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Malaysian adolescents' perceptions of healthy eating: a qualitative study

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Abstract

Objective: To explore the concepts of healthy eating and to identify the barriers and facilitating factors for dietary behaviour change in adolescents.
Design: A qualitative study involving twelve focus groups.
Setting: Two secondary schools in the district of Hulu Langat in Selangor, Malaysia.
Participants: Seventy-two adolescents aged 13–14 years.
Results: Adolescents had some understanding regarding healthy eating and were able to relate healthy eating with the concepts of balance and moderation. The adolescents' perceptions of healthy and unhealthy eating were based on food types and characteristics, cooking methods and eating behaviours. Facilitators for healthy eating were parents' control on adolescents' food choices, feeling concern about own health and body, being influenced by other's health condition, and knowledge of healthy or unhealthy eating. On the other hand, barriers for healthy eating were the availability of food at home and school, taste and characteristics of foods, and lack of knowledge on healthy or unhealthy foods.
Conclusions: The findings contribute to a better understanding of the adolescents' concept of healthy eating, as well as the facilitators and barriers to practising healthy eating. Future interventions should include a method of promoting the immediate benefits of healthy eating, the way to cope with environmental barriers for healthy eating, and increasing the availability of healthy food choices at home and in the school environment. The health and nutrition education programmes should also focus on educating parents, as they can be role models for adolescents to practise more healthful behaviours.

Keywords
Healthy eating
Adolescents
Focus group
Diet
Malaysia

In Malaysia, a high prevalence of diet-related health problems, namely obesity[1–4] and disordered eating[5–9], has been reported. The prevalence of obesity in Malaysian adolescents increased dramatically between the years 2011 and 2015 from 6·1 %[1] to 11·9 %[2] according to the National Health and Morbidity Survey. Disordered eating can be defined as unhealthy eating and weight-related behaviours and attitudes that are of medical and/or psychological concern, however cannot be considered as eating disorders[10]. The term 'disordered eating' is also used to describe dieting and unhealthy weight-loss behaviours[11]. The prevalence of disordered eating, which includes dieting, bulimia and food preoccupation, oral control, restrained eating and binge eating behaviours, is high in Malaysian adolescents, in the range of 14·0–36·0 % in various samples nationwide[5–9]. This phenomenon becomes more alarming since the risk of disordered eating was found to be higher in overweight and obese adolescents than in non-overweight and non-obese adolescents[12–16]. Poor eating behaviours among adolescents, such as skipping breakfast, as well as high consumption of fast foods and sweetened beverages can lead to these diet-related problems[17–22].

Short- and long-term effects of eating behaviours were shown in several studies[19,20,23–26]. Eating behaviours such as frequent eating at fast-food restaurants was found to be related to lower intakes of fruits, non-starchy vegetables, milk and key micronutrients in a sample of children,

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adolescents and adults[19,20,23], consequently being less likely to meet fruit and vegetable recommendations[24]. Moreover, eating behaviour in adolescence was shown to predict eating behaviour in adulthood[25,26].

Healthy eating during adolescence is essential since nutritious foods are important to support their rapid physical growth and development[27,28]. Insufficient intake of nutrients such as carbohydrate, protein, fat, vitamins and minerals may affect adolescents' growth, sexual maturation and function[28]. On the other hand, excessive intake of foods may have negative effects on health by increasing susceptibility to non-communicable diseases[27]. Moreover, adolescents' eating habits are changing rapidly and they are commonly involved in unstructured eating habits with more meals eaten outside the home, more foods consumed outside usual mealtimes, greater peer influence and more variation in intakes over time, with high levels of restrained eating[29,30].

In Malaysia, recommendations on healthy eating specifically for children and adolescents are included in the Malaysian Dietary Guidelines for Children and Adolescents[31]. Based on the guidelines, children and adolescents are encouraged to eat fruits and vegetables, consume milk and milk products, and drink plenty of water daily. They are also encouraged to limit intakes of fat, salt and sugar in the daily diet, as well as to be physically active every day. Even though the guidelines are present, the food intakes of children and adolescents still do not meet the recommended amounts[32–35].

The correct perception and knowledge on healthy eating is key to healthy eating behaviours in adolescents. However, previous intervention studies were shown to significantly change the nutrition knowledge, but not to change the nutrition practices or behaviours of participants[36–38]. This may happen due to the interventions being based on declarative knowledge (i.e. the knowledge of 'what is', awareness of things and processes) rather than procedural knowledge (i.e. the knowledge about how to do things)[39]. Another possible reason may be that participants tended to perceive more barriers instead of facilitators for healthy eating. Thus, adolescents' perceptions of barriers and facilitators for healthy eating should be explored to guide researchers to plan an appropriate intervention in order to enable adolescents to practise healthy eating. To the best of our knowledge, there is a lack of studies in Malaysia which explore the concepts of healthy eating, as well as the barriers and facilitators for dietary behaviour change, in adolescents.

The present study aimed to explore the concepts of healthy eating and to identify the barriers and facilitators for dietary behaviour change in Malaysian adolescents. Focus group discussion was chosen as the method of data collection since this method is suitable to obtain knowledge, perspectives and attitudes of the adolescents about the issue of interest and seek explanations for behaviours in a way that would be less easily accessible in responses to direct questions[40,41].

The present study was a needs assessment as a part of the development of 'Eat Right, Be Positive about Your Body and Live Actively' (EPaL), a health education intervention to prevent overweight and disordered eating among Malaysian adolescents. The outcome of the present study guided the development of the content and activities for the EPaL intervention. The details of the EPaL intervention programme are reported elsewhere[42].

