JURNAL KEPERAWATAN PROFESIONAL (JKP)
Vol. 13 No. 2 (2025)
p-ISSN: 2355-679X; e-ISSN: 2685-1830

Description of Sweetened Beverage Consumption in Obese Adolescents

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Kata kunci: Minuman Berpemanis, Obesitas, Remaja

Keywords: Sweetened Beverage, Obesity, Adolescent

Info article

Date posted: 31 Juli 2025

Date revised: 21 Agustus 2025

Date received: 07 September 2025

DOI Article:

Page: 439-452

Obesitas merupakan masalah kesehatan global dengan prevalensi yang terus meningkat. Salah satu faktor perilaku yang berkontribusi terhadap risiko obesitas remaja adalah konsumsi minuman manis. Data Riskesdas 2018 menunjukkan bahwa 61,27% penduduk usia ≥3 tahun mengonsumsi minuman manis lebih dari sekali sehari, 30,22% sebanyak 1–6 kali per minggu, dan hanya 8,51% yang mengonsumsinya kurang dari tiga kali per bulan. Penelitian ini bertujuan mendeskripsikan pola konsumsi minuman berpemanis pada remaja obesitas. Penelitian menggunakan desain deskriptif kuantitatif dengan pendekatan cross-sectional. Sampel penelitian terdiri dari 70 remaja obesitas yang dipilih melalui metode total sampling sesuai kriteria inklusi. Data dikumpulkan dengan kuesioner karakteristik responden dan Beverage Intake Questionnaire (BEVQ-15), lalu dianalisis secara univariat. Hasil menunjukkan bahwa dari 70 responden, 38 orang (54,3%) laki-laki dan 32 orang (45,7%) perempuan. Mayoritas responden berusia 14 tahun (58,6%) dan sebanyak 53 orang (75,7%) memiliki tingkat konsumsi minuman berpemanis tinggi. Tingginya frekuensi serta volume konsumsi berkontribusi pada peningkatan kalori harian sebagai faktor risiko obesitas. Diperlukan upaya kesadaran dan pengendalian konsumsi minuman berpemanis sebagai strategi pencegahan obesitas sejak remaja.

Description of Sweetened Beverage Consumption in Obese Adolescents

Obesity is a global health problem with increasing prevalence. One behavioral factor contributing to the risk of obesity in adolescents is the consumption of sugary drinks. The 2018 Basic Health Research (Riskesdas) data shows that 61.27% of the population aged ≥3 years consumed sugary drinks more than once a day, 30.22% consumed them 1–6 times per week, and only 8.51% consumed them less than three times per month. This study aims to describe the consumption patterns of sweetened drinks in obese adolescents. The study used a quantitative descriptive design with a cross-sectional approach. The study sample consisted of 70 obese adolescents selected through a total sampling method according to the inclusion criteria. Data were collected using a respondent characteristics questionnaire and the Beverage Intake Questionnaire (BEVQ-15), then analyzed univariately. The results showed that of the 70 respondents, 38 (54.3%) were male and 32 (45.7%) were female. The majority of respondents aged 14 (58.6%), and 53 (75.7%) reported high levels of sweetened beverage consumption. High frequency and volume of consumption contribute to increased daily calorie intake, a risk factor for obesity. Awareness-raising and control efforts regarding sweetened beverage consumption are needed as a strategy for obesity prevention from adolescence..

Introduction

Adolescents are individuals who are between the ages of 10 and 18 years old and are not married (BKKBN, 2019). As they get older and the stage of development they experience, adolescents need a balanced intake of nutrients to support optimal growth and development. If nutritional needs are not met properly, various health problems can arise such as malnutrition, anemia, and obesity. Obesity itself is caused by the accumulation of excess fat in the body which has the potential to increase the risk of various diseases, such as heart disorders, hypertension, type 2 diabetes mellitus, as well as damage to the gastrointestinal system, respiratory system, skeletal structure, and articular structure (Ministry of Health, 2024). The importance of attention to obesity in adolescents is reinforced by data showing that 80% of obese adolescents are at risk of remaining obese into adulthood (Nilden *et al.,* 2021).

