

Family Influence Adolescent Eating Habits

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Promoting healthy eating habits can prevent adolescent obesity in which family may play a significant role. Ten themes on how family influences adolescent dietary KAP were found: Knowledge—(1) parental education, (2) parenting style, and (3) family illness experience; Attitudes—(4) family health, (5) cultivation of preference, and (6) family motivation; Practices—(7) home meals and food availability, (8) time and cost, (9) parenting style, and (10) parental practical knowledge and attitudes.

Keywords: healthy eating ; adolescents ; family ; KAP

1. Introduction

There is strong evidence that obesity in childhood, particularly during adolescence, increases the risk of cardiovascular diseases ^{[1][2]}, which are one of the most preventable causes of mortality worldwide ^[3]. The prevalence of adolescent obesity is rising rapidly across Asia, creating a major public health problem ^{[4][5]}. The high proportion of adolescents failing to meet dietary recommendations ^{[6][7][8]} calls for an exploration of the factors that influence the development of their eating habits.

The Knowledge, Attitudes and Practices (KAP) model is commonly applied in health education. This model emphasizes that the acquisition of knowledge is the foundation of beliefs and attitudes that reinforce the intention to adopt healthy behaviors ^[9]. The World Health Organization (WHO) recommends the use of the model to help identify knowledge gaps, cultural beliefs, and behavior patterns ^[9] in order to inform the design of effective interventions for behavior change ^[10]. Indeed, two studies using the KAP model found that high school students in Korea had worse dietary habits than Chinese students despite acquiring more nutritional knowledge ^{[11][12]}, suggesting a translation gap from knowledge to practice. Furthermore, a recent national study of 697 Chinese adolescents (aged 12 to 17 years) showed that nutritional knowledge and social attitudes were among the major predictors for food preferences ^[13].

To better understand how attitudes influence eating habits, a range of theories have been applied, including the Health Belief Model, Social Cognitive Theory, and Theory of Planned Behavior ^{[14][15][16]}. These theories emphasize the role of individual perception and social influence in determining eating behavior. The most relevant concepts include: (A) *Outcome Expectation* (or *perceived benefits*) on personal health relevance ^[17]; (B) *Self-efficacy* (or *perceived power*) on preference towards food and preparation time ^{[17][18]}; (C) *Subjective Norms* from family and peers ^{[18][19]}; (D) *Cues to Action* from media, and the home and school environment ^[19]. These concepts emphasize how a person's intention to adopt a behavior is based on cognitive and motivational beliefs, i.e., attitudes ^[10]. Ecological models have also been used to examine how the environment impacts eating behaviors ^[15], highlighting the importance of socioeconomic status, including education level and household income, community, and household food environment as external correlations of eating practices.

Indeed, the significance of food parenting practices in shaping adolescent eating habits is featured in various behavior change models. The content map by Vaughn et al. categorized food parenting practices under three constructs—coercive control, structure, and autonomy support ^[20]. Except for those who exert coercive control, parents who respond to adolescents' views by supporting them structurally and autonomically will influence the social and cognitive determinants of their child's healthy eating habits. Specifically, adolescents perceive the structure of rules and limits as well as parental modeling of dietary patterns, either healthy or not, as *Subjective Norms*. Furthermore, the structure of food availability at home, meal preparation, and snack times can promote *Cues to Action*. Autonomy support can be provided by nutrition education, child involvement, and encouragement, all of which will enhance their *Outcome Expectation* and *Self-efficacy*.

Although the influence of parental food practices has been investigated, Vaughn et al. identified a lack of research around the family, parent, and child characteristics underlying the use of these practices as well as the non-linear and indirect impact on child eating practices ^[20]. Indeed, certain parenting practices may be explained by latent parental

characteristics, such as parenting style and knowledge [21][22][23]. Furthermore, it is important to note that parenting practices do not only affect the current eating habits of children but also influence how children choose their own food in the long term [20]. In this regard, studies should examine the impact of parent characteristics and parenting practices, collectively termed as *family factors*, on the cognition of adolescents (i.e., knowledge and attitudes that influence healthy eating practices).