Methods

Participants

Participants for the focus groups were recruited from two secondary schools in the urban and rural area of Selangor, Malaysia. These two schools were randomly selected from thirty-six national secondary schools (*Sekolah Menengah Kebangsaan*) in the district of Hulu Langat, in the state of Selangor, Malaysia. These schools were drawn from the list of schools which was obtained from the website of the Department of Education of Selangor[43]. The schools that met the inclusion criteria (coeducational, multiracial, non-residential and non-religious) were eligible to be included in the draw. The inclusion criteria for the participants in the study were adolescents who were studying in Forms 1 or 2 and aged 13–14 years; and adolescents who were given consent by their parents to participate in the focus groups. A total of seventy-two adolescents participated in the present study. The sample consisted of about equal numbers of males (51·4 %) and females (48·6 %). Based on ethnicity, there were equal numbers of Malay, Chinese and Indian participants (each *n* 24, 33·3 %). Sociodemographic characteristics of participants in the focus group discussions are presented in Table 1. Permission for data collection in schools was obtained from the Ministry of Education of Malaysia, as well as the State Department of Education

Table 1 Sociodemographic characteristics of participants in the focus group discussions: adolescents aged 13–14 years (*n* 72) from two secondary schools in the district of Hulu Langat in Selangor state, Malaysia, July and August 2013

Characteristic	*n*	%	Mean	SD
Sex				
Male	37	51·4	–	–
Female	35	48·6	–	–
Age (years)	–	–	13·56	0·53
Ethnicity				
Malay	24	33·3	–	–
Chinese	24	33·3	–	–
Indian	24	33·3	–	–
Area				
Urban	36	50·0	–	–
Rural	36	50·0	–	–
Family size	–	–	5·25	1·70
Siblings	–	–	3·35	1·22

of Selangor. Consent was also obtained from the board of the school, the principal, the parents and the adolescents prior to data collection.

Focus groups

A total of twelve focus groups were conducted in the present study, with six participants in each group. Focus groups were conducted during school hours in a room provided by the schools, and the participants were interviewed separately in the respective groups according to their age, sex and ethnicity. In each group, the focus group was conducted by a moderator and assisted by an assistant moderator who took field notes throughout the discussion. The discussion was conducted in Malay, Chinese and Tamil languages by different moderators and assistant moderators, respectively, according to the ethnicity of the group members and it followed the procedures in the Facilitator's Guides booklet, which was prepared by the research team. All moderators and assistant moderators were trained by the research team to conduct focus groups prior to data collection. The data collection was conducted until it reached saturation point, where similar comments were consistently repeated and no new inputs were gained from the discussions.

Before each focus group discussion started, the moderator and assistant moderator introduced themselves to the participants and started the ice-breaking session in which each participant was asked to briefly introduce themselves. Then, the focus group discussion proceeded with the introduction to the study where the moderator briefly explained the aims of the focus group, the ground rules in the focus group and the confidentiality of the outcomes from the focus group. The participants were also informed that the discussion would be recorded using two voice recorders and the recording would be used later to guide the research team in tracing the voices of each participant for the transcription process of the focus groups. After the introduction, the discussion session began with semi-structured and open-ended questions from the moderator. Each focus group took about 60–90 min. The key questions for the focus group were:

1. What does the term 'healthy eating' mean to you?
2. What foods do you see as 'healthy foods'?
3. What foods do you see as 'unhealthy foods'?
4. What things encourage you to change your eating habits?
5. What things prevent you to change your eating habits?

Data analysis

The data analysis for focus group discussions was carried out by using thematic analysis, as described by Braun and Clarke[44]. First of all, the verbal data from the focus group discussions were transcribed verbatim while referring to the field notes that were taken by the assistant moderator. Moderators and assistant moderators then discussed and recorded their observation of the group, including content, non-verbal expression and communication between the group members. Data familiarisation was achieved by repeated reading of the transcripts and listening to the audio recordings. The focus group discussion transcripts were analysed by systematically coding the data underneath the main discussion topics, in order to permit main themes for every discussion topic to emerge. Connected codes were then collated into potential themes, and repeatedly reviewed and refined to confirm they mirrored the coded extracts and data set as a whole. The agreed themes were checked to confirm there were clear distinctions, and thereafter the final themes were named and defined. Acceptable extracts from the focus group discussions were chosen and agreed upon to support the ultimate themes.

Results

The outcomes from the focus group discussions are reported under three main headings: (i) perceptions of healthy and unhealthy eating; (ii) facilitators for healthy eating; and (iii) barriers for healthy eating. The themes and examples of responses are shown in Table 2.

Perceptions of healthy and unhealthy eating

Under this category, three themes arose: food types and characteristics, cooking methods and eating behaviours.

In terms of food types and characteristics, healthy eating was described by most participants by naming specific foods and food groups, such as fruits including fruit juice, vegetables like salad, green vegetables and garlic. They also mentioned cereals and cereal products such as oats, bread, wholegrain bread, rice, brown rice, dried noodle, *meehoon* (rice vermicelli), Tiger™ biscuits and Koko Krunch™ ready-to-eat cereal as healthy foods. Besides that, they also named milk and dairy products such as cheese, Dutch Lady™ and yoghurt as healthy foods. Soups were also mentioned as healthy foods, for example clear soup noodle, vegetable soup, mushroom soup and *tomyam* soup. Protein sources such as fish, meat, chicken and salmon, and dietary supplements like honey and bird's nest were also included as their preference for healthy foods. They also mentioned plain water, vitamins, fresh foods, organic foods, sandwiches and fried rice as healthy foods. However, consuming foods based on the food pyramid was rarely mentioned by the adolescents.

