



## THE CORRELATION BETWEEN EATING BEHAVIOR AND NUTRITIONAL STATUS IN SENIOR HIGH SCHOOL ADOLESCENTS

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### ABSTRACT

Indonesia has experienced triple burdens of malnutrition characterized by undernutrition, overweight, and micronutrient deficiency problems. Adolescents are vulnerable population for these kind of problems because they tend to change their eating behavior along with physical and psychological development. This study aim to determine the correlation between eating behavior and nutritional status in adolescents at SMAN 22 Bandung. A cross-sectional design was used for the study, involving 277 participants randomly chosen from the population. Eating behavior variable was assessed using a modified version of the Dutch Eating Behaviour Questionnaire (DEBQ) which comprised 28 items covering restrained, emotional, and external aspects of eating behavior. Nutritional status was determined based on Body Mass Index (BMI). The Spearman Rank correlation test was used for bivariate analysis. Aspects of restrained eating behavior and external eating behavior significantly correlated with nutritional status with the value of ( $p = 0.003$ ,  $r = 0.173$ ) and ( $p = 0.003$ ,  $r = -0.176$ ) respectively. Meanwhile, there is no significant correlation between emotional eating behavior with nutritional status ( $p = 0.166$ ,  $r = 0.081$ ). Restrained eating behavior showed a positive correlation, indicating that individuals exhibiting higher levels of restrained eating behavior tended to have over-nutritional status. Conversely, external eating behavior demonstrated a negative correlation, suggesting that higher levels of external eating behavior were associated with poorer nutritional status.

Keywords: adolescent, body mass index, emotional eating, external eating, restrained eating

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## INTRODUCTION

Indonesia has experienced triple burdens of malnutrition characterized by undernutrition, overweight, and micronutrient deficiency problems (Rah et al., 2021). Based on the Non-communicable Disease Risk Factor Collaboration (NCD-RisC) in 1990-2016, the prevalence of overweight adolescents in males increased from 2% to 15% and females from 3% to 13%, the obesity adolescents in males 2% to 6% and females from 3% to 4%, and data underweight adolescents in males is 12% and females 8% (Bentham et al., 2017; UNICEF, 2021). The data are in line with current data Indonesian Health Survey in 2023, the prevalence of nutritional problems among adolescents aged 15-18 years nationally with overweight and obesity status was 12.1% and the category of severely thinness and thinness was 8.3% (Kemenkes RI, 2023).

According to the Indonesian Pediatric Association, adolescent nutrition problems are often

related to incorrect eating behavior and lifestyle (IDAI, 2013). Adolescents are a group that is vulnerable to changes in eating behavior along with physical and psychological development. Physical changes will lead adolescents to have a mindset about healthy and unhealthy eating behavior, whereas psychological changes can change the perception of eating and eating habits of adolescents (Rae & Renyoet, 2022). A study in the age category of 12-21 years in Tanah Baru, stated that the level of unhealthy eating behavior in adolescents was 83% (Sumartini & Ningrum, 2022). In addition, there are research results state that the level of knowledge of healthy eating patterns does not show a positive relationship to healthy eating practices. The results of study on high school students aged 15-18 years in Malang showing that they already know some knowledge of healthy eating patterns but do not show healthy eating practices (Sondari et al., 2019).

An ecological model that includes internal and external factors can help to understand the factors that put adolescents at higher risk of nutritional problems and eating disorders (Goines, 2020). One of the factors that directly influence eating behavior in adolescents is individual factors (Ratih et al., 2020). Individual factors that influence eating behavior and food choices consist of physiological and psychological processes (LaCaille, 2013). Psychological factors are one of the direct internal factors that greatly influence changes in eating habits in adolescents. According to Van Strien et al. (1986), eating behavior that related psychological consists of three aspects, which are emotional eating, restrained eating, and external eating. The results of research on IPB nutrition students in 2023, showed that the higher body mass index then the higher the restrained eating behavior (Nurdiani et al., 2023). Therefore, three aspect of eating behaviors are believed to identify eating-related problems such as eating disorders and obesity.

Based on the American Psychiatric Association, eating disorders are psychological disorders characterized by eating behavior problems (Mandiri, 2015). An increased risk of eating disorders often occurs in adolescents who experience anxiety about increasing weight and/or fat (Kurniawan et al., 2015). These wrong eating habits of adolescents can lead to eating disorders that will have a negative impact (Krisnani et al., 2018). Besides that, changes in eating habits can affect the abnormal nutritional status of adolescents (Rae & Renyoet, 2022). Food intake is an important component that impacts all aspects of nutrition-related health, including the risk of diet-related diseases (Dwyer & Bailey, 2017). Research at SMP Muhammadiyah 3 Jakarta in 2023, adolescents with poor food intake will have a risk of 1,385 times having abnormal nutritional status (Awaliah et al., 2023). In addition, about 80% of obesity in adolescence will remain obese in adulthood (Simbolon, 2013). It can be concluded that the impact of bad eating behavior can increase the risk of adolescent nutritional status problems in the future. Based on the phenomenon problems, this study aims to identify the relationship between eating behavior and nutritional status in high school adolescents.