2. Family Influence Adolescent Eating Habits

The family factors can be categorized into 10 themes under the adolescent dietary KAP framework: Knowledge—(1) nutrition education, (2) child involvement, and (3) family illness experience; Attitudes—(4) family health, (5) cultivation of preference, and (6) family motivation; Practices—(7) food preparation and availability, (8) time and cost, (9) parenting style, and (10) parental practical knowledge and attitudes. **Table 1** summarizes the findings.

Table 1. Summary of findings by themes.

KAP Constructs	Family Influence		
	Facilitators	Barriers	
Adolescent Knowledge	Nutrition education	<p>Education on nutrition benefits [24][25][26][27][28][29][30][31][32][33]</p> <p>Education on undesirable consequences of unhealthy eating [34][35][36][37]</p> <p>Advice on healthy food choice [24][38][25][35][39][37][27][40][41][42][28][30][43][32]</p> <p>Fostering cooking skills [24][41][32][33]</p>	Inconsistent message between parents and school [37]
	Child involvement	<p>Education during mealtimes and grocery shopping [24][26][37][44][28][43][33]</p> <p>Good communication with adolescents (e.g., open discussion, fun style) [45][38][36][46][37][28]</p>	<p>Adolescents having minimal responsibility in diet-related tasks [38]</p> <p>Limited ability for food discussion in parents with poor role model [26]</p>
	Family illness experience	<p>Emphasis on diet-related health risks experienced by family members with health problems [35][36][37]</p>	<p>Health-related topics as a taboo in families with illnesses [38]</p>
	Family health	<p>Perceived importance of diet-related health risks in family members with health problems [45][38][36][46]</p> <p>Modeling of positive outcome of healthy eating [47][48]</p>	
Adolescent Attitudes	Cultivation of preference	<p>Cultivate taste preference for healthy food [47][45][25][26][41][49][50][51][44][30]</p> <p>Reducing temptation of unhealthy foods by limiting sedentary time [25]</p> <p>Home cooking perceived as more hygienic than street foods [52]</p>	<p>Family preference on low cost/ unhealthy foods [53][26]</p>
	Family motivation	<p>Family modeling of healthy eating habits [47][45][25][35][36][37][27][40][49][28][54][30][32][33]</p> <p>Encouragement and praise [47][24][35][55][26][28][54][48][43][56][32][33]</p> <p>Parental concern on adolescent's health [24][27][40][28][57]</p> <p>Adolescent acting as a role model in the family [32][57]</p>	<p>Family modeling of unhealthy eating habits [38][53][58][36][39][55][59][46][49][54][48][60][61][31][62]</p> <p>Lack of parental concern on adolescent dietary issues (e.g., body weight is not important for the young) [63][59][26][57][62]</p> <p>Busy parents lacking time for encouragement [56]</p>

KAP Constructs	Family Influence	
	Facilitators	Barriers
Food preparation and availability	Provision of healthy home meals [34][64][47][65][24][63][25][35][39][59][42][50][66][28][30][43][56][32][57][33]	Unhealthy home meals [38][46][66][69][57]
	Home availability of healthy food/ unavailability of unhealthy foods [65][45][38][53][63][25][35][67][36][39][55][59][68][37][27][40][52][42][51][44][28][29][54][48][30][61][31][32][62][33]	Home availability of unhealthy/ unavailability of healthy foods [53][70][58][39][55][74][49][29][54][48][31][57]
Time and cost	Controlling access (e.g., increased access to ready-to-eat FV and healthier drinks, storing unhealthy snacks out-of-reach) [55][27][40][51][28][29][48][61][33]	Convenience of packaged and takeaway foods over home cooking [47][65][45][38][25][67][39][59][68][71][46][49][42][66][51][44][54][30][69][57][62][33] and time barrier for preparing FV and healthy beverages [53][29][48]
	Limiting the budget of junk food [65][49][28][62]	Financial preferences on affordable but unhealthy foods [64][47][65][45][24][70][67][58][39][55][26][46][52][42][28][29][48][60][56][32][57][62][33]
Adolescent Practices	Rules and monitoring of mealtimes [45][35][55][68][71][42][66][32] and snacking [34][45][63][25][36][59][68][27][49][51][29][54][32][33]	Easy accessibility of unhealthy food shops and restaurants [65][60]
	Authoritative practices (e.g., reasoning, regular meal schedule) [47][45][25][35][39][55][68][37][40][49][52][51][28][48][30][43][31][56][33]	Unstructured practices (e.g., accommodating family taste preference, lack of monitoring at mealtimes [45][63][51][28][54][57][62] and snacking [38][53][59][26][71][49][28][29][48][69][62][33]
Parenting style	Restriction on snacking [30][33]	Treats and bribes of unhealthy foods by family members [65][59]
	Child involvement with limited/ guided choices [45][35][49][51][33]	Atmosphere of meals with dissatisfying family relation [66]
Parental practical knowledge and attitudes	Grocery shopping without adolescents to avoid their request on unhealthy foods [35]	Lack of nutrition knowledge to make healthy choices or provide appropriate amounts [64][45][53][59][46][43][60][32]
	Healthy cooking skills/ varying food presentation [65][25][49][28][29][60][33]	Lack of cooking skills to provide healthy and tasty meals with variety [52][50][66]
	Healthy home food availability by health-conscious parents [53][26][41][49][66]	Lack of parental concern on healthy eating [59]

