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Factors Associated With Food Choice Motivations Among Urban High School Students in Indonesia

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Abstract

Background: This study aimed to examine what reasons motivated urban high school students to choose certain foods, and to identify factors associated with food choice motivations.

Methods: A cross-sectional study was conducted from April to May 2020 in Depok, Indonesia. A total of 433 high school students in grades 10–12 were recruited. Food choice motivations were identified using a questionnaire, and defined using exploratory factor analysis. Possible factors associated with motivations were evaluated using multiple linear regression.

Results: Five food choice motivations were identified and classed as: F1, health and religion; F2, price and convenience; F3, comfort; F4, weight control; and F5, familiarity. Being physically active was positively associated with F1 ($\beta = 0.234$, $P < 0.001$) and F4 ($\beta = 0.284$, $P < 0.001$). Negative associations were observed between F4 and wishing to be fatter ($\beta = -0.202$, $P = 0.05$) as well as between F5 and having less knowledge about nutrition ($\beta = -0.006$, $P = 0.04$). F2 ($\beta = 0.042$, $P = 0.004$) and F3 ($\beta = 0.040$, $P = 0.02$) were positively associated with frequent access to media. F3 was positively associated with students receiving a higher stipend ($\beta = 0.014$, $P = 0.003$).

Conclusions: Our findings highlighted five motivations influencing the daily food selections of high school students. These motivations were associated with physical activity, body image, nutrition knowledge, media access, and stipend. School personnel, family, and health professionals share the responsibility of supporting healthy food choices among adolescents.

Keywords: Food choice, Nutrition, High school student, Indonesia

1. Introduction

Health during adolescence can determine health status in adulthood. Worldwide, adolescents are increasingly overweight [1,2] which may increase the risk of non-communicable diseases later in life [3]. According to the latest National Health Survey, the prevalence of being overweight among adolescents in Indonesia showed an upward trend from 7.3% to 13.5% in 2013–2018 [4,5]. Among the neighboring metropolitan areas next to the Jakarta Special Capital Region, the Depok municipality showed the highest prevalence of being overweight (23.9%) among adolescents [6].

Unhealthy diet is a common contributor becoming overweight [3]. During adolescence, biological changes are thought to result in inappropriate eating habits. Growth spurts trigger hunger and increased

food consumption. In addition, psychological development begins to dominate the actions of adolescents [7]. Adolescents are more likely to spend time with friends than family; thus, making time for family, studies, and peer groups can lead to missed meals [8]. Adolescents compensate for both wanting to meet with friends and needing to eat meals by snacking more [9]. However, snack food choices tend to include greasy, “empty” foods that have high fat and carbohydrate content [10,11].

In Indonesia, adolescents have an excessive amount of salty and fatty food for their daily meals [9,12,13]. Consumption of healthy protein, vegetable, and fruits were found to be inadequate [12,14]. Instead, adolescents mostly consumed sweets and confectionaries for their snacks [9,14]. Among high school students, adolescents perceived unhealthy food as cheap and easy-to-get food. They favored

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this type of food mainly because of their tight schedule [9,13]. Irregular mealtimes with unhealthy food choices and less physical activity led adolescents to overnutrition [9,15,16,17].

One quantitative approach to assess food choice is a food choice questionnaire with nine subscales, which was primarily studied by Steptoe [18]. However, in age- or country-specific studies, researchers have developed new emerging subscales in order to adapt and validate their customized questionnaires [19,20,21,22,23,24]. Further study suggested that environment and animal welfare, as well as religion should be added as ethical subscales [21]. Socio-demographic characteristics such as sex, age, education background, income or family affluence were also found to be associated with food choice [22,25,26]. Furthermore, other health-related variables like physical activity, body image, eating practice and dieting were studied among school-age children [20,27,28].

The current thinking is that health practitioners should help adolescents to improve their food choices, rather than asking them to stop snacking to fulfill their energy and nutrient needs. An individual's food choices are built long before food is consumed. An adolescent's food choice is influenced by their personal desire for food, food's sensory characteristics (ie. appearance, taste, and texture), and food environment (ie. food availability and customs) [29]. Understanding adolescents' food choices can help health practitioners to reverse adolescents' unhealthy habits and behavior, thus steering them toward a healthier lifestyle.

The present study explored food choices in adolescents, specifically high school students. A later phase of adolescence was chosen since older adolescents have a firm cognitive capability. This helps them to shape their future and understand possible consequences from their current behavior. Furthermore, high school students can make personal choices since they are more independent from family support. These conditions are considered relevant when treating adolescence as pre-adulthood. The present study aimed to identify motives for the food choices that adolescents made and the association of various factors such as students' characteristics, physical activity, body image, nutrition knowledge, and media access with their food choice motivations.

2. Methodology

This cross-sectional study was conducted from April to May 2020 in Depok, Indonesia. Depok is included in the greater Jakarta area, where major

development occurs. In Depok, overnutrition among adolescents is prevalent and reached 24% in 2018, which was almost two times higher than the national prevalence of 13.5% [6]. A total of 433 high school students in grades 10–12 who were living in Depok were enrolled in our study by non-probability sampling. A unique online questionnaire link was initially distributed to potential high school students. The questionnaire was then spread within the students' social circles. Responses were collected and recorded during the study period.