The incidence of obesity continues to increase both globally, nationally, and regionally. According to WHO data in 2016, there are >1.9 billion adults worldwide recorded as overweight, of which around 650 million are identified as obese. According to WHO (2021), there are more than 340 million individuals aged 5 to 19 years who are recorded as overweight and obese. The Basic Health Research Report (Riskesdas, 2018) in Indonesia indicates a significant increase in obesity rates in all age groups. In school-age children, the prevalence reaches 20% or around 7.6 million children; in adolescents by 14.8% or around 3.3 million people; while in adults it was recorded to reach 35.5% or around 64.4 million people (UNICEF, 2022). At the regional level, especially in Riau Province, Riskesdas data shows an increase in the prevalence of obesity from 3.1% in 2013 to 11% in 2018 (Ministry of Health, 2018). Lifestyle factors are the main cause of the increase in the prevalence of obesity, especially among adolescents. Dietary changes, such as *consuming fast food* and sugar-sweetened beverages beyond what is needed, as well as lack of physical movement are the main factors that trigger weight gain (Telisa *et al.,* 2020). According to Riskesdas 2018, around 61.27% of the population aged 3 years and above in Indonesia routinely consume sugary drinks more than once a day, while 30.22% consume them between 1 and 6 times per week, and only 8.51% consume them less than three times a month. In addition, genetic factors, such as having parents who are also obese, also contribute. Obesity in adolescents increases the risk of developing various non-communicable diseases, including heart disease, stroke, diabetes, asthma, as well

as disorders of the muscular system and musculoskeletal disorders (Dewita, 2021).

The changing times also affect the development of innovation in the food and beverage sector. Currently, *sugar-sweetened beverages* (SSB) are one of the most popular types of drinks, especially for children and adolescents (Kim *et al.,* 2021). Sweetened beverages (SSBs) are types of beverages that contain added sugars, such as sucrose from cane sugar, high-fructose corn syrup, fructose-containing fruit juice concentrates, and various other forms of added sweeteners (Khan *et al.,* 2021). Research in China shows that the behavior of consuming sweetened beverages can affect the occurrence of premature *menarche* in girls (Kim *et al.,* 2021). Adolescent girls who consumed >1.5 servings of sweetened beverages daily had the potential to have their first period about 2.7 months earlier than those who consumed less. (Kim) *et al.,* 2021). Excessive sugar intake can increase the number of calories in the body and have an impact on the risk of obesity. *Energy balance theory* asserts that obesity occurs when energy intake exceeds energy expenditure, resulting in a buildup of energy in the body that is stored as fat. Sweetened beverages play an important role in this imbalance because the liquid calories they contain do not provide an adequate feeling of satiety, so consumption continues without compensation at the next meal. This mechanism explains how the frequency and portion of consumption of sweetened beverages can increase weight in children and adolescents (Arencibia-Albite, 2022).

Previous research conducted by Emiliana & Setriani (2024) states that the amount and frequency of sweetened drinks affect weight gain which can lead to obesity. This is because foods or drinks high in sugar generally also contain high calories and if not used immediately, sugar in the body will be stored by the liver and muscles in the form of glycogen (Hanum, 2023). Although the consumption of sweetened beverages has been widely researched at the national and international levels, local data on the consumption patterns of sweetened beverages in the city of Pekanbaru is still very limited. Most of the existing research focuses on the general picture in Indonesia or in other big cities, so it does not fully represent the condition of the people of Pekanbaru. In fact, each region has different social, cultural, and consumption characteristics, including a preference for certain types of sweetened beverages. The limitation of local data makes it important to conduct research in Pekanbaru to provide a more accurate picture of the consumption habits of sweetened beverages, especially in the majority group of

adolescents and children, so that it can be the basis for obesity prevention efforts at the regional level. This research was carried out at SMPN 1 Pekanbaru, SMPN 4 Pekanbaru, and SMPN 14 Pekanbaru. The three schools were chosen because they are located in Limapuluh District, Pekanbaru City, one of the strategic areas located in the city center. This geographical position makes it easy for students to access various shopping centers such as malls, supermarkets, coffee shops, and street food vendors that offer many drinks with artificial sweeteners. Referring to a preliminary study that has been conducted on 10 adolescents with obesity in three junior high schools in the city of Pekanbaru, the findings were obtained that 8 out of 10 students have a habit of consuming sweetened drinks. They admitted to consuming the drink more than twice a day, and often bought it when they were at school. Based on these conditions, the researcher determined the title of this study, namely "Overview of Consumption of Sweetened Beverages in Obese Adolescents".