Schools are institutions that have an important role in factor that influence adolescent eating behavior at school. Currently, there are still some schools that do not have rules to limit unhealthy food. Decisions made by schools can influence what the school population does and does not do and are beyond the control of individuals (Goines, 2020). Based on other study, high school-aged adolescents are still found to have not implemented healthy eating practices, where the availability of food at school is a factor that affects adolescent eating habits and contributes 30-40% of daily calorie intake (Sondari et al., 2019). Eating behavior and nutritional status are important in adolescents because they can affect adolescent health and individual quality as adults. In addition, not many studies have been found related to eating behavior in psychological aspects with nutritional status in high school adolescents.

## METHOD

This research design used a descriptive correlative with a cross sectional approach. This study has received research ethics approval from Aisiyiah University Bandung with ethics approval letter number 732/KEP.01/UNISA-BANDUNG/II/2024. The population of this study were active students in grades X & XI at SMAN 22 Bandung in the 2023/2024 school year aged 15-18 years. The sample size was 277 people with sampling technique using stratified random sampling method. The random sampling method used manual method through attendance from each class by using random numbers until the names were selected as respondents. The instrument of eating behavior in this study used the Dutch Eating Behavior Questionnaire (DEBQ) was developed from Van Strien et al., (1986) by measuring three aspects of eating behavior, which include emotional eating, restrained eating, and external eating with a total of 33 items. The original form of the DEBQ instrument is in English, so in this study using the instrument translated into Indonesian by Sholeha (2014) through the Language Development Center Institute UIN Syarif Hidayatullah Jakarta with a validity score on 28 items 0.47-0.83 and four items eliminated with a reliability coefficient of emotional eating 0.784, restraint eating 0.728, and external eating 0.712. The questions on the DEBQ are measured using a Likert scale with five categories (1) never, (2) rarely, (3) sometimes, (4) often, (5) always. This study measured nutritional status using the Body Mass Index formula by calculating body weight (in kilograms) divided by height squared (in meters). For measuring body weight using Speeds brand digital scales with an accuracy of 0.05 kg, while to measure height using a staturimeter with an accuracy of 0.1 cm. Bivariat analysis in this study to determine the relationship of each aspect of eating behaviors with body mass index using the Spearman Rank correlation test with a significance level of 5% (0.05).

## RESULTS

Respondents in this study collected 298 adolescents and exceeded the minimum sample (n=277). There were seven missing data that were dropped out, so the data to be analyzed were 291 respondents through questionnaires obtained on February-March, 2024.

Table 1.  
Respondent characteristics (n=291)

Respondent characteristics	f	%
Age		
15 years old	57	19,6
16 years old	142	48,8
17 years old	91	31,3
18 years old	1	0,3
Gender		
Male	140	48,1
Female	151	51,9
Grades		
X	146	50,2
XI	145	49,8
Eating frequency		
Less than three times a day	113	38,8
Three times a day	160	55
More than three times a day	18	6,2
Pocket money		

Respondent characteristics	f	%
<Rp20.000	66	22,7
Rp20.000-50.000	194	66,7
>Rp50.000	31	10
Feel under stress		
No	198	68
Yes	93	32

According to table 1, the majority of respondents were female (51.9%), 16 years old (48.8%), and in grade X (50.2%). However, the number of respondents in both class X and XI were almost equally distributed. The results of this study show that most respondents have characteristics with a frequency of eating three times a day (55%), get pocket money per day in the range of Rp20,000-50,000 (66.7%), and feel they are not experiencing stress (68%).

Table 2.  
Respondent's eating behaviors (n=291)

Subvariable	f	%	Mean $\pm$ SD	Median	Min	Max
Emotional eating	27	9,3	2.06 $\pm$ 0.78	2	1	5
Restrained eating	67	23	2.57 $\pm$ 0.86	2.55	1	5
External eating	97	67,7	3.25 $\pm$ 0.65	3.22	1	5

Each subject has three different scores, the highest score being interpreted as the most dominant eating behavior of the individual. According to table 2, the results of this study showed that the tend of the subject's eating behavior was "external eating" (3.25 $\pm$ 0.65).