Notes: FV refers to fruit and vegetables.

2.1. Adolescent Knowledge

There are, broadly, two types of dietary knowledge: theoretical knowledge and practical knowledge. Theoretical knowledge refers to the understanding of “why” and “what is” healthy eating, which includes health benefits and consequences of different eating habits and the recommended dietary intake. Practical knowledge refers to understanding “how” to eat healthily, from food selection during grocery shopping to cooking skills in meal preparation.

Nutrition education (Theme 1)

- Many studies found nutrition education by parents on both types of knowledge is a facilitator for adolescents to eat healthily, specifically, education on nutrition benefits. For example, disease prevention, weight loss and growth [24][25][26][27][28][29][30][31][32][33], health consequences of unhealthy eating such as heart and kidney problems [34][35][36][37], and healthy food choice and cooking skills [24][38][25][35][39][37][27][40][41][42][28][30][43][32][33]. However, parents with inaccurate knowledge can deliver messages that are inconsistent with what is taught at school, which confuses the adolescents [37].

Child involvement (Theme 2)

- Communication between parents and adolescents is important in education [45][36][46], whereas child involvement in meal planning and discussion facilitates effective communication. Four parenting strategies were identified: (1) mealtime and grocery shopping being used as opportunities to teach adolescents nutritional knowledge, such as reading food labels [24][26][37][44][28][43][33]; (2) open discussion on diet-related health outcomes [38][36]; (3) teaching adolescents about self-regulation [37][28]; (4) providing nutritional information in a casual and fun way [45]. Conversely, excluding adolescents from grocery shopping and meal preparation due to their busy study schedules served as a

barrier to adolescents' acquisition of practical nutritional knowledge [38]. Parents also perceived that the ability of food discussion was limited by their own poor eating habits [26].

Family illness experience (Theme 3)

- Illness experience of family members was perceived to facilitate the education of adolescents on the consequences of unhealthy eating in three US studies [35][36][37]. However, discussion on food and health was perceived as a taboo in some families [38].

2.2. Adolescent Attitudes

Attitudes towards healthy eating were categorized into four domains: (i) outcome expectation: the belief in and the perceived importance of health outcomes resulting from eating habits; (ii) preference: the liking of certain food groups or eating habits, which includes preference for taste, fun, and health; (iii) subjective norm: expectation of significant others, such as family, peers, and teachers, by role modeling and encouragement; (iv) self-efficacy: the capability to achieve certain behavior, predominantly influenced by practical knowledge and barriers.

Family health (Theme 4)

- Adolescents have become more aware of the negative impacts of unhealthy eating from the experience of health problems, particularly obesity, diabetes mellitus, and heart diseases, among the family members in the US studies [45][38][36][46]. Belief in healthy eating was, on the other hand, enhanced by observing positive outcomes from family members consuming healthy foods such as fruit and vegetables [47][48].