Method

This study was conducted with a quantitative approach and used a descriptive design to determine the description of a sedentary lifestyle in obese adolescents attending SMPN 1, SMPN 4, and SMPN 14 Pekanbaru. The population in this study includes all students classified as obese in the three schools. The sampling technique used was *non-probability sampling* with the total sampling method, while the data were analyzed using univariate descriptive statistical tests. This study involved 70 obese adolescents. The instrument used, namely *the Beverage Intake Questionnaire-15* (BEVQ-15), is used to evaluate the consumption of various types of beverages, including sweetened, alcoholic, and unsweetened beverages, and has become a standard measurement tool in research related to beverage intake. The questionnaire included 15 items that evaluated the frequency and amount of consumption of different types of beverages, including water, milk (whether low-fat, full-fat, or skimmed), sugary beverages such as soda, sweetened tea, sweetened fruit juice, and coffee, and alcoholic beverages. Participants were asked to write down how often they consumed the drink, as well as the volume of consumption in standard units such as milliliters or glasses (Aranis *et al.*, 2023). The data obtained from the questionnaire were then grouped by frequency of consumption, with the high category determined if the frequency of consumption exceeded 6 times per week, and the normal category if it was equal to or less than 6 times per week.

Meanwhile, information on consumption volume is used to identify the most consumed types of sweetened beverages (Aranis *et al.*, 2023). BEVQ-15 was first developed and validated by Hedrick *et al.* (2011) through a study entitled *Development and Evaluation of a Brief Questionnaire to Assess Habitual Beverage Intake* (BEVQ-15) and proved to have good validity and reliability, with R^2 values ranging from 0.52 to 0.95 ($P < 0.001$) (Hedrick *et al.*, 2011).

Research Results

Respondent Characteristics

Table 1: Frequency Distribution of Respondents Based on Respondent Characteristics

Characteristics	Frequency Distribution (N=70)	
	N	%
Age		
a. 12 Years	9	12,9
b. 13 Years	20	28,6
c. 14 Years	41	58,6
Gender		
a. Man	38	54,3
b. Woman	32	45,7
Weight		
a. 51-60	2	2,9
b. 61-70	31	44,3
c. 71-80	23	32,9
O.C. 81-90	9	12,9
e. 91-100	5	7,1
Height		
a. 131-140	1	1,4
b. 141-150	30	42,9
c. 151-160	28	40,0
O.C. 161-170	11	15,7
Z-Score>+2 SD (Obesitas)	70	100
Total	**70**	**100**

Based on the data in Table 1, out of a total of 70 respondents, most of the adolescents were obese at the age of 14, which was 41 people (58.6%). Most of the respondents in this study were men, namely 38 people (54.3%), while female respondents amounted to 32 people (45.7%). The most dominant weight range was 61–70 kg, experienced by 31 respondents (44.3%). For height, the majority of respondents were in the range of 141–150 cm as many as 30 people (42.9%). All respondents (100%) were included in the obesity category based on z-score values that exceeded +2 SD.

JKP
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Table 2: Overview of Consumption of Sweetened Beverages in Obese Adolescents

Characteristics	Frequency Distribution (N=70)	
	n	%
Normal	17	24,3
Tall	43	75,7
Total	**70**	**100**

Table 2 shows that respondents in this study consumed sweetened beverages in the high category of 53 respondents (75.7%), while those who consumed in the normal category were 17 respondents (24.3%).