Table 3.  
Respondent's BMI-status (n=291)

Categories	f	%
Underweight	90	30.9
Normal	169	58.1
Overweight	32	11
Mean $\pm$ SD	20.71 $\pm$ 3.63	
Min - Max	14.53 - 36.73	

Based on the table 3, more than half of the respondents had normal status (58.1%), then underweight 30.9%, and overweight 11%. In addition, the average BMI of respondents was 20.71 kg/m<sup>2</sup> with the lowest BMI of 14.53 kg/m<sup>2</sup> and the highest BMI of 36.73 kg/m<sup>2</sup>.

Table 4.  
Correlation between eating behaviors and body mass index (n=291)

Variable	Coefficient correlation	p-value
Emotional eating $\rightarrow$ IMT	0.081	0.166
Restrained eating $\rightarrow$ IMT	0.173	0.003
External eating $\rightarrow$ IMT	-0.176	0.003

Based on the results of the Spearman Rank correlation test in table 4, there is significant correlation between aspects of restrained eating behavior ( $p = 0.003$ ,  $r = 0.173$ ) and external eating ( $p = 0.003$ ,  $r = -0.176$ ) with BMI. Meanwhile, there is no significant correlation between emotional eating behavior with BMI ( $p > 0.05$ ).

## DISCUSSION

## **Eating Behavior**

The results of this study show that the tendency of respondents' eating behavior is mostly in the aspects of external eating 67,7%, 23% has a tendency for restrained eating behavior, and 9,3% has a tendency for emotional eating behavior. The results of this study are in line with studies in late adolescence of IPB nutrition students in 2023 with the tendency of eating behavior in subjects dominant in external eating (Nurdiani et al., 2023). Eating behavior is something that includes food choices and motives, eating practices and patterns, and eating-related problems such as obesity and eating disorders (LaCaille, 2013). Eating behavior is defined as the behavior of individuals when responding to stimuli to food which is influenced by internal and external factors.

The DEBQ instrument developed by Strien et al., (1986) measures three aspects of eating behavior, namely emotional eating, restrained eating, and external eating. Emotional eating which is defined as a response to internal emotions, restrained eating which means that a person controls the food consumed, and external eating which is the desire to eat triggered by the sight, smell, or taste of food (Nurdiani et al., 2023). A person with an eating disorder tends to be higher in the restrained eating aspect, while a person with obesity tends to be higher in the emotional eating and restrained eating types (Domoff, 2016). People with high external eating even though they are not psychologically hungry or are already full, there will be a high desire to eat triggered by the sight, smell, or taste of food. The desire to eat certain foods such as high carbohydrate foods, sweet foods, high fat foods is positively associated with external eating and BMI (Dakin et al., 2023). In addition, most emotional eating occurs during the transition between childhood and adulthood or the adolescent period, possibly as a result of estrogen activation during puberty (Strien, 2018). Emotional eating can increase food intake and lead to overnutrition as a form of coping with certain emotions (Syarofi & Muniroh, 2019). Individuals with high emotional eating have a tendency to overeat and consume high-fat foods and excess sugar (Auliannisaa & Wirjatmadi, 2023). Emotional eating is closely related as one of the stress coping, namely emotional-focused coping which focuses on emotional responses such as eating (Sukianto et al., 2020). Meanwhile, subjects with high restrained eating usually have a strong motivation to limit food intake, eat irregularly and often experience hunger and are unable to control the food eaten (Snoek et al., 2013). This eating behavior tends to be carried out by individuals who are overweight or obese. Individuals with high BMI tend to have diet control strategies to manage their weight (Dakin et al., 2023).

## **Nutritional Status**

The average BMI of respondents in this study was 20.71 kg/m<sup>2</sup> and more than half of the respondents had normal status (58.1%), then underweight 30.9%, and overweight 11%. Almost half of the respondents in this study had nutritional problems (41,9%) based on BMI calculations. These results differ from the prevalence of the 2018 National Riskesdas data, where the underweight category is higher than the national data, while overweight has lower results. As many 45% of respondents have a frequency of eating less and more than three times a day, which means that almost half of the respondents have eating habits that are not regular. The multiple nutritional problems found in adolescents are a continuation of growth and health problems from an early age and will continue into adulthood (Simbolon, 2013). Improving the nutritional status of adolescent girls and boys requires specific nutrition interventions that address the main barriers to nutritional status (Oddo et al., 2019). In addition, it is important to consider interventions that focus on improving adolescent diets. Nutritional status is part of health status that describes the state of the body that results from the intake, absorption, use, and metabolism of food intake (Dwyer & Bailey, 2017). Eating

habits can affect nutritional status because improper eating patterns can affect BMI (Utami & Setyarini, 2017). Nutritional status can be improved indirectly through eating behavior by 7.4% and the effect is positive (Rafkhani et al., 2021).