On the other hand, adolescents named numerous foods which they considered unhealthy foods. They mentioned sweet foods and drinks like sweets, ice cream, chocolate, carbonated drinks, canned drinks and jelly as unhealthy foods. Fried, oily and fatty foods such as *nasi lemak*, fried

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Table 2 Perception of healthy and unhealthy eating, and facilitators and barriers for practising healthy eating, arising in the twelve focus group discussions among adolescents aged 13–14 years (*n* 72) from two secondary schools in the district of Hulu Langat in Selangor state, Malaysia, July and August 2013

Theme	Example of responses
Perception of healthy and unhealthy eating	
Food types and characteristics	Healthy eating: '(Healthy foods are) yoghurt and milk.' (Male, Indian, 14 years) 'Every time you eat, should have vegetables and fruits … more balanced. Then, not drink too much iced water.' (Female, Malay, 13 years) Unhealthy eating: 'Oily foods, too sweet foods and beverages are unhealthy foods.' (Female, Chinese, 13 years) '[Unhealthy foods and drinks are] carbonated drinks except isotonic sport drink, high-fat foods, fried chicken, onion ring, burger and French fries.' (Male, Chinese, 13 years) '[Unhealthy foods are] foods which already reach expiry date.' (Male, Malay, 13 years)
Cooking methods	Healthy eating: 'Healthy eating is when you choose grilled foods instead of fried foods.' (Male, Chinese, 13 years) 'Steamed fish is a healthier food choice.' (Male, Indian, 13 years) 'Healthy eating is eating boiled foods, like boiled fish.' (Female, Malay, 14 years) Unhealthy eating: 'It is unhealthy to eat fried foods.' (Female, Malay, 13 years)
Eating behaviours	Healthy eating: '[Healthy eating is] you do not eat in fast pace.' (Male, Malay, 13 years) 'Not eating in large portion in one time [is healthy].' (Female, Malay, 13 years) 'It is healthy when you do not picky when eating.' (Male, Chinese, 13 years) Unhealthy eating: '[It is unhealthy to] overeat or eat less than required.' (Female, Indian, 14 years) 'It is not good to eat not according to mealtime.' (Female, Malay, 14 years)
Facilitators for healthy eating	
Parental control	'Last time, I'm not eat vegetables. Now I regularly eat vegetables. My mother and father ask and support me to eat vegetables.' (Male, Malay, 13 years) 'My father always restricts me to take salty food.' (Male, Indian, 13years) 'At home, I eat whatever my mother cooks.' (Female, Chinese, 14 years) 'My family will prepare and advise me to eat more vegetables.' (Male, Chinese, 13 years) 'My mother, she controls my food intake. She rarely bought instant foods, frozen foods. She buys and cooks more vegetables. So, I eat whatever she cooks.' (Female, Malay, 14 years)
Concern about own health and body	'Last time, I like to eat junk food in big portion. but not now … since I always get sick.' (Female, Malay, 13 years) 'I'm thinking to change my eating habits because I'm not confident with my body shape and I have been teased by others. [I'm also thinking to change my eating habits] to avoid disease and to stay healthy.' (Male, Chinese, 13 years)
Influenced by other's health condition	'I'm thinking to change my eating habits after seeing other people get disease after eating something.' (Male, Indian, 14 years) 'When I look at people dying because eating fast food excessively, it motivates me to change my eating habits.' (Male, Chinese, 13 years) 'Last time, I eat an apple per month. But recently I saw my cousin is very slim. Then, I'm thinking of being slim. So, I eat more vegetables and fruits.' (Female, Chinese, 13 years)
Knowledge on healthy and unhealthy eating	'Last time, I always eat instant noodle. Last year, in standard 5, I always eat instant noodle. Then, in standard 6, a teacher told us that instant noodle contains an ingredient. It's harmful. She said if still want to eat instant noodle, just eat it once a month or 2 times per month. Then, I changed and eat it only 2 times per month.' (Female, Malay, 14 years) 'Sometimes I watch television programmes. They said that eating foods that are too oily, not eating vegetables will cause this disease and that disease.' (Female, Chinese, 13 years) 'Junk food. Last time I really like it. But now, I'm not eating junk food anymore. I don't even feel full if eat junk food. My friends, relatives, they told me that junk food contains harmful ingredients.' (Male, Malay, 14 years)
Barriers for healthy eating	
Availability of foods at home and school	'Like in the school canteen, no fruits are sold.' (Female, Malay, 13 years) 'At school canteen, [they sell] fried foods. All fried. Oily.' (Female, Malay, 14 years) 'Last time, I always eat instant noodle. Because my mother was busy. Not able to cook.' (Female, Malay, 14 years) 'For me, usually I eat supper. I ask my father to pack food for me as he comes back late from work. He always brings back a pack of noodle or rice for me.' (Female, Chinese, 13 years)
Taste and characteristics of food	'I feel tempted to eat that [unhealthy] food when I see the food.' (Male, Indian, 13 years) 'I really love the [unhealthy] food, so not thinking about changing my eating habit.' (Female, Indian, 13 years) 'I want to stop myself from eating that [unhealthy] food, but the food is too tasty. So, at the end, I just give in to my desire.' (Male, Chinese, 13 years)
Knowledge on healthy and unhealthy foods	'I do not know the benefits of the foods eaten.' (Male, Indian, 14 years)

chicken, onion rings, French fries, fried noodle, fried rice, *murtabak* and mayonnaise were also indicated as unhealthy foods. Moreover, they indicated fast foods like burger, instant noodle, pizza, nugget and sausage; processed foods like junk foods and canned foods like canned sardine; and food-taste enhancers like monosodium glutamate and pickles as unhealthy foods. Other food types including seafood, *bah kut teh*, *sate, laksa*, cheese, *nasi ayam* and popcorn were also mentioned by the adolescents as unhealthy foods. Based on food characteristics, they described unhealthy foods as 'high-cholesterol food', 'high-protein food', 'food containing seasoning', 'food containing colouring', '*sambal*-based food', 'spicy food' and 'expired food'.

