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Association of Parenting Style and Mindful Eating with Sodium Intake among Adolescents in Indonesia

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Abstract

Background: Most adolescents have an excessive sodium intake associated with hypertension and cardiovascular disease (CVD). Parents have an important role in controlling adolescents' nutritional intake, including sodium, through healthy eating. Mindful eating is considered healthy eating with the potential to control nutritional intake. This study aims to analyze the association of parenting style and mindful eating with sodium intake among adolescents.

Methods: This cross-sectional study involved adolescents aged 15–18 years. Sodium intake was measured by repeated 24-hour food recall. Parenting style was examined with a validated parenting style and dimensions questionnaire self-administered by the adolescent parent. Mindful eating was evaluated using a mindful eating questionnaire (MEQ) self-administered by the adolescent. Data were analyzed using Kruskal–Walls and Spearman correlation.

Results: Parenting style has no significant association with sodium intake, and mindful eating has a negatively significant correlation with sodium intake ($p < 0.05$; $r = -0.17$).

Conclusions: Parenting style has no direct association with sodium intake. However, mindful eating has a significant association with sodium intake and parenting style. Mindful eating shows potential as a mediator between parenting style and sodium intake.

Keywords: adolescents, cross-sectional studies, parenting, sodium chloride dietary

INTRODUCTION

Excessive sodium intake indicates an unhealthy diet associated with an increased risk of noncommunicable diseases, such as high blood pressure, obesity, and cardiovascular disease (CVD).¹ In Indonesia, an association was observed between excessive sodium intake and high blood pressure, a CVD risk factor.² A prospective cohort study in Indonesia found that adults who consumed more than or equal to 2000 mg/d of sodium had higher hypertension incidences than those consuming < 2000 mg/day.³ Therefore, an unhealthy diet, including high sodium intake, must be addressed in adolescence. However, most adolescents currently have an excessive sodium intake.⁴ A previous report indicated the average sodium intake was 3214 mg/day among children and adolescents aged 7–18.⁵ Another study from an individual consumption survey in 2014 revealed the mean sodium intake at 2748 mg/day.⁶ According to the World Health Organization recommendation, sodium intake must not exceed 2000 mg daily.⁷ A diet survey in 2014 showed that 55.7% of adolescents consumed more than 2000 mg/day of sodium, making them the age group with the highest proportion of excessive sodium intake. Regarding gender, boys consume more calories and, therefore, tend to have

a higher sodium intake than girls.⁶ Furthermore, excessive sodium intake is common in adolescents with low economic status.⁸

The sources of sodium are quite affordable and frequently aggressively marketed.⁸ A survey of individual consumption in 2014 revealed that the food items mainly contributing to the sodium intake of adolescents (13–18 years old) were salt (44.3%), noodles (12.9%), and seasoning (8.4%).⁶ In 2020, the Ministry of National Development Planning reported that the main snack types consumed by adolescents were ultra-processed food, chips, and fried food that commonly contain high sodium.⁹

Adolescence is one of the critical periods that determines the health status in adulthood, and nutrition plays a substantial role in the well-being and development of adolescents.⁴ Excessive sodium intake is a characteristic of an unhealthy diet that cannot be separated from the role of parents as role models and food procurers, which are closely related to shaping adolescents' food intake. Parents' low education is predicted to have a negative association with sodium intake. Moreover, effective parenting during this period can have a positive and lasting effect on adolescents' health. Parenting style is one of the psychosocial factors important in shaping the diet of adolescents, including sodium intake, because family is the first and the closest environment for adolescents.¹⁰ According to Baumrind, the three parenting styles are authoritative, authoritarian, and permissive. Authoritative practices are characterized by high warmth and less

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control and recommend cultivating children's interest in food to increase food acceptance. Meanwhile, authoritarian parties tend to be less warm, have high control, and prefer child-feeding practices. In contrast, permissive parents are warmer but less controlling and allow their children to eat whatever they want.¹¹

Authoritarian and permissive parenting styles have been linked to unhealthy diets.¹² A longitudinal study found that after two years of follow-up, boys with authoritarian mothers were significantly ($p < 0.05$) less likely to eat fruit and vegetables.¹³ Boots *et al.* found that low warmth was associated with a high preference for unhealthy food.¹⁴ Some parents that are less controlling allow adolescents to have a long screen time¹⁵ and possibly order online food.¹⁶ Arifiani *et al.* showed that commonly ordered food choices were categorized as high-sodium food.¹⁶