2.1. Measurements

An online, self-reported questionnaire was used to gather sociodemographic data such as sex (male/female), date of birth (to calculate age in years), self-reported body weight (kg) and body height (cm), and stipend (Indonesian Rupiah; IDR). Body mass index (BMI) or BMI-for-age was used to evaluate the students' nutritional status based on body weight and height in correspondence with age and sex [30]. BMI was categorized based on the participant's BMI-for-age z-score (BAZ) as: underweight, BAZ < -2 SD; normal, BAZ -2 to 1 SD; overweight, BAZ 1 to 2 SD; and obese, BAZ >2 SD.

The reasons for the food choices of the students was determined using a food choice questionnaire [18,21,22] comprising of 33 items covering nine subscales including: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and religion. Responses were recorded using a four-point Likert scale (0, not important at all; 1, slightly important; 2, important; and 3, very important) with an initial statement of "It is important to me that the food I eat on a typical day ...", and followed by statements as listed in Table 2. Examples of the statements included contains no additives, cheers me up, is easy to prepare, tastes good, contains natural ingredients, is not expensive, is low in calories, is not forbidden in my religion, etc. The questionnaire was available in Bahasa. It had a high psychometrics profile with coefficient of $\alpha > 0.7$ [22].

A physical activity questionnaire for adolescent (PAQ-A) was used to evaluate the students' physical activity [31]. It was translated to Bahasa, and was backward translated to English by experts, including a nutrition professional, public health lecturer, and high school teacher. The forward translation of the PAQ-A in this present study had a Cronbach's α value of 0.76, which was considered to be reliable [32]. The PAQ-A consisted of nine questions that recorded the students' physical activity during the past week. However, only eight

questions were used for the analysis, in which students responded using a five-point score. Final scores were calculated using the average of the total score from the eight-item questionnaire. A higher score indicated higher physical activity [31]. A cutoff value of a minimum score of 2.75 was used to categorize adolescents as physically active [33]. Examples of questions from the PAQ-A included: 1) Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? 2) In the last 7 days, what did you normally do at lunch (besides eating lunch)?

Students' perception of their body image was evaluated using the Stundkard's scale [34]. The scale was used to confirm a value from current body image minus ideal body image. The scale was organized into three categories: score 0, "satisfied"; score >0, "wishing to be thinner"; and <0, "wishing to be fatter." Forward and backward translations between Bahasa and English were also performed for this questionnaire prior to data collection.

The nutrition knowledge questionnaire used in the present study was adapted from the National Dietary Guidelines [35]. It consisted of information about a) nutrient sources (11 items), b) food effect on health (4 items), and c) dietary guidelines (10 items). Examples of questions following aforementioned topics respectively included: a) Which one of the following foods do experts count as a source of carbohydrate? b) Which one of these following diseases is related to how much sugar people eat? c) How much do experts recommend to limit salt consumption in a day? Content validity was performed by three experts using item-objective congruence (IOC), and resulted in 25 questions scoring above 0.5. Although the questionnaire had a slightly low Cronbach's α value of 0.68, it was acceptable to be used in the present study [32]. The IOC also identified one question to assess the frequency of accessing media related to food: "How many times do you access the media which related to food in a week?"

2.2. Data analysis

Nutritional status from BMI-for-age categories of the students was based on the World Health Organization AnthroPlus software calculation. General characteristics of participants were reported in frequency and percentage for categorical data. Median and interquartile rank (IQR) were presented because the continuous data were skewed. Exploratory factor analysis (EFA) was performed using principal component analysis (PCA) with the

Promax (oblique) method. After sorting for eigenvalues >1, PCA extracted 33 items into new subscales representing food choice in high school students. An initial cutoff throughout the rotation process was set for a factor loading value > 0.32 [36]. Once factor items were constructed, they were named accordingly to underlying commonalities. Thus, multiple linear regression analysis was applied to determine relationships between food choice and associated factors. The significance level in the present study was set at $P = 0.05$. Data were analyzed using SPSS version 22.0 [37].

2.3. Ethical approval

This study was approved by the Institutional Review Board of Universitas Muhammadiyah Jakarta (approval number 10.003.B/KEPK-FKMUMJ/TV/2020).

3. Results

Table 1 presents the general characteristics of the participants in the present study. Among 433 participants, 71.4% were female. A total of 14.1% students were overweight (z-score >1 SD), and 40% of all participants reported "wishing to be thinner." Using to a PAQ-A score cutoff value of 2.75 [33], most of the students (87.5%) were physically inactive.

Table 2 shows the EFA of food choice among high school students. PCA was performed after Kaiser–Meyer–Olkin measurement of sampling adequacy value of 0.9 and a significant Bartlett's Test of

Table 1. Characteristics of participants (n = 433).