In terms of cooking methods, steamed foods like steamed fish and steamed egg, grilled foods, barbecued foods, roasted foods like roasted chicken, boiled foods, non-fried foods and cholesterol-free foods were mentioned as healthy foods. Meanwhile, fried foods were mentioned as unhealthy foods.

Finally, based on eating behaviours, healthy eating was indicated as having three meals daily, eating at mealtime, not skipping meals and not eating late at night. Some adolescents mentioned that 'eat until full enough', 'not eat in fast pace' and 'chew well' as healthy eating. They also indicated healthy eating as 'control food intake', 'balanced diet' and 'not picky when eating'. Furthermore, they related healthy eating with the concepts of moderation, for example 'not eat large portion in one time' and 'not eat too much'. Besides that, 'eat light taste food' and 'eat different dishes' were also mentioned as healthy eating. On the other hand, unhealthy eating was indicated as not eating according to mealtime, drinking too much water, overeating or eating less, eating too much seafood and consuming food away from home.

Facilitators for healthy eating

Parents' control on adolescents' food choices was mentioned by most adolescents as a facilitator for healthy eating. Some adolescents mentioned that requests from teachers, relatives, coach and doctor to change their eating habits to healthier eating habits also facilitated them in healthy eating. The feeling of concern about their own health and body also facilitated them to eat more healthily. Their dissatisfaction about their health and physical appearance such as they felt like 'getting fat', 'growing pimples', 'not confident with own body shape', 'get health problem' and 'always getting sick' were considered by the adolescents a result of unhealthy eating behaviours. They practised healthier eating since they 'want to stay healthy', 'to avoid diseases', 'to keep body fit' and 'to have a long life'. Moreover, they tended to eat healthier because they were 'afraid of being fat', 'want to be taller', 'want to be thinner', 'concern about body size and shape' and 'do not want to wear spectacles'.

Some of them tended to change their eating behaviours to healthier eating habits after being influenced by other's health conditions, for example they have seen other people fall sick or die because of excessive consumption of fast foods. Some of them also tended to eat healthier after being influenced by someone who has a slim body or seeing other people practising healthy eating.

Knowledge on healthy or unhealthy eating also contributed to facilitating the adolescents for healthy eating. The adolescents mentioned that they tended to practise healthier eating after knowing the effects of unhealthy foods and being aware that certain foods are unhealthy. The adolescents pointed out that they got the knowledge on foods that cause or prevent diseases from television programmes. Some of them got the knowledge from their teachers, such as instant noodle contains unhealthy ingredients which are harmful to health, carbonated drink is harmful to the intestine and fish has a high content of protein. Parents also became a source of their knowledge, in which parents told them that junk foods contain lots of monosodium glutamate, which is not good for the brain. Some of them got the knowledge from their friends and relatives, for example the fact that junk foods contain unhealthy ingredients.

Barriers to healthy eating

The adolescents named availability of food at home and school as the common barrier for practising healthy eating. At home, they have to consume what their parents prepared for them regardless if the food was healthy or not so healthy. On the other hand, the availability of unhealthy food choices was greater than that of healthy foods either in the school compound or outside the school.

The other barrier for healthy eating was taste and characteristics of foods. They said that the taste of healthy foods such as vegetables is 'bitter' and 'not tasty', and that the texture of green vegetables after being cooked is not attractive. It contrasted to unhealthy foods, which usually have good taste. The adolescents described that unhealthy foods and beverages are tasty, which they 'cannot get rid of it', increase their 'temptation to eat' and they 'really like the food'. They also mentioned that they tended to follow their siblings in consuming unhealthy foods. Knowledge on healthy or unhealthy foods was also considered as barrier for healthy eating, as they mentioned that they were unable to practise healthy eating due to the lack of awareness on healthy eating and did not know the benefits of the foods.

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Discussion

In the present study, adolescents had some understanding of the concept of healthy eating. Frequently, the adolescents described healthy and unhealthy eating based on food types and characteristics, by naming specific foods and food groups[45,46]. Similar to several previous studies, fruits and vegetables were prominently mentioned as healthy foods by the adolescents[45,47]. Several previous studies with children[46,48] and adults[49] have also shown the same outcomes, as these foods have qualities such as being 'fresh' or 'nutritious'[46].

Similar to children, the adolescents always conceptualised unhealthy foods in relation to the foods' taste, texture and visual appeal[46]. In a previous study[45], chips, candy, fast foods and soda pop were considered by adolescents as unhealthy foods, as well as pizza, sugary foods, butter/oils, junk foods, hamburgers and McDonald's™. Other studies have shown that children[46,48] and adults[49] also considered fast foods, fried foods and sweet foods as unhealthy foods. In our study, the adolescents also mentioned that processed and canned foods, as well as food taste enhancers as unhealthy foods, similar to a previous study[49]. The adolescents also defined healthy eating based on the exclusion of unhealthy foods[50]. Moreover, the adolescents were able to relate cooking methods in differentiating healthy and unhealthy foods, as well as relating healthy eating with the concept of balance and moderation[49,51].

In the present study, some adolescents mentioned seafood and high-protein foods as unhealthy foods. They elaborated that they have experienced allergic symptoms when consuming seafood or they have seen others experience allergic symptoms due to seafood consumption. Even though fish and shellfish represent a valuable source of protein for the general population, these foods are known to induce hypersensitivity reactions in sensitised or allergic individuals[52]. Moreover, in our study, fried rice was named as both a healthy and an unhealthy food. The adolescents may have considered fried rice as healthy because fried rice is usually prepared with the inclusion of vegetables and a protein source, such as chicken. Hence, it can be considered a balanced dish. On the other hand, fried rice was considered an unhealthy food because frying is considered an unhealthy cooking method[31].