Table 3: Overview of the Frequency of Consumption of Sweetened Beverages in Obese Adolescents

Frequency Konsumsi	Teh Manis		Susu *full cream*		Juice with sweetener		Milk kacang		Tea and coffee with milk/ Crimean		Tea and coffee without milk/ Crimean		Energy drinks/ sport		Soft drinks/ diet	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Never	10	14,3	17	24,3	25	35,7	36	51,4	45	64,3	49	70,0	57	81,4	57	81,4
1x/week	13	18,6	20	28,6	18	25,7	14	20,0	11	15,7	7	10,0	6	8,6	9	12,9
2-3x/ week	29	41,4	14	20,0	21	30,0	18	25,7	14	20,0	14	20,0	7	10,0	4	5,7
4-6x/ week	2	2,9	10	14,3	5	7,1	1	1,4	0	0	0	0	0	0	0	0
1x/day	16	22,9	9	12,9	1	1,4	0	0	0	0	0	0	0	0	0	0
2x/day	0	0	0	0	0	0	1	1,4	0	0	0	0	0	0	0	0
>3x/day	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**

Table 3 shows that sweet tea is the sweetened beverage consumed by many participants, with the highest frequency of 2–3 times per week (41.4%). Other types of sweetened drinks that are also quite widely consumed are *full cream* milk and sweetened juice, which are most commonly consumed 1 time per week by 20 respondents (28.6%) and 18 respondents (25.7%) respectively. Tea and coffee drinks without dairy/creamer, as well as energy drinks or soda/diet drinks, were never consumed by most of the respondents, namely 49 to 57 respondents (70%–81.4%) respectively. Likewise for soft drinks/diets, 81.4% of respondents stated that they had never consumed it.

Table 4: Overview of the Consumption Volume of Sweetened Beverages in Obese Adolescents

Frequency Konsumsi	Teh Manis		Susu *full cream*		Juice with sweetener		Milk Kacang		Tea and coffee with milk/ Crimean		Tea and coffee without milk/ Crimean		Energy drinks/ sport		Soft drinks/ diet	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Never	10	14,3	17	24,3	25	35,7	36	51,4	45	64,3	49	70,0	57	81,4	57	81,4
<177.5 ml	4	5,7	4	5,7	2	2,9	5	7,1	5	7,1	4	5,7	1	1,4	2	2,9
236,6 ml	53	75,7	39	55,7	34	48,6	23	32,9	16	22,9	15	21,4	12	17,7	11	15,7

354,8 ml	2	2,9	5	7,1	6	8,6	3	4,3	4	5,7	1	1,4	0	0	0	0
473,18 ml	1	1,4	2	2,9	3	4,3	1	1,4	0	0	0	0	1	1,4	0	0
591,5 ml	0	0	3	4,3	0	0	2	2,9	0	0	1	1,4	0	0	0	0
>591 ml	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**	**70**	**100**

Referring to Table 4, most of the respondents consumed sweetened drinks with a volume of <236.6 ml, mainly sweetened tea (75.7%) and sweetened juice (48.6%).

Discussion

Respondent Characteristics

The study revealed that most of the participants were 14 years old (58.6%), 13 years old (28.6%), and 12 years old (12.9%), which was classified as early adolescence. One of the reasons is that teenagers at this age tend to be obese due to a lack of attention to appearance. As they age, individuals will naturally become more aware of their physical appearance and begin to pay attention to their body shape as a way to attract the attention of the opposite sex (Nugroho, 2020). Appearance here has to do with how a person perceives himself based on the point of view of others. This means that the individual begins to understand the impression he wants to make through appearance. Therefore, older adults tend to show greater interest in self-care compared to younger adolescents (Fernando, 2019).

The results of this study show that the majority of respondents are male (54.3%) and female (45.7%). These findings are in line with previous research that stated that men have a higher chance of experiencing obesity than women (Jahan *et al.*, 2020). Adolescent boys tend to be more susceptible to obesity because they are influenced by hormonal factors, eating habits, and higher levels of physical activity (Huang et al., 2024). Sim *et al.* (2019) in his research in Korea also found that adolescent boys tend to consume sugary drinks excessively due to increased fluid needs due to frequent physical activities such as playing basketball and soccer. Excessive consumption of sugar-sweetened beverages has been linked to an increased risk of obesity (Hu et al., 2023). According to Suha & Rosyada (2022), adolescent boys have a 2.3 times higher risk of obesity, which is influenced by the habit of skipping breakfast, eating *fast food*, and irregular eating habits. Researchers assume that adolescents at an early age tend to be more at risk of obesity because they are still in the stage of recognizing their body image, and do not yet fully have the awareness to maintain diet and physical activity. In addition, adolescent boys have a greater potential to be obese than women, which may be caused by hormonal factors, poorly controlled eating habits, and relatively low levels of physical activity.