Characteristics	N = 433	
	n	%
Sex		
Male	124	28.6
Female	309	71.4
BMI-for-age		
Underweight	36	8.3
Normal	336	77.6
Overweight	61	14.1
Obese	14	3.2
Body image perception		
Satisfied	168	38.8
Wishing to be thinner	173	40.0
Wishing to be fatter	92	21.2
Physical activity		
Active	54	12.5
Inactive	379	87.5
Median; IQR	2.2	0.6
Media access, times (Median; IQR)	3.0	3.0
Stipend, IDR (10K) (Median; IQR)	7.0	10.0
Nutrition knowledge, score (Median; IQR)	68.0	16.0

Sphericity ($P < 0.001$). It resulted in five factors, which were rotated using the promax (oblique) method. Since there was overlapping variance between factors, a specific factor loading was decided using a value of 0.39. Two items (Q22, Q29) which were respectively defined as “Keeps me awake and alert” and “Is what I usually eat” were excluded due to a lower factor loading after adjustment (0.33). On the other hand, item (Q4) “tastes good,” (Q28) “makes me feel good,” and (Q17) “has a pleasant texture” were included into factors 2, 3, and 5, respectively, with a higher factor loading.

Factors were named and tested for reliability (Fig. 1). High school students emphasized health and religion as influencing their daily food choice (mean = 3.1, SD = 0.7). The present study also revealed weight control food choice motive among high school students. Those five food choice motivations were then used as dependent variables for linear regression analysis.

Among assessed variables, physical activity was positively associated with Health and religion food choice motive in high school students (Table 3). This be implied that more physically active students tended to put more importance on health and religion in their daily food choice ($\beta = 0.234, P < 0.001$). Similarly, an active student would be more likely to choose their food by considering Weight control issues ($\beta = 0.284, P < 0.001$). Students who were “wishing to be fatter” were less attentive about Weight control food choice motive ($\beta = -0.202, P = 0.05$). Frequent media access in high school students implied more food choice based on Price and convenience ($\beta = 0.042, P = 0.004$). On the other hand, Comfort food choice motive was more considered by students whose parents provided a higher stipend ($\beta = 0.014, P = 0.003$) and those who accessed media more often ($\beta = 0.040, P = 0.02$). Although a subtle, negative correlation was found for Familiarity food choice motive. A student with

Table 2. Exploratory factor analysis (EFA) of food choice motivations among high school students (N = 433).

No	Items	Factor				
		1	2	3	4	5
Q33	Is in harmony with my religious views	0.93	0.002	-0.008	-0.26	0.01
Q2	Contains no additives	0.87	-0.05	-0.22	0.04	0.09
Q20	Contains lots of vitamins and minerals	0.87	-0.001	-0.004	0.05	-0.05
Q19	Keeps me healthy	0.86	-0.005	0.04	0.07	-0.10
Q10	Is nutritious	0.85	0.06	0.09	0.02	-0.21
Q25	Is high in protein	0.81	-0.08	0.07	0.09	-0.04
Q32	Is not forbidden in my religion	0.74	0.22	-0.07	-0.25	-0.01
Q27	Is good for my skin/teeth/hair/nails etc.	0.68	-0.14	0.14	0.09	0.07
Q9	Is high in fiber	0.66	0.003	0.03	0.23	-0.21
Q21	Contains no artificial ingredients	0.62	0.05	-0.20	0.10	0.29
Q5	Contains natural ingredients	0.62	0.03	-0.04	0.22	0.006
Q6	Is not expensive	-0.002	0.92	-0.13	0.12	-0.12
Q31	Is cheap	-0.06	0.91	-0.09	-0.02	0.04
Q12	Is good value for money	0.01	0.85	0.07	-0.003	-0.12
Q11	Is easily available in shops and supermarkets	-0.02	0.71	0.08	0.05	0.006
Q30	Can be bought in shops close to where I live or work	-0.13	0.70	0.10	0.000	0.22
Q1	Is easy to prepare	0.13	0.65	-0.20	0.05	0.17
Q26	Takes no time to prepare	0.07	0.48	0.14	0.004	0.19
Q8	Is familiar to me	-0.07	0.44	0.20	0.20	-0.02
Q4	Tastes good	0.24	0.42	0.37	-0.10	-0.30
Q15	Helps me cope with stress	-0.09	-0.05	0.99	0.02	-0.05
Q13	Cheers me up	-0.09	0.06	0.91	-0.007	-0.08
Q24	Helps me relax	0.01	-0.11	0.84	0.04	0.09
Q14	Smells nice	-0.11	0.27	0.74	0.03	-0.07
Q23	Looks nice	-0.06	-0.06	0.70	-0.02	0.27
Q28	Makes me feel good	0.36	-0.08	0.65	-0.09	0.03
Q3	Is low in calories	0.08	0.08	-0.08	0.81	0.04
Q7	Is low in fat	0.12	0.08	0.02	0.75	0.03
Q16	Helps me control my weight	0.18	-0.08	0.31	0.43	0.15
Q18	Is like the food I ate when I was a child	-0.15	0.02	0.05	0.08	0.85
Q17	Has a pleasant texture	0.25	0.06	0.32	-0.10	0.39

Note: Items following appropriate factor loadings are shown in bold.