Parents' control on adolescents' food choices was mentioned by most adolescents as a facilitator for healthy eating, consistent with a previous study[46]. An adolescent is influenced most heavily by parents and other family members and is exposed to the foods, activities and perceptions of obesity supported by the family in the home environment[53], whereby they adapt to and eat whatever their parents decide[47,54]. Parental concern about adolescents' weight was shown to impact on the availability of healthy foods at home. It was shown to be associated with less home availability of energy-dense snack foods like cakes, potato chips and sweets, and a lower intake of these food items among adolescents[55]. Furthermore, the availability of healthy foods was positively associated with diet quality and inversely related to BMI[56].

These findings document the potential of the home as a setting to promote positive dietary behaviours in adolescents. Additionally, the home food environment was shown to be more significant than the school food environment in predicting the dietary patterns among children from twelve countries[57]. Since mothers were usually reported to be responsible for the preparation of family meals[58,59], maternal knowledge on nutrition could give positive effects in improving the quality of food intake and eating behaviour of adolescents at home. Proficient knowledge on nutrition appeared to be linked to a healthier home environment and enhanced diet quality. Mothers with greater knowledge on nutrition provided a healthier home environment, provided more healthy foods and made unhealthy foods less available in the home, which in turn improved the diet quality of adolescents[56].

The adolescents in our study were also willing to engage in healthy eating behaviours as a result of the feeling of dissatisfaction with their own health or physical appearance. A previous study[50] found a stronger link between the willingness to engage in healthy eating behaviours and the perception of weight and attitudes to weight-control behaviours, rather than concerns about short-term or long-term health. Health consciousness was found to have a positive, significant impact on substituting buying intentions, for instance substituting less healthy snack alternatives such as sweets and chips with healthier ones based on fresh fruits and vegetables[60].

The correct way to maintain a healthy body weight through healthy eating should be emphasised in health education among adolescents since weight concern was shown to have a direct association with weight-related problems, such as purging, binge eating and overweight[61]. Several longitudinal studies also demonstrated that body dissatisfaction predicts the development of disordered eating behaviours in adolescents[62,63].

Knowledge on healthy or unhealthy foods is also important to facilitate adolescents in practising healthy eating. This shows that having information about diet and nutrition is very crucial in adolescents because it is considered an important tool for knowing how to choose better foods[54,64]. The knowledge among adolescents is of concern, as dietary practices established at this stage in life may persist in subsequent years[26].

Perceived barriers to healthy eating have been shown to fully mediate the relationship between self-efficacy and

fruit and vegetable consumption[65]. In the present study, the adolescents mentioned availability of foods at school as a barrier for them to practise healthy eating. In school, it seems common to find that there is a higher availability of unhealthy food choices compared with healthy foods[45,47,54,66]. In Malaysia, there is a guideline for food and drink sales in the school cafeteria and any location within the school compound, which lists the foods and drinks that can be sold at school, as well as the foods and drinks prohibited and not recommended to be sold in schools. However, there are still many school cafeterias that do not adhere to the guideline.

Targeting perceived barriers to healthy eating such as the lack of availability, as well as affordable and appealing healthy foods in schools may serve to increase adolescents' willingness and ability to incorporate recommendations into their lifestyles[45]. Besides home, school eating was shown to be associated with better food choices than other locations[67]. The availability of healthy foods can increase the consumption of healthy foods, as shown in previous studies whereby adolescents believed that if fruits or vegetables were more readily available in their environment, such as in vending machines at school or on the table at home, they would be more likely to consume them[68,69]. Efforts are needed not only to increase the availability and accessibility of healthful foods, but also to educate children on appropriate food choices within and among food groups, as well as to provide youths with nutrition education and behavioural skills training to encourage greater consumption of these foods[70]. There are limitations for adolescents to apply their nutrition knowledge into practice due to low confidence in food skills. Even though they are very interested in developing food skills such as food preparation, they had very limited opportunities due to the lack of food literacy education in home and school settings[71]. Future intervention could emphasise skill-based nutrition education since it has great potential in improving eating behaviours and food skills[72,73].

The adolescents also related healthy eating with the taste and characteristics of foods, in a negative view, consistent with several studies[45,47,48,50,54,74]. This shows that food aesthetics, in terms of taste, texture, appearance and smell, is one of the most powerful physical reinforcers of food choices[50,75]. Similar to previous studies, it seemed difficult to eat as recommended because of the better taste of unhealthy foods than more healthful options[47,74], as well as the satiety and craving of 'less healthful' alternatives[47].

The way foods are prepared or served also influences food choices among adolescents[74]. Changes in preparation methods or improvements in the presentation of fruits and vegetables could make these items more appealing to children[70]. Food preparation was shown to be important for children's and adolescents' acceptance of vegetables, for example they preferred boiled vegetables over baked and stir-fried vegetables of the same colour[64,76]. In addition, a study also showed that adolescents had high acceptance of snack products based on fresh fruits and vegetables[60].

The strength of the present study is its focus on adolescents and the inputs which came from adolescents from three main ethnicities in Malaysia (Malay, Chinese and Indian), both in the urban and rural area. To our knowledge, the present study is the first using a qualitative method, specifically focus group discussions, to explore the adolescents' perceptions on healthy eating, as well as the facilitators and barriers for practising healthy eating in the Malaysian setting. As for the limitations of the study, the adolescents may have given socially desirable responses during the focus group discussions, especially when they could not prompt their personal barriers or if they overstated their positive healthy eating behaviours. Moreover, the present study was carried out among school adolescents in the district of Hulu Langat, Selangor. Thus, the study results cannot be generalised to all adolescents from other schools in Selangor or other states in Malaysia. The results also cannot be generalised to adolescents who are not studying in formal education.