Authoritative parents show adolescents how to eat and improve their health without coercion (e.g., increased physical activity and consumption of fruits and vegetables).¹² This finding aligns with the two cross-sectional studies of Peters *et al.*, who found that the authoritative parenting style is linked to healthy dietary intake, including a high intake of fruit and vegetables.¹⁷ This finding also aligns with research on older children (5–18 years old), indicating that the authoritative parenting style is related to increased diet quality.¹⁸ Goodman *et al.* also showed that authoritative practice can improve adolescents' eating behavior toward less emotional eating.¹⁹ Less emotional eating is also known as mindful eating, which involves physical and emotional senses to experience and enjoy the food being eaten to increase awareness and focus on eating while paying attention to hunger and satiety cues. Authoritative parenting is considered a positive parenting style that promotes adolescents' well-being by shaping their mindful eating behavior,¹⁹ which is predicted to prevent excess sodium intake.²⁰ Therefore, mindful eating may mediate parenting style and sodium intake.

Parenting style has been linked to dietary intake, and the authoritative style is likely to have a positive impact on the same. This view is supported by a previous review of seven articles, five of which found the association of authoritative or high warmth and control with a high intake of fruit and vegetables and a low intake of unhealthy food.¹² The study also showed that research regarding parenting style and sodium intake among adolescents is still limited and thus requires further exploration. Therefore, the present work aims to analyze the association among parenting style, mindful eating, and sodium intake.

METHODS

A cross-sectional study was conducted in Surabaya, one of urban cities in Indonesia. According to the 2018 Indonesian

National Basic Health Research, the prevalence of overweight and obesity in Surabaya (17.8%) was higher than the national level (13.5%).²¹ Agustina *et al.* reported that the prevalence of overweight and obesity in older adolescents in 2018 was almost double that in 2013, with an increase of 6.2%.²² This increase was higher than the prevalence in younger adolescents (5.2 %).²² Therefore, the present study recruited adolescents from either public or private senior high schools in Surabaya as the respondents. Twenty students were chosen randomly from each school based on the inclusion criteria (aged 15–18 years old, have a mobile phone and internet connection, and are willing to participate in the research). The exclusion criteria included health problems that require special treatment or diet and the inability to communicate normally. The study procedure was approved by the ethical committee of the Faculty of Medicine, Universitas Indonesia (KET-573/UN2.F1/ETIK/PPM.00.02/2022).

Instruments

The instruments used in this study consisted of a sociodemographic questionnaire, wealth index questionnaire, MEQ, Parenting Scale, Dimension Questionnaire (PSDQ), and 24-hour food recall.

Sociodemographic data (age, gender, parents' education, and wealth index) were obtained through interviews. If the parent graduated from junior high school, he/she was categorized as having < 12 years of education. If the parent graduated from senior high school or above, he/she was categorized as having ≥ 12 years of education. The education categories for parents were in accordance with government regulations regarding the 12-year compulsory education program. The questions were close-ended, and the enumerator input the code for the answer from the respondent. The wealth index questionnaire was adopted from the Indonesia Demographic Health Survey (IDHS) in 2017, carried out by the National Population and Family Planning Board (BKKBN), Statistics Indonesia (BPS), and the Ministry of Health (Kemenkes). The respondents were interviewed regarding electricity and ownership of durable goods in households such as radio, television, nonmobile telephone, computer/laptop, refrigerator, fan, washing machine, air conditioner, watch, mobile telephone, bicycle, motorcycle, and private car. Score one was given for each durable goods that was owned by the respondent, and score two was given for each durable goods that was not owned by the respondent. Each score was then multiplied by the coefficient obtained from the IDHS database, and all the scores were added for each variable. The sum of the total answer score for each participant was categorized according to the coefficient percentile (lowest ≤ 0.04 , low-middle ≤ 0.07 , middle ≤ 0.12 , middle-high ≤ 0.19 , and highest ≤ 1.26).²³

Parenting style was assessed using PSDQ, developed by Robinson *et al.* and widely used to measure parenting styles based on the three Baumrind parenting styles.²⁴ Its

Indonesian version is already available. In a previous study, PSDQ was backward-translated, pretested among the parents of 13- to 19-year-old children, and yielded Cronbach alpha of 0.80, 0.75, and 0.64 for authoritative, authoritarian, and permissive styles, respectively.²⁵ PSDQ consisted of 32 self-reported items for parents that covered three parenting styles: authoritative (15 items), authoritarian (12 items), and permissive (5 items). Every item was answered using the Likert scale (1 = never to 5 = always). The average score was calculated for each parenting style (authoritarian total score divided by 12, authoritative total score divided by 15, and permissive total score divided by 5). The highest average score among the three styles indicated the most dominant parenting style applied.²⁶ Internal consistency reliability from the preliminary study was good for authoritative and authoritarian styles and the whole construct (PSDQ-32 items) with Cronbach alpha = 0.91, 0.70, 0.84, respectively, but poor for permissive parenting with Cronbach alpha = 0.40. For the permissive style, the Cronbach alpha in the present study was lower than in the previous study. Nevertheless, many previous reports also showed barely acceptable internal consistency for the permissive style.²⁶

