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Promoting Healthier Eating via Parental Communication: Development and Validation of the Active and Restrictive Parental Guidance Questionnaire (PARQ)

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ABSTRACT

Parents are important sources of influence in the development of healthy eating among children and adolescents. Besides gatekeeping and modeling, parents serve as health educators and promoters, using intentional and persuasive communication to encourage healthier eating preferences and behaviors in children. Despite this, a lack of reliable and valid measures has limited the research on how parent-driven interpersonal communication about foods influence child food consumption outcomes. Building on the research in parental mediation of media consumption, and parenting practices in public health nutrition, this study details the development and validation of the active and restrictive parental guidance questionnaire with a sample of 246 children and adolescents at the scale development phase and another sample of 1,113 children and adolescents at the scale validation phase. Findings show that parents employ four communicative strategies to encourage a healthier diet: active guidance, general discussion, preventive restrictive guidance, and promotive restrictive guidance. The new measure was shown to have good validity and measurement model fit. Implications for future research are discussed.

Parents are important social agents in the development of healthy lifestyles among young people. The communicative actions of parents can have consequences on a wide range of lifestyle choices, from smoking (Harakeh et al., 2005) to condom use (Hadley et al., 2009). This includes the guiding of children's food consumption (Kiefner-Burmeister et al., 2014). As early interventions are crucial in the development of healthy lifestyles among individuals (Rimal, 2003), it is important that researchers identify effective parental communication strategies that can guide children to develop healthier food preferences from a young age.

Research examining the role of parenting on child food consumption behaviors in the domains of public health and health communication have identified three significant roles, among others, that parents play in influencing children's food consumption. First, parents are gatekeepers, where their decisions to make certain foods available at home can lead to children's consumption of those foods (Wyse et al., 2011). Second, parents are role models, where their own consumption of certain foods is associated with children's food consumption habits (Cruwys et al., 2015). Last, parents are health educators, utilizing communication techniques to foster healthier eating in children (Lwin et al., 2017). While research have identified strong associations between availability, modeling, and child food consumption outcomes, there remains a lack of research into how intentional communicative and persuasive strategies by parents influence child food consumption (Yee et al., 2017).

While some researchers have highlighted the importance of communication in nutrition education, reasoning, and the use of verbal rules to help children develop healthier eating habits (Vaughn et al., 2016), existing research does not rely upon a set of standardized instruments to measure the variety of communication strategies displayed by parents. As such, there are few conceptual frameworks that provide a foundation for examining the effects of specific parental communication practices. The objective of this study is to provide future researchers with a useful instrument and framework to examine parental communication effects in the domain of health promotion and communication regarding food and nutrition.

Healthier eating: Reducing sugar-sweetened beverage and increasing vegetable consumption

While what constitutes a healthy diet is complex, there is consensus that it involves two kinds of nutritional intake: (1) low to no amount of free sugar intake, and (2) high levels of fruit and vegetable consumption (World Health Organization, 2018). First, researchers have identified free sugars as "empty calories" that do not register like other type of calories, contributing to decreased insulin sensitivity, which can create feelings of hunger (R. H. Lustig, 2006b). This sense of hunger can then drive individuals into a vicious feedback loop of obesity-related eating behaviors, potentially altering our brain's reward system (R. H. Lustig, 2006a, 2013). Sugar-sweetened beverages (SSB) are the main source of free sugar intake in children's diets (Ebbeling et al., 2006; Malik et al., 2010). Some estimates suggest that 61% of children in the US drink SSB on any given day, with 20% of high school students drinking soda daily (Bleich et al., 2018; Miller et al., 2017). In the U.K., the numbers are similar, with

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6% of the daily energy intake of children between ages 4 and 18 coming from SSB (Department of Health and the Food Standards Agency, 2011). Similar trends can be found in Asian countries (Pan et al., 2011; Health Promotion Board, 2012). In Singapore, it is estimated that around 28% of children aged between 4 and 9 consume SSB once a week at the minimum (Health Promotion Board, 2012).

Other than free sugars, the consumption of fruits and vegetables has been mooted as a possible barrier against obesity and its associated diseases (Boeing et al., 2012; Qian et al., 2015; Slavin & Lloyd, 2012). Fruit and vegetable consumption work to prevent and reduce obesity through increased intake of dietary fiber, which provides increased satiation, regulated blood sugar levels, and increased resting energy expenditure (Smith, 1987; De Vadder et al., 2014). Despite its health benefits, children do not consume sufficient fruits and vegetables. In the U.S., it was found that 93% of children do not consume sufficient vegetables based on existing guidelines (Kim et al., 2014). Mirroring the situation in the U.S., an European study among 11-year-old children found that the average consumption of fruit and vegetables were below recommended levels (Lynch et al., 2014). Likewise, a large majority of Singaporean children between 6- and 12-years-old do not meet daily guidelines for fruit and vegetable consumption (Brownlee et al., 2019).