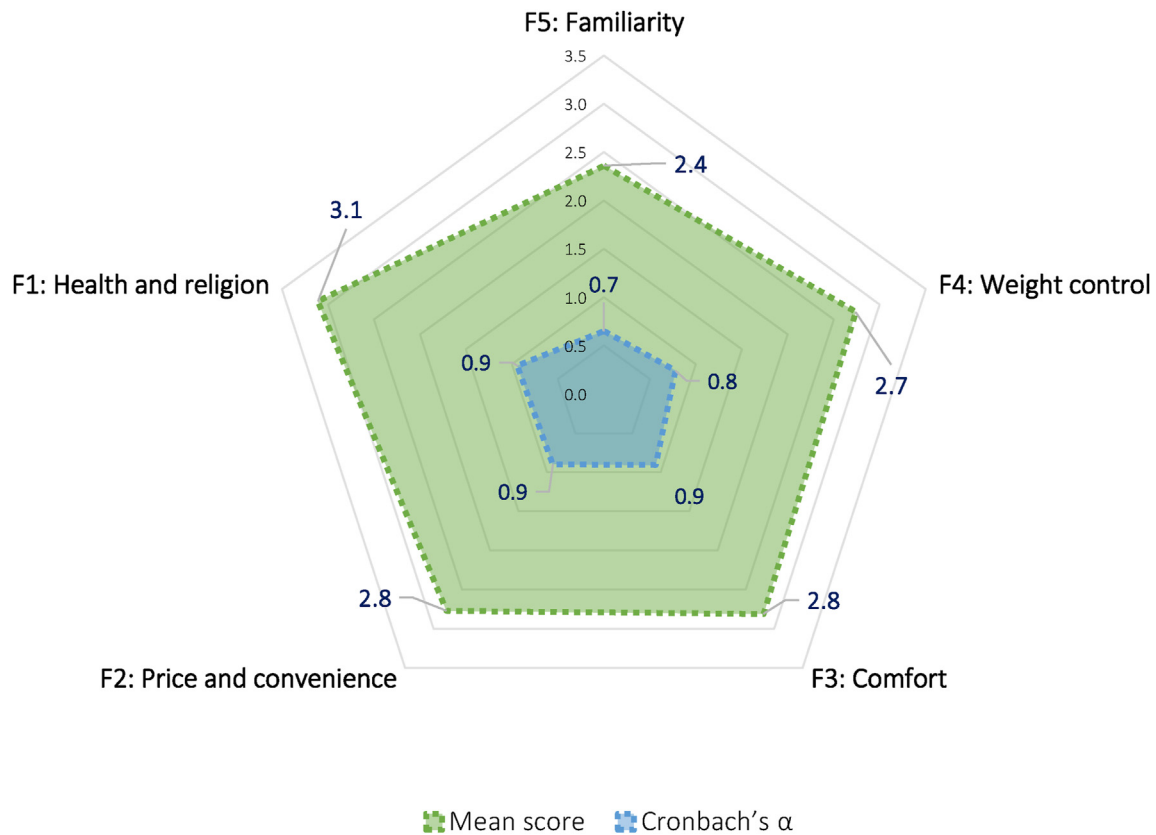


Fig. 1. Spider chart of food choice in high school students ($N = 433$).

less knowledge about nutrition was more likely to think about familiarity when they chose their food ($\beta = -0.006$, $P = 0.04$).

4. Discussion

This present study identified five motivating factors influencing food choices, namely Health and religion, Price and convenience, Comfort, Weight control, and Familiarity for urban high school students. Being physically active was positively correlated with Health and religion and Weight control

food choice motives. More media access was associated with valuing Price and convenience as well as Comfort food choice motive. Having a higher stipend was positively associated with Comfort food choice motive. Having more nutrition knowledge was negatively correlated with Familiarity food choice motive.

In the present study, religion item variables were as important as health considerations. In previous studies, religion was the least important of all food choice motivations in adolescents [24] and adults [21]. A study in Indonesia found religion item

Table 3. Multiple linear regression for factors associated with food choice motivations in high school students ($N = 433$).

Variables	F1: Health and Religion		F2: Price and Convenience		F3: Comfort		F4: Weight Control		F5: Familiarity	
	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Sex	-0.129	0.11	0.044	0.58	-0.128	0.15	-0.096	0.26	0.015	0.87
Age	0.021	0.57	-0.024	0.51	0.001	0.99	0.003	0.44	0.014	0.74
BMI	0.011	0.74	-0.016	0.63	0.001	0.97	0.015	0.68	-0.021	0.59
Physical activity	0.234	< 0.001	-0.049	0.44	0.060	0.40	0.284	< 0.001	-0.063	0.40
Media access	0.012	0.41	0.042	0.004	0.040	0.02	0.017	0.29	0.030	0.08
Stipend	0.001	0.76	0.003	0.48	0.014	0.003	-0.001	0.87	0.002	0.60
Nutrition knowledge	0.002	0.43	0.001	0.70	-0.001	0.85	-0.003	0.31	-0.006	0.04
Wishing to be thinner	-0.129	0.13	-0.042	0.61	-0.094	0.32	0.116	0.20	-0.128	0.19
Wishing to be fatter	-0.018	0.85	-0.029	0.76	-0.039	0.72	-0.202	0.05	-0.067	0.55