Mindful eating was measured by the MEQ developed by Framson *et al.*²⁷, translated in Indonesia, and validated by Hilmia *et al.*²⁸ The validity of the MEQ-Indonesia version ranged 0.750–0.917 (Aiken's V)²⁸, according to the preliminary study, its reliability was 0.75 (Cronbach alpha). Therefore, the MEQ is a valid and reliable instrument. The MEQ is a self-administered questionnaire consisting of 28 items grouped into five domains (distraction = three items; disinhibition = eight items; external cues = six items; awareness = seven items; and emotional response = four items) and then answered using the Likert scale (1 = never/rarely, 2 = sometimes, 3 = often, and 4 = usually/always). Reverse scoring was applied to items 1, 2, 6, 7, 9, 11, 17, 18, 19, 27, and 28. Each item was summed based on the domain to generate the domain score excluding those with a "not applicable" response. The average of the five domain scores was taken as the mindful eating score. A high score indicated mindful eating.²⁷

Sodium intake was assessed by interview using repeated 24-hour food recall once on weekdays and once on weekends; the results were then averaged. During the interview, a food picture book was used to assist the respondents in estimating the portion of food consumed. After the list of food consumed was obtained from the 24-hour food recall, the sodium content for each food was estimated. For cooked food, the salt added during cooking was estimated using the guideline from the Ministry of Health containing a list of food ingredients and their salt content per 100 grams of food. For packaged food, the sodium content was determined from the nutrition label printed on the back of the food packaging. The sodium content was estimated from the Indonesian Food

Composition Table for raw food. All data on food consumption were entered into the nutrisurvey® software to calculate sodium intake.²⁹

Study procedure

After ethical clearance was obtained, randomization was performed to select the schools for research locations. Research permits were applied through the provincial education office and then forwarded to the selected schools.

Enumerators were recruited from nutritional science majors and trained by experts to perform a 24-hour food recall with the multiple pass method, a structured way to recall the diet for the whole day. The steps included collecting all-day uninterrupted diet memories (pass 1), asking for details of the individual foods and beverages listed (pass 2), followed by their portion sizes and recipes (pass 3), and summarizing all recalled food and beverages (pass 4).³⁰

A preliminary study was conducted on 32 adolescents with the same inclusion and exclusion criteria to ensure that the instruments used were valid and reliable and that those adolescents and their parents understood the questionnaire they would fill out. The reliability and validity of instruments for the preliminary study were mentioned in the instrument section.

During data collection, the researchers visited the school and requested informed assent from adolescents who were willing to participate in this study. Informed consent and PSDQ form were then provided to the adolescents to give to their parents at home. An explanation of the PSDQ form was also given to the adolescents to pass on to their parents. Each parent willing to be involved in this study can sign the informed consent and fill out the PSDQ in the home. The contact person of the researcher was also provided in case the parent needed further information, and a WhatsApp group was created with the adolescents to follow up and ensure the PSDQ form was filled out according to the instructions on the form. The next day at school, the PSDQ forms that their parents had filled out were collected. The respondents were then interviewed regarding their sociodemographic and sodium intake through a 24-hour food recall. Next, they were asked to independently fill in the MEQ via the Google form on their cell phones. For the weekend 24-hour food recall, an appointment was made to interview the respondents on Monday.

Data analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS IBM Corp.) version 22 for Windows. The normality of data distribution was tested using Kolmogorov-Smirnov. The descriptive analysis of sociodemographic variables (age, sex, parent's education, and parent's occupation), wealth index, mindful eating,

parenting style, and sodium intake were presented as mean \pm SD or median (minimum-maximum) for continuous data and number (%) for categorical data. Spearman correlation was used to analyze age, mindful eating, and sodium intake associations. Mann-Whitney was applied to analyze the associations among gender, parents' education, and sodium intake. Kruskal-Wallis was employed to analyze the associations among wealth index, parenting style, and sodium intake. The statistical significance limit was accepted as $p < 0.05$.

RESULTS

The demographic characteristics are shown in Table 1. Among the 240 subjects, 60.4% are female, with a mean age of 16.7 ± 0.7 years old. Data on age are normally distributed with Kolmogorov-Smirnov ($p > 0.05$). Most of the adolescents in this study have a high wealth index (81.7%). The characteristics of the adolescent's parents included their education and occupation. The majority of adolescents' parents in this study have education attainment of ≥ 12 years. The authoritative parenting style (98.8%) is applied by most of the adolescents' parents in this study (Table 1).