Cultivation of preference (Theme 5)

- Cultivating preference for healthy food was a commonly found family facilitator, particularly in studies where participants were young adolescents [47][45][25][26][41][49][50][51][44][28][30]. Communication on nutritional information influenced their food interpretation and preference for health [45][26][49]. Parents could broaden adolescents' taste preferences and acceptance by exposing them to a wide variety of nutritious foods at an early age [25][44][30] and by making healthy eating fun, for example, choosing vegetables in certain colors during shopping [47] as well as providing fewer food choices at home [51]. To tackle the taste preference for junk food, parents tried to reduce these temptations by limiting sedentary time and engaging their adolescents in activities such as sports and hobbies [25]. Hygienic concerns could encourage adolescents, particularly in rural areas, to eat at home instead of food stalls on the streets [52]. One barrier hindering adolescents' preference for healthy food was family's prioritizing either low cost or unhealthy food [53][26].

Family motivation (Theme 6)

- Family norm and role modeling can be both facilitators of and barriers to healthy eating in adolescents. Aside from listening to their parents' advice, adolescents also choose their food by observing their parents' and siblings' eating habits of both healthy [47][45][25][35][36][37][27][40][49][28][54][30][32][33] and unhealthy foods [38][53][58][36][39][55][59][46][49][54][48][60][61][31][62]. Parents who followed the same rules as they told their children enhanced the formation of the family norm [27][33]. Parents' verbal encouragement and compliments served as positive reinforcement for healthy eating habits [47][24][35][55][26][54][48][43][56][32]. Examples include setting expectations on diet [26][33], family support on trying healthy foods for the first time [47], making healthy eating their family lifestyle [47], describing the taste of healthy foods [28], and communication between parents regarding adolescent eating habits [33]. Parental encouragement could be initiated by their concerns around adolescents' health, in particular weight gain and illnesses from eating unhealthy foods [40][28], which formed the subjective norm in their children [24][27][57].
- In addition to family members' preference for unhealthy foods [40,46,72], another important family barrier that impedes healthy eating was not prioritizing health in the family [42,50,51]. Some parents had cultural beliefs suggesting that thinness is a sign of sickness and convinced adolescents that body weight is not an important indicator of health [42,78], while some considered food choice was adolescents' own responsibility, hence not providing sufficient guidance on healthy eating [42,79]. The busy schedule of working parents limited their chances to talk to their children and therefore made it difficult to encourage healthy eating among adolescents [75]. Nevertheless, two studies on low-income families found that the unhealthy eating habits in parents motivated some adolescents to eat healthily in order to be the role models for the family [77,78].

2.3. Adolescent Practices

Practices of healthy eating refer to the consumption of fresher products such as fruit and vegetables, and less junk food with high sugar or salt content, such as sugary drinks, confectionaries, and chips. Mealtime is the major food occasion, and any food consumption between meals or after dinner is defined as snacking.

Food preparation and availability (Theme 7)

- Many studies identified home meals as an important facilitator of healthy eating [34][64][47][65][24][63][25][35][39][59][42][50][66][28][30][43][56][32][57][33]. Subjects regarded food prepared at home as healthy due to better variety, freshness, and reduced uses of sugar, oil, and salt [34][43][57]. Apart from home meals, food availability also influenced adolescent food choice at home. Parents could manage the food supply to provide more healthy foods and to restrict food with insufficient nutrients [65][45][38][53][63][25][35][67][36][39][55][59][68][37][27][40][49][52][42][51][44][28][29][54][48][30][61][31][32][62][33]. Failure of some families to provide healthy meals [38][46][66][69][57] or stock healthy foods at home [53][70][58][39][55][71][49][29][54][48][31][57] is explained in more depth in the following themes.