variables were not loaded in any food choice motives among students from public middle schools [22]. The unique finding regarding the importance of religion in affecting food choice could be due to the sampling techniques in the present study, which allowed high school students to participate regardless of their type of school. Our study included students from Islamic (29.3%) and Christian schools (<1%), in addition to secular schools which comprised of non-religious public and private schools. Overall, over two-thirds of our study participants were Muslim students. Furthermore, our study participants may have fully developed cognitive and psychosocial aspects during the later phase of adolescence. These aspects may raise an awareness among participants about religion as the obedience to God, or respecting the norm that applied in the society [38]. Besides having faith within as an individual person, engagement with family or peers in the same religion might elicit a pressure to do the same or right things [39].

Weight control food choice motive among the high school students was another intriguing result. Instead, of being loaded under the Health food choice motive, it was separately sorted as a different category with a narrower focus on controlling one's weight. This motivating factor contrasted with arguments about adolescents who valued health in a broader view [24]. The emergence of weight control as a separate motivation could be because this study was dominated by female adolescents, whereas the sex proportion was equal in previous studies.

The second aim of the present study was to identify factors associated with food choice motivations. In addition to Health and religion as well as Weight control, physical activity was found to be significantly related to food choice motivations. Students who were physically active were more aware of health and religion, as well as weight control, while choosing foods. This finding is supported by previous studies which found that adolescents who were conscious about health and wanted to improve their health were more physically active [40] and had a better quality of diet [41] than the recommended levels. A study on food choice based on personality showed that females who considered health more were ones who aimed toward specific exercise goals [20]. For example, health-conscious females set goals and reached the frequency of doing any exercise or sport several times in a week.

There was an inverse relationship between students who perceived themselves as “wishing to be fatter” and being motivated by weight control. These students put less importance on weight

control when choosing food. The findings of the present study support similar findings about dietary intake toward body weight perception and weight control [40]. Adolescents who considered themselves as thin consumed more calories and fat than fit or overweight students. Meanwhile, those who were trying to gain weight consumed more unrecommended food. This likely occurred because those who were striving to have a good appearance were more likely to apply weight control motives to their food choice [20]. Although females were often predicted to consider weight control more [19,42], the present study showed no significant association between respondents' sex and motivation for food choices in general. A previous study might support this finding as males were also found to put more importance on weight control than females [18].

Students who frequently accessed media placed more importance on price and convenience while choosing foods. This finding was supported by the findings of a previous study in which students who frequently accessed media were more likely to have tried advertised food at least once in the past month [43]. Since media often promotes processed or manufactured food, exposure to advertising has increased awareness of and demand for the advertised foods [44]. In one study, adolescents in Jakarta possessed positive attitudes of TV commercial that triggered food purchase. These attitudes were associated with frequent consumption of instant noodles. Similarly, longer duration of commercial engagement was associated with frequent consumption of instant noodles and pizza [45]. In later studies, however, adolescents actively exposed to online information ended up using the information to choose healthier food [46].

In the Comfort food choice motive, receiving a higher stipend was associated with students having an increased likelihood to consider comfort when choosing food. An average amount of 87.600,00 IDR (± 5.87 USD) per week given to a student was considered as enough for a high school student. Although stipend was not related to the Price and convenience food choice motive, the significance of media access in Comfort food choice motive could influence students to consider preference over price [47]. In contrast with the findings of a study in middle school students, Comfort motive had no associated factor [22]. This may be due to increased stress during high school compared with middle school. Furthermore, media access enables students to access information, such as type of foods or a place where foods are available [48]. Adolescents used technology for meal planning and preparation as a way to be involved in family meal-times despite their busy activities [8]. In addition, high

school students have the ability to travel without family to get their preferred food [8]. Under the Comfort subscales, sensory and mood item variables coupled with experience and memories are believed to be early and fundamental motivations for food choice. Unfortunately, concern with food's appearance and being able to talk with peers tended to lure high school students away from healthier food choices [9].

On the other hand, familiarity was inversely associated with nutrition knowledge. Students with more knowledge about nutrition were less likely to choose foods based on familiarity. It is common for people to choose familiar food because it evokes memories, stimulates feelings of comfort and safety, or may be a religious or traditional practice. During childhood, food choice mostly comes from a preference for their mother's food [9,13]. However, preference reversal as a child grows older may increase diet variety and diversity [47]. Nutrition knowledge enables individuals to make sensible food choices. In knowledgeable children, this may weaken the relationship between product evaluation and consumption [49]. Also, improved knowledge of healthy food strengthens the likelihood of choosing food based on health and weight concerns [50].