Differences in fluid needs and consumption patterns of sugary drinks between men and women are also believed to affect the risk of obesity in adolescence.

Overview of Consumption of Sweetened Beverages in Obese Adolescents

Based on the results of this study, the majority of respondents were recorded as 57 people (78.1%) showing a large consumption pattern of sweetened beverages. The findings in this study are in line with the results of a previous study, namely the research of Emiliana & Setiarini (2024) which revealed that the habit of consuming sweetened beverages has a significant relationship with an increased risk of overweight and obesity in children and adolescents. The amount and frequency of consumption of sweetened beverages is known to have a direct impact on weight gain. A similar thing was also found by Oladoyinbo *et al.* (2022), which shows a significant correlation between the intake of sweetened beverages such as soda and juice and an increase in BMI (*Body Mass Index*) by age. Adolescents who regularly consume sweetened beverages tend to be *overweight* (Olodoyinbo *et al.*, 2022). Hu *et al.* (2023) added that an increase in soft drink consumption by 10% per day can increase the incidence of overweight and obesity by 3.7%. These findings are also reinforced by Marshall *et al.* (2019), which found that adding 8 ounces of sweetened beverages per day can increase BMI Z-scores by 0.050 in children and adolescents. According to Asriati (2023), individuals with consumption of sweetened beverages exceeding two servings per day (>480 ml) have a 1.3-fold increased risk of developing prediabetes. Luwito & Santoso (2022) explained that sweetened drinks are generally high in calories but low in nutrients, so they can be at risk of developing type 2 diabetes mellitus, fat accumulation in the liver, and obesity. In addition, Rocha *et al.* (2021) found that easy access to sweetened drinks in the school environment, both from canteens, advertisements, and street vendors also affects the high consumption of sweetened drinks by students.

Based on the type, sweet tea is the most consumed sweetened drink. The results of this study showed that as many as 29 respondents (41.4%) consumed it 2-3 times a week, and 16 people (22.9%) daily with the most frequently consumed consumption volume of 236.6 ml or equivalent to 1 glass each time it was consumed. This is due to the relatively low price so that it is easy to reach, its high availability in various places such as stalls, school canteens, and minimarkets, and the sweet taste that is very familiar in people's consumption culture. In addition, massive promotion through advertising and sponsorship of events that are close to

young people also strengthens this preference. It is not uncommon for sweet tea to be chosen as a substitute for water because it is considered more refreshing. This is in line with previous research, namely the research of Rahayu *et al*. (2024), which states that tea is the most commonly consumed type of sweetened drink.

The type of full cream milk-sweetened drink in this study is ranked second highest after sweet tea, namely as many as 28.6% of respondents consume it once a week, 20% as many as 2-3 times a week, and 12.9% of respondents consume it every day with the most frequent consumption volume of 236.6 ml or equivalent to 1 glass each consumption. Although milk contains important nutrients, if it has been added flavor, the sugar content increases. Mahato *et al*. (2020) stated that the sugar content in chocolate milk ranges from 8 to 13%, even exceeding the sugar content contained in formula milk for toddlers. Peckham *et al*. (2021) also emphasized that even though it is claimed to be a healthier option, flavored milk can still increase the risk of weight gain. Researchers assume that regular consumption of *sweetened full cream* milk may increase the risk of obesity in adolescents. Although milk contains important nutrients, the addition of sugar in sweetened milk increases its calorie content, which has the potential to lead to weight gain if consumed in excess. Therefore, there is a need for stronger education about the types of milk consumed and its impact on long-term health, especially in the context of preventing obesity in adolescents.

Sweetened fruit juice drinks are the third most commonly consumed drink. Based on the results of this study, as many as 30% of respondents consume it 2-3 times a week, 25.7% once a week, and a small part daily. Padahal, Gonzalez-Palacios *et al.* (2019) stated that consumption of sweetened juice >1 glass daily was associated with a higher risk of obesity. Researchers assume that excessive consumption of sweetened fruit juices, including those consumed several times a week, may contribute to an increased risk of obesity in adolescents, due to the added sugar content in them. Therefore, it is important to raise adolescents' awareness of the dangers of excessive consumption of sweetened beverages. In this study, plant-based milk such as almond, coconut, and cashew milk was also quite often consumed by obese adolescents. The results showed that as many as 23.3% of respondents consumed it 2-3 times a week, even though plant-based milk contained a fairly high amount of added sugar (Johnson *et al.*, 2024). Researchers assume that although plant-based milk is known as a healthy alternative, most

products on the market (such as almond, coconut milk, and cashew milk) contain high amounts of added sugar. This can contribute to an increase in adolescents' daily sugar intake if consumed regularly without control.