Conclusions

The findings of the present study contribute to a better understanding of the adolescents' perceptions of healthy eating, as well as the facilitators and barriers to practising healthy eating in Malaysia. Overall, even though the adolescents had the correct concepts on healthy eating, which guided their existing knowledge, the higher perceived barriers may inhibit them from practising healthy eating. This is the gap that researchers should take into account in developing interventions to promote a healthy lifestyle among adolescents. Instead of only providing the adolescents with relevant knowledge, they should be educated on coping with the barriers around them in order to make healthy lifestyle a reality. Future interventions should include a method of promoting the immediate benefits of healthy eating to enhance the importance of healthy eating in the eyes of adolescents. In addition, the intervention should also emphasise increasing the availability of healthy food choices at home and in the school environment. Apart from educating the adolescents, health and nutrition education programmes should also provide knowledge and guidance towards healthy eating for their parents. This is because adolescents are looking to their parents to encourage, support and enable them to be involved in more healthful

behaviours. As mentioned earlier, the results of the present study were used in the development of the content and activities of the EPaL intervention programme.

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References

1. Institute for Public Health, National Institute of Health, Ministry of Health Malaysia (2011) *National Health and Morbidity Survey 2011 (NHMS 2011). Volume II: Non-Communicable Diseases*. Kuala Lumpur: Institute for Public Health, Ministry of Health, Malaysia.
2. Institute for Public Health, National Institute of Health, Ministry of Health Malaysia (2015) *National Health and Morbidity Survey 2015 (NHMS 2015). Vol. II: Non-Communicable Diseases, Risk Factors and Other Health Problems*. Kuala Lumpur: Institute for Public Health, Ministry of Health, Malaysia.
3. Hazreen MA, Su TT, Jalaludin MY *et al.* (2014) An exploratory study on risk factors for chronic non-communicable diseases among adolescents in Malaysia: overview of the Malaysian Health and Adolescents Longitudinal Research Team study (The MyHeART study). *BMC Public Health* **14**, Suppl. 3, S6.
4. Zainuddin AA, Manickam MA, Baharudin A *et al.* (2014) Self-perception of body weight status and weight control practices among adolescents in Malaysia. *Asia Pac J Public Health* **26**, 5 Suppl., 18S–26S.
5. Soo KL, Shariff ZM, Taib MN *et al.* (2008) Eating behaviour, body image, and self-esteem of adolescent girls in Malaysia. *Percept Mot Skills* **106**, 833–844.
6. Farah Wahida Z, Mohd Nasir MT & Hazizi AS (2011) Physical activity, eating behaviour and body image perception among young adolescents in Kuantan, Pahang, Malaysia. *Malays J Nutr* **17**, 325–336.
7. Cheah WL, Hazmi H & Chang CT (2017) Disordered eating and body image issues and their associated factors among adolescents in urban secondary schools in Sarawak, Malaysia. *Int J Adolesc Med Health* **29**, issue 2, 20150044.
8. Karen Sharmini S (2016) Disordered eating among urban and rural secondary school children in Selangor, Malaysia. PhD Thesis, University of Malaya.
9. Gan WY, Mohamad N & Law LS (2018) Factors associated with binge eating behavior among Malaysian adolescents. *Nutrients* **10**, 66.
10. Ackard DM (2004) Anorexia, bulimia, disordered eating and obesity. In *Principles of Gender-Specific Medicine*, pp. 715–728. [MJ Legato, editor]. New York: Academic Press.
11. Bryla KY (2003) Disordered eating among female adolescents: prevalence, risk factors, and consequences. *Health Educ* **35**, 25–29.
12. Herpertz-Dahlmann B, Wille N, Holling H *et al.* (2008) Disordered eating behaviour and attitudes, associated psychopathology and health-related quality of life: results of the BELLA study. *Eur Child Adolesc Psychiatry* **17**, 82–91.
13. Musaiger AO, Al-Mannai M, Tayyem R *et al.* (2013) Risk of disordered eating attitudes among adolescents in seven Arab countries by gender and obesity: a cross-cultural study. *Appetite* **60**, 162–167.
14. Tam CK, Ng CF, Yu CM *et al.* (2007) Disordered eating attitudes and behaviours among adolescents in Hong Kong: prevalence and correlates. *J Paediatr Child Health* **43**, 811–817.
15. Tanofsky-Kraff M, Yanovski SZ, Wilfley DE *et al.* (2004) Eating-disordered behaviors, body fat, and psychopathology in overweight and normal-weight children. *J Consult Clin Psychol* **72**, 53–61.
16. Norhayati M, Chin YS, Mohd Nasir MT *et al.* (2015) Body image disturbance and disordered eating in overweight and obese male and female Malaysian adolescents. In *Proceedings of Malaysian Association for the Study of Obesity Scientific Conference*, pp. 74–75. Kuala Lumpur: .Malaysian Association for the Study of Obesity
17. Nurul-Fadhilah A, Teo PS, Huybrechts I *et al.* (2013) Infrequent breakfast consumption is associated with higher body adiposity and abdominal obesity in Malaysian school-aged adolescents. *PLoS One* **8**, e59297.
18. Tee ES, Nurliyana AR, Norimah AK *et al.* (2018) Breakfast consumption among Malaysian primary and secondary school children and relationship with body weight status – findings from the MyBreakfast Study. *Asia Pac J Clin Nutr* **27**, 421–432.
19. Bowman S, Gortmaker SL, Ebbeling CB *et al.* (2004) Effects of fast-food consumption on energy intake and diet quality among children in a national household survey. *Pediatrics* **113**, 112–118.
20. Duffey KJ, Gordon-Larsen P, Jacobs DR Jr *et al.* (2007) Differential associations of fast food and restaurant food consumption with 3-y change in body mass index: the Coronary Artery Risk Development in Young Adults Study. *Am J Clin Nutr* **85**, 201–208.
21. Neumark-Sztainer D, Wall M, Story M *et al.* (2009) Five-year longitudinal predictive factors for disordered eating in a population-based sample of overweight adolescents: implications for prevention and treatment. *Int J Eat Disord* **42**, 664–672.
22. Haines J, Kleinman KP, Rifas-Shiman SL *et al.* (2010) Examination of shared risk and protective factors for overweight and disordered eating among adolescents. *Arch Pediatr Adolesc Med* **164**, 336–343.
23. Bowman SA & Vinyard BT (2004) Fast food consumption of US adults: impact on energy and nutrient intakes and overweight status. *J Am Coll Nutr* **23**, 163–168.