Despite our finding of a relationship between body image perception and food choice motivations, the present study showed no association between BMI and food choice motivations among high school students. Likewise, the BMI of the students also did not have a significant association with nutrition knowledge and physical activity level. Maulida [22] indicated similar findings about BMI, nutrition knowledge, and food choice motives with secondary school students in Jakarta participating in a study. Even so, another study among adults learnt that mood, convenience, and sensory appeal were more favored by overweight and obese individuals [51]. However, having a higher educational background, and not additional knowledge about nutrition, was inversely associated with increased weight gain among obese adults [52]. In regards to physical activity, the present study is consistent with a study by Gaylis [40] that found no association between body weight and physical activity. But students' perception toward their body weight was associated with physical activity among those who perceived themselves as overweight. Overweight students dominated those who failed to meet physical activity recommendation.

The present study has several limitations. The snowball technique applied in this study, in which more participants were recruited based on referral from potential students. This option was crucial for

conducting research and recruiting enough participants during the COVID-19 pandemic. PAQ-A, like the other physical activity questionnaires, is designed to measure respondents' activity in the past week. Data were collected during social distancing when school, physical education, and outdoor activities were strictly not recommended. This may have affected the results of the physical activity variable; although most students were physically inactive as expected. Future studies should objectively measure physical activity, and not rely on self-report. Furthermore, data on body weight and height of the participants were obtained based on self-reported data. These could have been either over or under-reported since this measurement relies on the participants' memories from their last body measurement. The researchers in this study could only rely on participants' responses. Some students were able to weigh themselves when they accessed the questionnaire because they had a weight scale at home. However, others recalled their weight from their last physical checkup at school clinic, especially for private school students. Consequently, the BMI-for-age variable, which was calculated using these data, may have been affected. Generalizability is limited for this study because participants were only recruited in a specific area of Indonesia.

5. Conclusion

Five food choice motivations, namely Health and religion, Price and convenience, Comfort, Weight control, and Familiarity were identified in urban high school students. Physical activity was related to Health and religion, as well as Weight control food choice motives. Media access was associated with Price and convenience as well as Comfort food choice motives.

6. Recommendations

Policy makers enhancing physical activity among adolescents play major roles in health and religion and weight control food choice motives. Increasing knowledge about nutrition and familiarity food choice motive should be considered by families, schools, and health providers. As it was associated with price and convenience, and comfort food choice motives, media access among adolescents can also be utilized to widen high school students' understanding of convenience food choice motive. Students can be encouraged to shift from unhealthy habits to fulfilling specific nutrient considerations.

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Conflict of interest

The authors declared that they have no conflicts of interest.

