behaviors (Marentes-Castillo et al., 2024).

Research has shown that self-efficacy is positively and significantly associated with obesity prevention behaviors in adolescents, especially when analyzed alongside other constructs in the Health Belief Model (HBM). The higher the level of self-efficacy adolescents possess, the more likely they are to engage in behaviors such as maintaining a healthy diet and increasing physical



activity. Self-efficacy plays a crucial role in developing strategies and overcoming barriers to healthy living (Fitriani et al., 2022).

Adolescents with low self-efficacy related to healthy eating patterns are at greater risk of obesity compared to those with higher self-efficacy. Individuals with strong self-efficacy are better able to overcome obstacles to maintaining a healthy diet while sustaining an ideal body weight. Adolescent self-efficacy is a significant predictor of various healthy lifestyle behaviors, including health responsibility, physical activity, and dietary habits. High levels of self-efficacy support the consistent and sustainable adoption of healthy lifestyle practices (Bektas et al., 2021).

Adolescents with high self-efficacy tend to avoid high-fat foods, consume more fruits and vegetables, and maintain a healthy weight. Conversely, adolescents with low self-efficacy in managing healthy eating patterns are more susceptible to obesity, as they are easily influenced by external factors such as family habits, peer pressure, and access to fast food. These adolescents often struggle to maintain healthy eating habits in the long term, ultimately increasing their risk of obesity (Efthymiou et al., 2022).

The Relationship Between Self-Efficacy for Healthy Body Weight and the Incidence of Obesity in Adolescents in Medan City. Self-efficacy for healthy body weight refers to an individual's belief in their ability to achieve and maintain their ideal weight through healthy behaviors. According to Bandura's (2006) social cognitive theory, self-efficacy influences a person's ability to regulate behavior, including weight management. Individuals with high self-efficacy are better equipped to face challenges, make healthy decisions, and consistently maintain healthy habits despite temptations. Conversely, those with low self-efficacy are more likely to give up on maintaining their ideal weight.

This study showed that self-efficacy for healthy body weight was significantly associated with obesity in adolescents. Adolescents with low self-efficacy had a 5.1 times higher risk of obesity (OR = 5.111; 95% CI: 2.502–10.442; $p < 0.001$). Low self-efficacy in dealing with obesity can negatively impact adolescents' self-esteem, social behavior, and academic performance. A study on adolescent girls found a link between low self-efficacy in weight management and negative perceptions of academic abilities. Participants reported feeling they would be more confident participating in classroom activities if they were thinner (Schapiro et al., 2021).

Research on adolescent girls also shows that those with high self-efficacy are more likely to initiate and maintain health-promoting behaviors. One study demonstrated a significant interaction between self-efficacy and weight status, where increased self-efficacy in overweight adolescents contributed to improved health behaviors. This indicates that self-efficacy acts as an important mediator in behavior change, especially among at-risk groups. Strengthening self-efficacy can



help adolescents overcome psychosocial barriers and make healthier decisions (Dzielska et al., 2020).

These findings are consistent with the study by Liou and Kulik (2020), which showed that individuals with high self-efficacy are more capable of maintaining their weight and sustaining healthy eating habits. On the other hand, those with low self-efficacy often struggle to maintain ideal body weight and are more susceptible to external influences such as poor dietary habits and obesogenic environments. These results underscore the importance of interventions that focus on enhancing adolescents' self-efficacy in weight management. Adolescents must be trained to build confidence in managing their weight through both healthy eating and regular physical activity.

Self-efficacy-based educational programs that teach skills such as goal setting, self-monitoring, and personalized feedback can enhance adolescents' ability to maintain a healthy weight over the long term (Nguyen et al., 2020). Therefore, strengthening self-efficacy in the context of healthy weight management is a crucial step in preventing adolescent obesity. Intervention programs designed with a self-efficacy-based approach can help adolescents overcome barriers to maintaining an ideal body weight and adopting healthy dietary patterns, ultimately improving their long-term health.

Conclusion

This study involved 200 adolescent respondents, consisting of 108 females and 92 males, aged between 15 and 18 years. The results of the bivariate analysis using the McNemar test showed that total self-efficacy ($OR = 2.111$; $p = 0.007$), self-efficacy towards healthy eating patterns ($OR = 2.235$; $p = 0.004$), and self-efficacy towards healthy weight ($OR = 5.111$; $p < 0.001$) had a significant relationship with the incidence of obesity in adolescents.



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