The scores of mindful eating (average 2.7 ± 0.2) are normally distributed with Kolmogorov-Smirnov ($p > 0.05$). The sodium intake average is 1665.6 (76.1-3550.9), and the data are not normally distributed with Kolmogorov-Smirnov ($p < 0.05$).

The adolescents' demographic characteristics and sodium intake are presented in Table 2. The correlation between age and sodium intake is insignificant ($p = 0.530$; $r = 0.04$). Similarly, gender, wealth index, and parents' education have no significant association with sodium intake. In terms of gender, males have a higher sodium intake than females.

Table 2 also presents the association between parenting style and sodium intake analyzed using Kruskal-Wallis test. The results showed no significant p-value (0.587). Among the parenting styles, authoritative is associated with the lowest sodium intake.

Spearman correlation analysis was performed between mindful eating and sodium intake. A negatively significant correlation is observed ($p = 0.007$; $r = -0.17$), which indicates that a high mindful eating score is associated with a low sodium intake.

The results of one way-ANOVA for parenting style and mindful eating are displayed in Table 3. A significant mindful eating score of 3.2 ± 0.0 associated with permissive parenting style. Authoritative and authoritarian have the same mindful eating scores.

TABLE 1. Demographic characteristics of adolescents and descriptive analysis of parenting styles (N = 240)

Variables	N (%)
Gender	
Female	145 (60.4)
Male	95 (39.6)
Wealth index	
Highest	196 (81.7)
Middle-high	13 (5.4)
Middle	4 (1.7)
Middle-low	10 (4.2)
Lowest	17 (7.1)
Father's education	
<12 years	37 (15.4)
≥ 12 years	203 (84.6)
Mother's education	
<12 years	43 (17.9)
≥ 12 years	197 (82.1)
Parenting styles	
Authoritative	237 (98.8)
Authoritarian	2 (0.8)
Permissive	1 (0.4)

TABLE 2. Characteristics of adolescents and sodium intake (N = 240)

Characteristics of participants	Sodium intake	<i>p</i>
Gender^a		
Female	1532.2 (76.1-3660.9)	0.084
Male	1969.2 (512.6-3482.1)	
Wealth index^b		
Highest	1695.2 (76.1-3550.9)	0.463
Middle-high	1406.7 (574.5-3487.0)	
Middle	1811.7 (1564.5-2407.1)	
Middle-low	2258.1 (398.6-2816.4)	
Lowest	1443.2 (108.1-3474.1)	
Father's education^a		
<12 years	1564.5 (108.2-3487.0)	0.317
≥ 12 years	1691.4 (76.1-3550.9)	
Mother's education^a		
<12 years	1594.3 (108.2-3531.9)	0.816
≥ 12 years	1676.9 (76.1-3550.9)	
Parenting style		
Authoritative	1654.4 (76.1-3550.9)	0.587
Authoritarian	1662.2 (1315.7-2008.7)	
Permissive	2371.5	

^a (Mann-Whitney U); ^b (Kruskal-Wallis); Values are presented in median (min-max)

TABLE 3. Parenting style and mindful eating (N = 240)

Parenting style	Mindful eating score	<i>p</i>
Authoritative	2.6 \pm 0.2	0.033*
Authoritarian	2.6 \pm 0.2	
Permissive	3.2 \pm 0.0	

Values are presented mean \pm SD; *Significant $p < 0.05$

DISCUSSION

This study aimed to investigate the association between parenting style and sodium intake in adolescents. Baumrind categorized parenting style as authoritative (identified by organized guiding that integrates the child's specific preferences), authoritarian (defined by strict adherence to parental norms and limited encouragement of child autonomy), and permissive (characterized by indulgence and provides minimal structural guidance to the child).¹¹

Results showed no significant associations between adolescent characteristics and sodium intake. Furthermore, the association between parenting style (authoritative, authoritarian, and permissive) and sodium intake was insignificant. This finding is similar to the study on 1614 parent-child pairs that found no significant association between general parenting style (measured by using a questionnaire and completed by one of the parents) and dietary habit (measured by food frequency questionnaire/FFQ) in logistic regression.³¹