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References

- [1] Benedict RK, Schmale A, Namaste S. Adolescent nutrition 2000-2017: DHS data on adolescents age 15-19. DHS Comparative Report No. 47; Rockville, MD: ICF; 2018.
- [2] World Health Organization [WHO]. Tenfold increase in childhood and adolescent obesity in four decades: new study by Imperial College London and WHO London. [updated 2017 October 11; cited 2020 January 6]. Available from: <https://apps.who.int/mediacentre/news/releases/2017/increase-childhood-obesity/en/index.html>.
- [3] Ruiz LD, Zuelch ML, Dimitratos SM, Scherr RE. Adolescent obesity: diet quality, psychosocial health, and cardiometabolic risk factors. *Nutrients* 2020;12(1):43. <https://doi.org/10.3390/nu12010043>.
- [4] Basic Health Survey 2013. Jakarta: badan penelitian dan pengembangan masyarakat. Kementerian Kesehatan Republik Indonesia; 2013.
- [5] Basic Health Survey 2018. Jakarta: badan penelitian dan pengembangan masyarakat. Kementerian Kesehatan Republik Indonesia; 2018.
- [6] West java province basic health Survey 2018. Jakarta: Badan Penelitian dan Pengembangan Masyarakat, Kementerian Kesehatan Republik Indonesia; 2018.
- [7] Das JK, Salam RA, Thornburg KL, Prentice AM, Campisi S, Lassi ZS, et al. Nutrition in adolescents: physiology, metabolism, and nutritional needs. *Ann N Y Acad Sci* 2017; 1393(1):21–33. <https://doi.org/10.1111/nyas.13330>.
- [8] Riggsbee KA, Riggsbee J, Vilaro MJ, Moret L, Spence M, Anderson Steeves E, et al. More than fast food: development of a story map to compare adolescent perceptions and observations of their food environments and related food behaviors. *Int J Environ Res Publ Health* 2019;16(1):76. <https://doi.org/10.3390/ijerph16010076>.
- [9] Silalahi VCR, Sufyan DL, Wahyuningsih U, Puspareni LD. Pengetahuan pedoman gizi seimbang dan perilaku pilihan pangan pada remaja putri overweight: studi kualitatif. *Journal of Nutrition College* 2020;9(4):258–66. <https://doi.org/10.14710/jnc.v9i4.28708>.
- [10] Calvert S, Dempsey RC, Povey R. A qualitative study investigating food choices and perceived psychosocial influences on eating behaviours in secondary school students. *Br Food J* 2020;122(4):1027–39. <https://doi.org/10.1108/BFJ-07-2019-0575>.
- [11] Davison J, Stewart-Knox B, Connolly P, Lloyd K, Dunne L, Bunting B. Exploring the association between mental well-being, health-related quality of life, family affluence and food choice in adolescents. *Appetite* 2021;158:105020. <https://doi.org/10.1016/j.appet.2020.105020>.
- [12] Rachmi CN, Jusril H, Ariawan I, Beal T, Sutrisna A. Eating behaviour of Indonesian adolescents: a systematic review of the literature. *Publ Health Nutr* 2021;24(S2):s84–97. <https://doi.org/10.1017/s1368980020002876>.
- [13] Sondari M, Brouwer I, Februhartanty J. Eating behaviour of adolescent schoolgirls in Malang, East Java: a qualitative study. *Malays J Nutr* 2019;25(Suppl):87–96.
- [14] Ministry of Health. Total diet Survey: national food consumption Survey 2014. Jakarta: Health Research and Development Division, Ministry of Health Indonesia; 2014.
- [15] Budiarti A, Utami MPP. Konsumsi makanan cepat saji pada remaja di surabaya. *Jurnal Ilmu Kesehatan MAKIA* 2021; 11(2):8–14. <https://doi.org/10.37413/jmakia.v11i2.167>.
- [16] Intantiyana M, Widajanti L, Rahfiludin MZ. Hubungan citra tubuh, aktivitas fisik dan pengetahuan gizi seimbang dengan kejadian obesitas pada remaja putri gizi lebih di SMA Negeri 9 Kota Semarang. *Jurnal Kesehatan Masyarakat (Undip)* 2018;6(5):404–12. <https://doi.org/10.14710/jkm.v6i5.22064>.
- [17] Prasetya G, Khomsan A. The knowledge, attitude and practice of mothers and children on the Indonesian dietary guidelines and the relationship with children's nutritional status. *J Gizi Pangan* 2021;16(Suppl.1):55–64.
- [18] Steptoe A, Pollard TM, Wardle J. Development of a measure of the motives underlying the selection of food: the food choice questionnaire. *Appetite* 1995;25(3):267–84. <https://doi.org/10.1006/appe.1995.0061>.
- [19] da Silva WR, Marôco J, Alvarenga MdS, Campos JADB. What are the motives underlying Brazilians' food choices? An analysis of the Food Choice Questionnaire and its relationship with different sample characteristics. *J Sensory Stud* 2022;37(5):e12775. <https://doi.org/10.1111/joss.12775>.
- [20] Lindeman M, Stark K. Pleasure, pursuit of health or negotiation of identity? Personality correlates of food choice motives among young and middle-aged women. *Appetite* 1999; 33(1):141–61. <https://doi.org/10.1006/appe.1999.0241>.
- [21] Lindeman M, Väänänen M. Measurement of ethical food choice motives. *Appetite* 2000;34(1):55–9. <https://doi.org/10.1006/appe.1999.0293>.
- [22] Maulida R, Nanishi K, Green J, Shibanuma A, Jimba M. Food-choice motives of adolescents in Jakarta, Indonesia: the roles of gender and family income. *Publ Health Nutr* 2016; 19(15):2760–8. <https://doi.org/10.1017/s136898001600094x>.
- [23] Cunha LM, Cabral D, Moura AP, de Almeida MDV. Application of the Food Choice Questionnaire across cultures: systematic review of cross-cultural and single country studies. *Food Qual Prefer* 2018;64:21–36. <https://doi.org/10.1016/j.foodqual.2017.10.007>.
- [24] Share M, Stewart-Knox B. Determinants of food choice in Irish adolescents. *Food Qual Prefer* 2012;25(1):57–62. <https://doi.org/10.1016/j.foodqual.2011.12.005>.
- [25] Dahal M, Basnet A, Khanal S, Baral K, Dhakal S. Gender difference in food choice and eating practice and their association with health among students of kathmandu, Nepal. *J Obes* 2022;2022:2340809. <https://doi.org/10.1155/2022/2340809>.
- [26] Gama AP, Adhikari K, Hoisington DA. Factors influencing food choices of Malawian consumers: a food choice questionnaire approach. *J Sensory Stud* 2018;33(5):e12442. <https://doi.org/10.1111/joss.12442>.
- [27] Dias SS, Lages M, Frontini R, Luís L, Dixe MDA, Sousa P. Association between food choices motivators and physical activity in body image (dis)Satisfaction in Portuguese adolescents. *Front Public Health* 2021;9:651228. <https://doi.org/10.3389/fpubh.2021.651228>.
- [28] Głabska D, Skolmowska D, Guzek D. Food preferences and food choice determinants in a polish adolescents' COVID-19 experience (PLACE-19) study. *Nutrients* 2021;13(8):2491. <https://doi.org/10.3390/nu13082491>.
- [29] Rozin P. Food choice: an introduction. In: Frewer L, van Trijp H, editors. *Understanding consumers of food products*. Boca Raton, FL: Woodhead Publishing; 2007. p. 3–29.