Public Health Nutrition

24. Welch N, McNaughton SA, Hunter W *et al.* (2009) Is the perception of time pressure a barrier to healthy eating and physical activity among women? *Public Health Nutr* **12**, 888–895.
25. Merten MJ, Williams AL & Shriver LH (2009) Breakfast consumption in adolescence and young adulthood: parental presence, community context, and obesity. *J Am Diet Assoc* **109**, 1384–1391.
26. Pedersen TP, Holstein BE, Flachs EM *et al.* (2013) Meal frequencies in early adolescence predict meal frequencies in late adolescence and early adulthood. *BMC Public Health* **13**, 445.
27. Adesina AF, Peterside O, Anochie I *et al.* (2012) Weight status of adolescents in secondary schools in Port Harcourt using body mass index (BMI). *Ital J Pediatr* **38**, 31.
28. Savige G, Macfarlane A, Ball K *et al.* (2007) Snacking behaviours of adolescents and their association with skipping meals. *Int J Behav Nutr Phys Act* **4**, 36.
29. Livingstone MBE, Robson PJ & Wallace JMW (2004) Issues in dietary intake assessment of children and adolescents. *Br J Nutr* **92**, Suppl. 2, S213–S222.
30. Pérez-Rodrigo C, Artiach Escauriaza B, Artiach Escauriaza J *et al.* (2015) Dietary assessment in children and adolescents: issues and recommendations. *Nutr Hosp* **31**, 76–83.
31. National Coordinating Committee on Food and Nutrition (2013) *Malaysian Dietary Guidelines for Children and Adolescents*. Putrajaya: Ministry of Health.
32. Woon FC, Chin YS, Kaartina S *et al.* (2014) Association between home environment, dietary practice, and physical activity among primary school children in Selangor, Malaysia. *Malays J Nutr* **20**, 1–14.
33. Fara Wahida R, Chin YS & Mohd Yusof BN (2012) Obesity-related behaviors of Malaysian adolescents: a sample from Kajang district of Selangor state. *Nutr Res Pract* **6**, 458–465.
34. Abdul Majid H, Ramli L, Ying SP *et al.* (2016) Dietary intake among adolescents in a middle-income country: an outcome from the Malaysian Health and Adolescents Longitudinal Research Team Study (the MyHeARTs Study). *PLoS One* **11**, e0155447.
35. Pon LW, Kandiah M & Mohd Nasir MT (2004) Body image perception, dietary practices and physical activity of overweight and normal weight Malaysian female adolescents. *Malays J Nutr* **10**, 131–147.
36. Cown MH, Grossman BM & Giraudo SQ (2017) Nutrition education intervention to improve nutrition-related knowledge, attitudes, and behaviors for Hispanic Children. *Ecol Food Nutr* **56**, 493–513.
37. de Villiers A, Steyn NP, Draper CE *et al.* (2016) Primary school children's nutrition knowledge, self-efficacy, and behavior, after a three-year healthy lifestyle intervention (HealthKick). *Ethn Dis* **26**, 171–180.
38. Ruzita AT, Wan Azdie M & Ismail M (2007) The effectiveness of nutrition education programme for primary school children. *Malays J Nutr* **13**, 45–54.
39. Worsley A (2002) Nutrition knowledge and food consumption: can nutrition knowledge change food behaviour? *Asia Pac J Clin Nutr* **11**, Suppl. 3, S579–S585.
40. Krueger RA (1988) *Focus Groups: A Practical Guide for Applied Research*. Thousand Oaks, CA: SAGE Publications, Inc.
41. Kitzinger J (1995) Introducing focus groups. *BMJ* **311**, 299–302.
42. Sharif Ishak SIZ, Chin YS, Mohd Taib MN *et al.* (2016) School-based intervention to prevent overweight and disordered eating in secondary school Malaysian adolescents: a study protocol. *BMC Public Health* **16**, 1101.
43. Jabatan Pendidikan Selangor (2013) Maklumat asas pendidikan negeri Selangor. www.jpnselangor.moe.gov.my (accessed November 2013).
44. Braun V & Clarke V (2006) Using thematic analysis in psychology. *Qual Res Psychol* **3**, 77–101.
45. Croll JK, Neumark-Sztainer D & Story M (2010) Healthy eating: what does it mean to adolescents? *J Nutr Educ* **33**, 193–198.
46. Frerichs L, Intolubbe-Chmil L, Brittin J *et al.* (2016) Children's discourse of liked, healthy, and unhealthy foods. *J Acad Nutr Diet* **116**, 1323–1331.
47. O'Dea JA (2003) Why do kids eat healthful food? Perceived benefits of and barriers to healthful eating and physical activity among children and adolescents. *J Am Diet Assoc* **103**, 497–501.
48. Sylvetsky AC, Hennink M, Comeau D *et al.* (2013) Youth understanding of healthy eating and obesity: a focus group study. *J Obes* **2013**, 670295.
49. Povey R, Conner M, Sparks P *et al.* (1998) Interpretations of healthy and unhealthy eating, and implications for dietary change. *Health Educ Res* **13**, 171–183.
50. Stevenson C, Doherty G, Barnett J *et al.* (2007) Adolescents' views of food and eating: identifying barriers to healthy eating. *J Adolesc* **30**, 417–434.
51. Dixey R, Sahota P, Atwal S *et al.* (2001) Children talking about healthy eating: data from focus groups with 300 9–11-year-olds. *Nutr Bull* **26**, 71–79.
52. Fernandes TJR, Costa J, Oliveira MBPP *et al.* (2015) An overview on fish and shellfish allergens and current methods of detection. *Food Agric Immunol* **26**, 848–869.
53. Brown C, Shaibu S, Maruapula S *et al.* (2015) Perceptions and attitudes towards food choice in adolescents in Gaborone, Botswana. *Appetite* **95**, 29–35.
54. Monge-Rojas R, Garita C, Sanchez M *et al.* (2005) Barriers to and motivators for healthful eating as perceived by rural and urban Costa Rican adolescents. *J Nutr Educ Behav* **37**, 33–40.
55. MacFarlane A, Crawford D & Worsley A (2010) Associations between parental concern for adolescent weight and the home food environment and dietary intake. *J Nutr Educ Behav* **42**, 152–160.
56. Tabbakh T & Freeland-Graves JH (2016) The home environment: a mediator of nutrition knowledge and diet quality in adolescents. *Appetite* **105**, 46–52.
57. Vepsäläinen H, Mikkilä V, Erkkola M *et al.* (2015) Association between home and school food environments and dietary patterns among 9–11-year-old children in 12 countries. *Int J Obes Suppl* **5**, Suppl. 2, S66–S73.
58. Rathi N, Riddell L & Worsley A (2018) Indian adolescents' perceptions of the home food environment. *BMC Public Health* **18**, 169.
59. Berge JM, MacLehose RF, Larson N *et al* (2016) Family food preparation and its effects on adolescent dietary quality and eating patterns. *J Adolesc Health* **59**, 530–536.
60. Nørgaard MK, Sørensen BT & Grunert KG (2014) Social and individual determinants of adolescents' acceptance of novel healthy and cool snack products. *Appetite* **83**, 226–235.
61. Haines J, Kleinman KP, Rifas-Shiman SL *et al.* (2010) Examination of shared risk and protective factors for overweight and disordered eating among adolescents. *Arch Pediatr Adolesc Med* **164**, 336–343.
62. Stice E (2001) A prospective test of the dual-pathway model of bulimic pathology: mediating effects of dieting and negative affect. *J Abnorm Psychol* **110**, 124–135.
63. Wertheim EH, Koerner J & Paxton SJ (2001) Longitudinal predictors of restrictive eating and bulimic tendencies in three different age groups of adolescent girls. *J Youth Adolesc* **30**, 69–81.
64. Molaison EF, Connell CL, Stuff JE *et al.* (2005) Influences on fruit and vegetable consumption by low-income black American adolescents. *J Nutr Educ Behav* **37**, 246–251.
65. Bruening M, Kubik MY, Kenyon D *et al.* (2010) Perceived barriers mediate the association between self-efficacy and fruit and vegetable consumption among students attending alternative high schools. *J Am Diet Assoc* **110**, 1542–1546.