Time and cost (Theme 8)

- Time and cost for healthy food were important barriers to healthy food provision at home. A tight schedule and long working hours of parents prevented them from preparing family meals, encouraging adolescents to consume takeaway, fast, and prepackaged food instead of fresh foods [47][65][45][70][25][67][39][59][68][71][46][49][42][66][51][44][54][48][30][43][69][57][62][33]. Some adolescents explained that more preparation work such as washing, cutting, and cooking is required for fresh production, as compared to ready-to-eat junk food and sugary drinks [53][29][48]. Easy accessibility of restaurants and food shops further attracted families to eat unhealthy food through takeaway or when they were eating out [65][60]. Peeling fruit and vegetables as well as cutting them into ready-to-eat pieces can overcome the 'inconvenience' barrier, especially among young adolescents [55][27][29][48][33]. Preparing portable water in the refrigerator provided a healthier alternative to sugary drinks on hand [40][28][61], while keeping snacks in a locked cabinet restricted the accessibility to young adolescents [51].
- Although low food budget might limit the purchase of junk snacks in some Western studies [65][49][28][62], it was also an important barrier to the purchase of more costly healthy food such as fruit, vegetables, and organic products, especially among low-income families who might choose unhealthy high-energy food because of its lower cost [64][47][65][45][24][70][67][58][39][55][26][46][52][42][28][29][48][60][56][32][57][62][33].

Parenting style (Theme 9)

- Several key parenting practices were highlighted in various studies, which could be facilitating or inhibiting adolescents' eating habits, depending on the parenting styles. Setting family rules facilitated healthy eating in adolescents during home meals and snacking. Some examples of rules include: having vegetables with every dinner, finishing everything on the plate, and serving the same meal to all family members [45][35][55][68][71][42][66][32], as well as restricting the consumption of unhealthy snacks in terms of quantity and frequency, and drinking water between glasses of juice [34][45][63][25][36][59][68][27][49][51][29][54][32][33]. Some parents further monitored their adolescents' eating practices by verbally checking on food purchases or consumption [55][27][33], tracking food stock at home [27], and requesting adolescents to seek permission before eating unhealthy food [29]. Several authoritative parenting strategies were proposed: (i) controlling or providing supervision on food choices such as asking adolescents to at least try a few bites of healthy food [35][39][55][48][31][56]; (ii) encouraging or prompting adolescents to try healthier alternatives with reasoning [45][40][52][28][30]; (iii) having regular meal schedules and eating with family [47][68][37][43]; (iv) setting a snacking allowance [25][51]; (v) being responsive to adolescents' preference, especially on nutritious foods [51][33]. Except for one Canadian study that found parents preferred grocery shopping alone to prevent requests for junk foods by adolescents [35], involving them in meal planning, shopping and preparation with limited/ guided choices, such as selecting from a list of food choices, and washing and cutting fresh produce [45][35][49][51][33], was perceived as a facilitator to their eating habits.
- Unstructured practices are a major barrier to healthy eating practices in adolescents. Accommodating taste preference of family members, usually towards fast food [45][63][51][54][57], a lack of monitoring when not eating together at a table [28], and failing to negotiate for healthy eating [62] could counteract the benefits of home meals. The lack of parental supervision also encouraged adolescents' unhealthy snacking habits as their food choice tended to be based on taste preferences and minimal preparation effort [38][53][59][26][71][49][28][29][48][60][69][62][33]. Family members, especially grandparents, might provide adolescents with unhealthy foods as treats and bribes [65][59], and these items such as chocolates, candies, and pizza were often used as rewards for good academic performance, helping out with chores,

or even eating healthy foods [71][49][28][29][60][33]. On the other hand, over-restriction could have an opposite effect on adolescents as they might want the restricted food items more and consume them on other occasions when they are not monitored [30][33]. Some adolescents with poor family relationships mentioned that the unpleasant atmosphere of eating with their family sometimes prevented them from eating at home [66].

Parental practical knowledge and attitudes (Theme 10)

- The perception of home meals as inferior in taste with little variation [52][50][66] could be the result of insufficient knowledge on the range of healthy food choices and inadequate skills to prepare tasty, healthy meals. To facilitate healthy eating at home, some parents highlighted the importance of cooking skills to better the presentation of healthy food, for example, hiding fruit and vegetables in soup, stew, or smoothies [25][49][28][29][33], while others would modify recipes, attempting to use healthier cooking methods, optimizing food choices, and preparing meals at lower costs [65][60]. A number of US studies reported that a high level of health awareness in parents was essential to maintaining a healthy food environment at home [53][26][41][49][66].
- Parents lack of nutritional knowledge, or concern, were barriers to providing healthy meals for adolescents [64][53][59][46][43][60][32]. Disagreement on the interpretation of nutrition guidelines, such as the perceived definition of a serving among different family members [45], was an additional barrier to a healthy home food environment.