- [30] Decree of the ministry of health republic of Indonesia about anthropometrics standard for children. Jakarta: Ministry of Health; 2020.
- [31] Kowalski KC, Crocker PR, Donen RM. The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. Saskatoon, SK: College of Kinesiology, University of Saskatchewan; 2004.
- [32] Taber KS. The use of Cronbach's alpha when developing and reporting research instruments in science education. *Res Sci Educ* 2018;48(6):1273–96. <https://doi.org/10.1007/s11165-016-9602-2>.
- [33] Benítez-Porres J, Alvero-Cruz JR, Sardinha LB, López-Fernández I, Carnero EA. Cut-off values for classifying active children and adolescents using the Physical Activity Questionnaire: PAQ-C and PAQ-A. Cut-off values for classifying active children and adolescents using the Physical Activity Questionnaire: PAQ-C and PAQ-A. *Nutr Hosp* 2016; 33(5):564. <https://doi.org/10.20960/nh.564>.
- [34] Erdenebileg Z, Park SH, Chang KJ. Comparison of body image perception, nutrition knowledge, dietary attitudes, and dietary habits between Korean and Mongolian college students. *Nutr Res Pract* 2018;12(2):149–59. <https://doi.org/10.4162/nrp.2018.12.2.149>.
- [35] Decree of the ministry of health republic of Indonesia about balanced nutrition guidelines. Jakarta: Ministry of Health; 2014.
- [36] Tabachnick BG, Fidell LS. Using multivariate statistics. Boston: Pearson Education; 2007.
- [37] SPSS version 22.0. Chicago, IL: SPSS Inc; 2013.
- [38] Cohen AB. You can learn a lot about religion from food. *Curr Opin Psychol* 2021;40:1–5. <https://doi.org/10.1016/j.copsyc.2020.07.032>.
- [39] Hassan Y, Pandey J. Examining the engagement of young consumers for religiously sanctioned food: the case of halal food in India. *Young Consum* 2020;21(2):211–32. <https://doi.org/10.1108/YC-01-2019-0940>.
- [40] Gaylis JB, Levy SS, Hong MY. Relationships between body weight perception, body mass index, physical activity, and food choices in Southern California male and female adolescents. *Int J Adolesc Youth* 2020;25(1):264–75. <https://doi.org/10.1080/02673843.2019.1614465>.
- [41] Hayes JF, Giles GE, Mahoney CR, Kanarek RB. Breakfast food health and acute exercise: effects on state body image. *Eat Behav* 2018;30:22–7. <https://doi.org/10.1016/j.eatbeh.2018.05.006>.
- [42] Wardle J, Haase AM, Steptoe A, Nillapun M, Jonwutiwes K, Bellisle F. Gender differences in food choice: the contribution of health beliefs and dieting. *Ann Behav Med* 2004;27(2): 107–16. https://doi.org/10.1207/s15324796abm2702_5.
- [43] Scully M, Wakefield M, Niven P, Chapman K, Crawford D, Pratt IS, et al. Association between food marketing exposure and adolescents' food choices and eating behaviors. *Appetite* 2012;58(1):1–5. <https://doi.org/10.1016/j.appet.2011.09.020>.
- [44] Sheehy T, Kolahdooz F, editors. Nutrition at a glance. Oxford: John Wiley & Sons; 2016.
- [45] Wahyuniar L, Karyadi L. Pengaruh iklan makanan/minuman/suplemen vitamin-mineral di tv terhadap pola konsumsi remaja di wilayah Jakarta Timur. *Jurnal Ilmu Kesehatan Bhakti Husada: Health Sci J* 2020;11(1):95–113.
- [46] Masitah R, Sulistyadewi NPE. Pemanfaatan isi pesan instagram dan perilaku pemilihan makanan jajanan pada remaja. *Gizi Indonesia* 2020;43(2):77–86.
- [47] Lusk JL. Income and (Ir) rational food choice. *J Econ Behav Organ* 2019;166:630–45.
- [48] Neufeld LM, Andrade EB, Ballonoff Suleiman A, Barker M, Beal T, Blum LS, et al. Food choice in transition: adolescent autonomy, agency, and the food environment. *Lancet* 2022; 399(10320):185–97. [https://doi.org/10.1016/S0140-6736\(21\)01687-1](https://doi.org/10.1016/S0140-6736(21)01687-1).
- [49] Tarabashkina L, Quester P, Crouch R. Exploring the moderating effect of children's nutritional knowledge on the relationship between product evaluations and food choice. *Soc Sci Med* 2016;149:145–52. <https://doi.org/10.1016/j.socscimed.2015.11.046>.
- [50] Miedema B, Bowes A, Hamilton R, Reading S. Assessing the efficacy of a group mediated nutritional knowledge intervention for individuals with obesity. *Can J Diet Pract Res* 2016;77(4):206–9. <https://doi.org/10.3148/cjdp-2016-022>.
- [51] Mazzolani BC, Smaira FI, Esteves GP, Santo André HC, Amarante MC, Castanho D, et al. Influence of body mass index on eating habits and food choice determinants among Brazilian women during the COVID-19 pandemic. *Front Nutr* 2021;8:664240. <https://doi.org/10.3389/fnut.2021.664240>.
- [52] Pellegrini M, Ponzio V, Rosato R, Scumaci E, Goitre I, Benso A, et al. Changes in weight and nutritional habits in adults with obesity during the "lockdown" period Caused by the COVID-19 virus emergency. *Nutrients* 2020;12(7):2016. <https://doi.org/10.3390/nu12072016>.