Public Health Nutrition

66. Rathi N, Riddell L & Worsley A (2018) Parents' and teachers' views of food environments and policies in Indian private secondary schools. *Int J Environ Res Public Health* **15**, 1532.
67. Ziauddeen N, Page P, Penney TL *et al.* (2018) Eating at food outlets and leisure places and 'on the go' is associated with less-healthy food choices than eating at home and in school in children: cross-sectional data from the UK National Diet and Nutrition Survey Rolling Program (2008–2014). *Am J Clin Nutr* **107**, 992–1003.
68. Kubik MY, Lytle LA, Hannan PJ *et al.* (2003) The association of the school food environment with dietary behaviors of young adolescents. *Am J Public Health* **93**, 1168–1173.
69. Di Noia J & Contento IR (2010) Fruit and vegetable availability enables adolescent consumption that exceeds national average. *Nutr Res* **30**, 396–402.
70. Condon EM, Crepinsek MK & Fox MK (2009) School meals: types of foods offered to and consumed by children at lunch and breakfast. *J Am Diet Assoc* **109**, 2 Suppl., S67–S78.
71. Ronto R, Ball L, Pendergast D *et al.* (2016) Adolescents' perspectives on food literacy and its impact on their dietary behaviours. *Appetite* **107**, 549–557.
72. Hartmann C, Dohle S & Siegrist M (2013) Importance of cooking skills for balanced food choices. *Appetite* **65**, 125–131.
73. Price TT, Carrington AS, Margheim L *et al.* (2017) Teen Cuisine: impacting dietary habits and food preparation skills in adolescents. *J Nutr Educ Behav* **49**, 175–178.
74. Neumark-Sztainer D, Story M, Perry C *et al.* (1999) Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *J Am Diet Assoc* **99**, 929–937.
75. Rasmussen M, Krølner R, Klepp KI *et al.* (2006) Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part I: Quantitative studies. *Int J Behav Nutr Phys Act* **3**, 22.
76. Poelman AAM & Delahunty CM (2011) The effect of preparation method and typicality of colour on children's acceptance for vegetables. *Food Qual Prefer* **22**, 355–364.

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