Other studies presented different results. Monroe *et al.* examined the association between parenting practice and food group (dairy, fruit, vegetable, and unhealthy snack) consumed in younger adolescents and found that authoritative parenting style has a negatively significant correlation with unhealthy snack consumption.³² Furthermore, Lopez *et al.* conducted a study among 174 mother-child pairs with a mean child age of 10 years and showed an insignificant direct effect of the three types of parenting style (measured by using PSDQ) on children's dietary intake.³³ They also performed further analysis on mediation, in which the parenting practice was assumed as the mediator. The results showed that the authoritative parenting style indirectly affects children's dietary intake through mealtime structure (one of the parenting practices).³³

Several possible reasons can explain the above difference. First, the difference may be due to the measurement of parenting style, which is not relatively insensitive to measuring dietary intake. Moreover, parenting styles can differ among individuals (mother or father) and time. Therefore, the measurement of parenting style must be person- and time-specific.³¹ However, the present study did not count the number of fathers or mothers who fulfilled the PSDQ. According to Lopez *et al.*, parenting style indirectly affects the dietary intake of children and adolescents; however, they did not assess parenting practice as a potential moderator between parenting style and sodium intake.³³ Moreover, a domain or parenting style-specific analysis will benefit more than a general analysis.

Furthermore, a previous study showed that parenting style (authoritative, authoritarian, and permissive) may

have an indirect effect on child eating behavior, and this influence is mediated by mindful eating.¹⁹ Mindful eating originates from mindfulness, a basic human ability to pay attention to what is happening inside and outside the individual. Mindfulness applied to eating is termed mindful eating, which refers to raising awareness of the physical and emotional sensations associated with eating.²⁷ Mindful eating as a parenting practice is predicted to have a positive impact on the dietary intake of children and adolescents. Therefore, we also analyzed the relationship between mindful eating and sodium intake and found their negatively significant correlation. This finding is in line with the study of Kartika *et al.*, who discovered a negatively significant association between mindful and intuitive eating and calorie intake in female teenagers.³⁴ The cross-sectional study among 546 university students also found a negative significant correlation between mindful eating and sugar and fat intake.³⁵

Mindful eating is characterized by less distraction and emotion and great focus when eating.²⁷ A similar result was obtained by Jordan *et al.* who explored the effect of a 15-minute mindful eating practice on food intake in 60 university students.³⁶ The participants in the intervention group listened to an audio recording regarding mindfulness instruction that asked them to focus on the physical signal from their bodies. Meanwhile, the participants in the control group listened to an audio recording focused on relaxation without mindfulness. All the participants were then asked to eat snacks. Compared with those in the control group, the participants exposed to mindfulness practice consumed 24% fewer calories. The overall energy intake of the participants in the experimental and control groups was 149 calories and 198 calories, respectively.³⁶ This finding illustrates that mindful eating has the potential to control food intake, including sodium intake.

We also analyzed the relationship between parenting style and mindful eating and found that parenting style has a significant association with mindful eating. This finding is in line with the study of Goodman *et al.*, who found that the authoritative parenting style is significantly related to high mindful eating scores, and authoritarian and permissive parenting styles are significantly related to low mindful eating scores.¹⁹ Although the present study found that the permissive parenting style has the highest mindful eating score, this conclusion is not substantial because only one subject applied this parenting style in this study.

Duncan *et al.* suggested that when parents integrate mindful eating into their practice, they take care of their children in a value-consistent manner instead of merely replying automatically.³⁷ All these findings imply that parenting style combined with mindful eating can benefit children and adolescents' dietary habits. Although a

previous study classified mindful parenting as a new parenting style, this concept requires further exploration.³⁸

The strength of this study lies in the preparation phase: we ensured that all instruments were valid and reliable by conducting a pretest. To accurately manage the dietary assessment, we recruited all the enumerators from the nutrition science program and had an expert train them regarding the sodium intake assessment. Considering that the 24-hour food recall relies on estimation and is prone to bias, we tried to minimize bias using a food picture book (published by the Indonesian Ministry of Health) during sodium assessment to help the respondents estimate the portion of the food consumed.

The limitation of this study is the memory lapses during sodium intake assessment using 24-hour food recall. Due to the limited data collection time in the field, the researcher could not visit the respondent's house to determine who filled out the PSDQ. The assessment of parenting style is not quite as sensitive as the dietary assessment. In addition, the parenting style will be more visible if each parenting style score is analyzed rather than just selecting the predominant parenting style score. Future studies must explore the potential of mindful eating as a mediator between parenting style and sodium intake. Moreover, parenting style should be measured separately between fathers and mothers.

CONCLUSIONS

Parenting style showed an insignificant direct effect on sodium intake. Further analysis revealed that mindful eating had a significant association with parenting style and sodium intake. Thus, mindful eating manners can be a mediator for parenting style and sodium intake. Further exploration of parenting style and sodium intake is warranted.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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