Since the consumption of SSB and fruits and vegetables among children tend not to adhere to recommended guidelines, with both food types' nutritional contents generally indicative of unhealthy versus healthy foods, we have utilized SSB and fruits and vegetables as proxies for unhealthy versus healthy categories of foods in our operationalization of parental guidance (e.g. rules about SSB or fruits and vegetables reflect restrictive guidance).

Active and restrictive guidance of food consumption

Building on the theoretical foundations of parental mediation in the study of media consumption (Valkenburg et al., 1999), and the parenting practices literature in public health nutrition (Vaughn et al., 2016), we propose that parental *communication* about food consumption can be delineated into two broad constructs: active and restrictive guidance. It describes two distinct types of interpersonal communication strategies parents employ when attempting help children develop healthier eating habits.

Initially conceptualized to better understand how parents can moderate the effects of television watching on children, the concept of *parental mediation* was developed to measure the occurrence of different interpersonal communication strategies parents employ. Specifically, researchers in the field argue that the type and frequency of social interaction between parents and children can negate the negative effects of television watching on children (Clark, 2011; A. I. Nathanson, 1999). There are three main dimensions of parental mediation: *active* mediation, which refers to verbal parent-child discussions about the television content; *restrictive* mediation, which refers to the setting of rules regarding television viewing; and *co-viewing*, which refers to children watching television in the company of parents (Valkenburg et al., 1999).

While initial investigation of parental mediation has focused on television, parental verbal discussion and setting of rules are characteristic of parenting behaviors across contexts. Specifically, the concepts of parental active and restrictive mediation have been extended to other modes of mediated communication such as video gaming, Internet use, advertising, and social media (Buijzen & Valkenburg, 2005; Clark, 2011; Lou & Kim, 2019; Martins et al., 2017; Shin & Huh, 2011). Indeed, active verbal discussions and rule-setting has been found, in varying degrees, to have an effect on behaviors across a multitude of behavioral contexts, such as smoking, academic outcomes, alcohol consumption, and food consumption among others (Baxter et al., 2009; Hill & Tyson, 2009; Van Der Vorst et al., 2010; Yee et al., 2019). As with parental mediation, the assumption is that the social interactions between parent and children about food constitutes an important socialization process which can have protective effects on children.

Based on this, active guidance had been defined as "*the degree to which parents actively discuss, verbally interact, and instruct their child with regards to food*" (Yee et al., 2017). It includes a variety of proactive verbal communication about food that parents employ with regards to food. As a result, it encompasses several related constructs such as nutrition education, reasoning, teachable moments, and communicating health beliefs, that has been studied by other researchers in the public health domain (Musher-Eizenman & Holub, 2007; Vaughn et al., 2016). Since these myriad communicative actions have strong conceptual overlaps between them, a higher-order construct such as active guidance could be a useful way to group them. For example, Vaughn et al. (2016) conceptualized nutrition education and reasoning as distinct constructs but suggested strong overlaps between them. Nutrition education was defined as "*parents' attempts to pass along information and skills to help their children make informed choices about the foods they eat*" (p,108), while reasoning was defined as "*ways in which a parent uses logic to persuade children to change their eating behavior*" (p. 110).

As both concepts appear to reflect parental verbal discussions aimed at achieving healthier eating preferences, involve talking about various foods' positive or negative features, rely on proactive verbal communication from parents that appeal to children's thought process when it comes to food, and both involve the transmission of both factual and evaluative information about foods, it would be parsimonious to conceptualize these actions as a single construct. This is reinforced by our examination of the operationalization of related constructs by previous researchers (See Table 1). All measures point to a central theme of verbal communication about a food item's value to the child eating it, involving a transmission of evaluative and factual information from the parent to the child. The concept of active guidance incorporates these actions into a single parsimonious construct.

On the other hand, restrictive guidance is defined as the "*frequency with which parents set limits, rules, or restrictions regarding food consumption*" (Yee et al., 2017). This refers to parents' verbal setting of eating-related rules for children. Research examining the effect of rule-setting has produced mixed findings, with some studies showing that parental rules

Table 1. Operationalization of constructs related to active guidance among previous researchers.