The results of this study showed that tea and coffee drinks without creamer with added sugar were consumed by 19.2% of respondents 2-3 times a week, while those who used creamer or milk were consumed by 15.1% with a consumption volume of 236.6 ml each or equivalent to 1 glass. Henn *et al.* (2023) stated in his research that adding a teaspoon of sugar in coffee every day can lead to weight gain of 0.09 kg in 4 years. Even though it looks small, regular consumption still has an impact in the long term. As for other sugary drinks that are widely consumed in this study, namely energy and sports drinks, the results of this study show that energy or sports drinks are consumed by 10% of respondents 2-3 times a week, with a consumption volume of 236.6 ml or 1 glass. In fact, this type of drink contains 21–34 grams of sugar per serving, which certainly increases calorie intake (Kożuchowska *et al.*, 2025). Meanwhile, the results of the study also showed that diet soft drinks or those containing artificial sweeteners were rarely consumed, with 81.4% of respondents stating that they had never consumed them. Even so, a small percentage still consume it occasionally. Zhang *et al.* (2023) stated in his research that although it does not contain sugar, artificial sweeteners can increase cravings for sweetness and affect overall diet. Although not consumed regularly by all respondents, energy drinks, sports drinks, and diet soft drinks still contribute to increased sugar intake and sweetness preferences among obese adolescents. In addition, although most respondents do not consume large amounts of diet soft drinks, the artificial sweeteners contained in them can still affect overall diet by increasing sweetness desires. Therefore, it is important to limit sugar consumption as a form of prevention and treatment of obesity in adolescents, considering that excessive sugar intake has the potential to increase daily calories without providing an adequate satiety effect. Some of the steps that can be taken include minimizing access to sweetened drinks, choosing healthy alternatives such as water or juice without added sugar, reading nutrition content labels, and providing nutrition education from an early age so that adolescents have awareness in choosing healthier drinks. This study has novelty because it not only assesses the frequency and portion of consumption of sweetened drinks, but also differentiates the types of sweetened drinks consumed, such as soft drinks,

packaged sweet teas, energy drinks, and sweetened condensed milk. This approach provides a more specific picture of the types of sweetened beverages that contribute most to the increased risk of obesity in children and adolescents, so that it can be the basis for more targeted nutrition and education interventions. This study has limitations in the form of possible memory bias, because data on the intake of sweetened beverages was obtained through interviews and questionnaires that relied on the respondents' memory. This can affect the accuracy of reporting the frequency and amount of sweetened beverage consumption. Therefore, further research is recommended to use the method of recording daily intake so that the results obtained are more valid.

Conclusion

The characteristics of the respondents showed that most were 14-year-old adolescents (58.6%), with the proportion of sex dominated by males (54.3%). The results of the study revealed that most obese adolescents have a habit of consuming sweetened drinks at high intensity (75.7%). The most commonly consumed type of sweetened beverage is sweetened tea, with the highest frequency of consumption of 2-3 times per week (41.4%) and the dominant consumption volume of 236.6 ml (75.7%). These findings emphasize the need for early education and intervention on sweetened beverage consumption patterns, to prevent excess weight gain and other related health risks. Nutrition education and promotion of healthier beverage consumption can be important steps in efforts to prevent obesity in the adolescent age group.

Acknowledgments

The researcher expressed his appreciation to all parties who have participated in supporting the smooth implementation of this research. The researcher expressed his deepest gratitude to the respondents for their participation and willingness to provide the data and information needed, as well as to the school and parents for the permission and cooperation given. The award is also aimed at the supervisor for guidance, direction, and input that is very meaningful during the process of preparing this research. The researcher hopes that the findings in this study can contribute positively to the development of science, especially in the realm of adolescent health.

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