### **The Correlation between Eating Behaviors and BMI**

This study showed that there is a positive correlation between aspects of restrained eating behavior and BMI in senior high school adolescents ( $p = 0.003$ ,  $r = 0.173$ ). This results are in line with other study that is a positive correlation between restrained eating and BMI in junior high school adolescents ( $p\text{-value}=0.002$ ;  $r = 0.334$ ) (Sholeha, 2014). In this study, the association between restrained eating and nutritional status may be because adolescents had just gone on a diet and were overweight so the restrained eating score was quite high. The results of research on Medical students in 2015, explained that overweight people tend to limit themselves to food, always try to eat less usually, often refuse food/drinks, pay more attention to what will be eaten, often make themselves hungry and often pay attention to weight scales (Khotibuddin, 2017). Restricting eating or skipping meals is an effort sometimes made by adolescent who want to have a thinner body shape or fat anxiety. However, this method is not effective because it can cause weight gain. A person who skips meals and leads to irregular eating patterns will experience counter-regulation when the individual loses control, causing the person to eat as much as possible, and eventually gain weight (Snoek et al., 2013). The research which says that there is a significant positive relationship between restrained eating behavior and overweight in STIKes Mitra Keluarga students ( $p = 0.001$ ) (Noerfitri & Aulia, 2022). Adolescents need to realize that efforts to lose weight should not be done by limiting food or even not eating but can be done in other ways such as exercising or increasing activity.

This study found that there is a negative correlation between external eating and BMI in senior high school adolescents ( $p = 0.003$ ,  $r = -0.176$ ). These results are negatively related, which means that the poorer nutritional status of the subject, the higher to tendency of external eating behavior. This finding has been consistently reported in other studies, suggesting that a negative correlation between external eating and BMI (Nurdiani et al., 2023; Silva et al., 2013). The eating behavior aspect of external eating is strongly influenced by ideal image of the desired body so that subjects with lower than ideal body weight tend to eat more (Nurdiani et al., 2023). In adolescents with thinness, external eating can be an intervention to increase weight. Meanwhile, in overweight adolescents external eating should be considered to prevent the maintenance of obesity. Adolescents with excessive carbohydrate consumption are 5 times more likely to be overweight than adolescents with non-high carbohydrate consumption (Utami & Setyarini, 2017). The results of this study are inconsistent with the research of Snoek et al. (2013), there is no relationship between external eating and BMI in early adolescents. Other study says that obese adults reported higher scores across all DEBQ subscales with a tendency to emotionally and externally significant eating than individuals with normal BMI (Benbaibèche et al., 2023). The tendency to eat more when exposed to external food cues by itself does not seem to cause energy imbalance and increased weight status (Dakin et al., 2023).

Furthermore, the result revealed that there is no significant correlation between emotional eating behavior with BMI in senior high school adolescents ( $p = 0.166$ ;  $r = 0.081$ ). This findings are in line to other study that is no correlation between emotional eating and obesity in final year students at the Faculty of Public Health, Universitas Airlangga in 2022 (Auliannisaa & Wirjatmadi, 2023). However, the results in this study contradict other findings which state that there is a relationship between emotional eating and nutritional status in fourth-year students at Airlangga University in 2019, which means that the higher the emotional eating score, the more it triggers an increase in nutritional status (Syarofi & Muniroh, 2019). The study that high emotional eating is associated with increased food consumption due to uncontrolled eating behavior when experiencing certain emotional conditions. No relationship between emotional eating and BMI can be caused by a number of factors, possibly including individuals using effective coping mechanisms against stress/emotions or emotional eating behavior is not a way and coping undertaken by a person. A decrease in food consumption can occur at the beginning of a stressful situation where the adrenal glands will produce adrenaline hormones that can reduce appetite (van der Valk et al., 2018). The treatment of people with high emotional eating should not focus on a low-calorie diet but on emotion regulation skills (Strien, 2018).

This study has limitations that need to be considered, that is the results of this study cannot be generalized to high school students as a whole. However, the results of this study describe most of the conditions of adolescents in high school. The time difference in the subject data collection process allows bias in this study which can affect body weight before weight measurement. In addition, the questionnaires were filled out in close proximity. In this case, it is possible that respondents can see each other or discuss in filling out the answers to the eating behavior questionnaire.

## CONCLUSION

Restrained eating behavior showed a positive correlation, indicating that individuals exhibiting higher levels of restrained eating behavior tended to have over-nutritional status. Conversely, external eating behavior demonstrated a negative correlation, suggesting that higher levels of external eating behavior were associated with poorer nutritional status. Based on the results of this study, that adolescents can be given interventions to increase awareness about appropriate eating behavior through peer groups at school. Suggestions for future researchers to develop research using other factors that influence malnutrition in schools adolescents.

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