3. Summary

3.1. Parental Knowledge

Parents use their knowledge to provide their children with guidance on healthy eating. Indeed, such knowledge enables parents to prepare tasty and healthy meals of varied presentation, cooking methods, and with a wide range of ingredients. These may confer further benefits by cultivating a wider taste preference and better diet quality in children, as shown in previous interventions on empowering cooking skills in parents [72][73][74].

3.2. Parental Attitudes

Parental concern in family health facilitates motivation and provision of quality meals to adolescents. While its facilitating role is presented in this review [24][27][40][28][57], the low priority of adolescent health among parents is also revealed [63][59][57]. As proposed in a previous narrative review [75], fathers are less conscious of encouraging adolescents to eat healthily, and tend to abdicate the responsibility to their spouses, who are the primary caregivers in the family. An additional explanation is that parents are afraid of raising issues around body weight as they believe it could cause their children undue psychological stress [76]. Alternatively, some parents might perceive the increased obligations their adolescents take up from schoolwork, extracurricular activities, and social relationships with peers as more important than adolescent health. These attitudes reduce the tendency of parents to enhance dietary KAP in adolescents. Changing parents' misconception of 'health is less important than schoolwork' and educating parents that a healthy diet is beneficial to school performance [77][78][79][80] can be a solution.

3.3. Parenting Style

There is a spectrum of parenting styles, ranging from authoritarian, to authoritative, to permissive. It is a consistent finding that an authoritative parenting style (i.e., being involved with reasonable expectations) facilitates adolescents' KAP of healthy eating—providing nutrition information in a friendly and open manner, cultivating adolescent preference for healthy eating, and controlling their food consumption by rules and monitoring—whereas the two extremes do not. Parents may encounter challenges in parenting as their children grow, especially when social impacts from peers, teachers, and media become increasingly influential, and parents are being viewed as less powerful and ideal [81]. Therefore, involving adolescents in food preparation can be a strategy to facilitate communication and exchange of knowledge and attitudes, in addition to its positive association with diet quality [82][83][84].

3.4. Lack of Time

The competing demands from work and studies may limit the time available for families to practice healthy eating. Working mothers in Germany and the US were found to spend less time in meal preparation, eating with adolescents, and encouraging healthy eating than their non-employed or part-time counterparts [85][86]. Furthermore, the longer the length of parents' working hours, the higher the tendency for young adolescents to have unhealthy family meals [87][88], which was reflected in this review, emphasizing that working parents preferred fast and prepackaged food instead of preparing a home meal after work.

3.5. Cost Concern

The cost of food is another important family barrier that can impact healthy food choices. This review consistently found that many parents choose unhealthy high-energy foods for their low cost, particularly parents from low-income families. The positive relationship of socioeconomic status and diet quality is well known in the literature [89][90], where the trade-off between food cost, food waste, and health is a common dilemma [91]. One study in our review found that discussion on food choices in low SES families was understandably focused on the price of food as opposed to healthy eating and food quality [26], which may encourage adolescents to choose unhealthy food due to its lower cost. This could potentially impede their ability for behavioral change in the future.

4. Conclusions

Authoritative parenting styles as well as parental dietary knowledge and attitudes are facilitators of food parenting practices that promote adolescents' KAP of healthy eating, while time and cost concerns are major barriers. Studies that conducted interviews with parent–adolescent dyads provided richer data on the dyadic mutual influence, which should be encouraged in future studies. Adolescents with working parents and low SES may be more vulnerable to unhealthy eating habits as their parents may not have sufficient knowledge and time to educate them or to serve as role models, in addition to having a limited food budget. Time- and cost-saving strategies that promote healthy eating in adolescents deserve more investigation. There could be cultural differences in family influences on adolescents' KAP, especially in the aspects of attitudes and food choices, which call for more studies among Asian families.

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