Study	Construct	Operationalization
Musher-Eizenman and Holub (2007)	Teaching about nutrition	(1) I discuss with my child why it's important to eat healthy foods (2) I discuss with my child the nutritional value of foods (3) I tell my child what to eat and what not to eat without explanation (R)
Papaioannou et al. (2013)	Teachable moments	(1) To tell your child that eating fruits and vegetables will make them strong and healthy (2) To use mealtimes to teach your child about healthy eating (3) To ask your child to help you with food preparation (4) To tell your child they have to try at least a couple of bites but don't have to eat it all (5) To tell your child what will happen to them if they eat too many bad foods
Van Lippevelde et al. (2013)	Communicating health beliefs	(1) How often do you tell your child that fruit juice/soft drinks are not good for him/her? (2) How often do you tell your child that fruit juice/soft drinks can make him/her fat? (3) How often do you tell your child that fruit juice/soft drinks are bad for his/her teeth?
Vaughn et al. (2017)	Reasoning	(1) How often do you have to encourage your child to eat things he or she does not like (because those foods are good for him or her)? (2) How often do you encourage vegetable consumption by making a game of eating vegetables or telling a story around eating a vegetable? (3) I reason with my child to get him or her to eat (4) I negotiate with my child how much he or she can leave on his or her plate
	Nutrition Education	(1) How often do you try to make foods more familiar to your child by telling him or her where it came from? (2) How often do you try to make foods more familiar to your child by telling him or her where it came from? (3) I discuss with my child the nutritional value of foods (4) Do you give your child reasons for the rules you make about food and eating?
Vereecken et al. (2004)	Encouragement through rationale	How often do you tell your child: (1) Fruits/vegetables are good for you (2) By eating fruits/vegetables, you will get bigger (3) Fruits/vegetables taste good (4) Fruits/vegetables are healthy
	Discouragement through rationale	(1) Sweets/soft drinks are unhealthy (2) Sweets/soft drinks are bad for the teeth (3) Sweets/soft drinks don't taste good (4) Sweets/soft drinks can make you fat (5) If you eat/drink too much sweets/soft drinks, you will get ill

are associated with increased healthy food consumption (Loth et al., 2016), and others finding it to be negatively associated with child healthy food consumption (Boots et al., 2015).

In order to develop the parental active and restrictive guidance questionnaire (PARQ), we went through three phases: (1) the substantive validity phase, where we defined the concept and developed an item pool, (2) the structural validity phase, where we collected data from two samples of children and psychometrically evaluated the data to explore the factor structure that underlies active and restrictive guidance, and (3) the external validity phase, where we explored the scale's validity in relation to related constructs (Simms, 2008).

Method

Study one

Participants and procedures

In order to collect the data necessary to evaluate the factor structure of the collated item pool, a convenience sample of 246 children and adolescents aged between 9 and 18 (M = 13.15, SD = 2.28) was recruited to take part in a self-administered survey. The sample had slightly more girls (56.9%) than boys (43.1%), and an ethnic distribution of 78.9% Chinese, 11.4% Malay, 4.5% Indian, and 5.3% of other races, roughly reflecting the ethnic distribution of the population of Singapore (Department of Statistics, 2010). Approval from the university's ethics board (IRB-2017-10-015), along with informed parental consent, and child assent, was obtained before administering the survey with the participants. The participants were recruited through a variety of mediums, from posting on online platforms frequented by parents, such as parent groups on Facebook, through personal networks, to street interceptions in public parks where children frequent. Participants were given a choice to fill out the survey through Qualtrics, or through a paper-and-pencil survey that was delivered to them. In total, 50 participants chose to complete the survey online, and 196 completed a paper-and-pencil survey, with each survey lasting approximately 40–60 minutes.

Item pool development

To develop the scale, we followed best practices laid out in Carpenter's (2018) guide to scale development for communication researchers. To build an item pool, we first collated all the studies highlighted in a previous meta-analysis which contained facets of active and restrictive guidance (Yee et al., 2017). Following that, we extracted all relevant items that were categorized under either active or restrictive guidance from each study that was identified to have measured these two variables. These included sub-scales from established scales such as the teaching nutrition sub-scale, and the restriction for health and weight sub-scales in the Comprehensive Feeding Practices Questionnaire (Musher-Eizenman & Holub, 2007). In total, 118 items reflecting either active or restrictive guidance was extracted from all the identified studies. As some of the items were obtained from scales intended to be administered to parents, wording on some items were adapted to cater to child participants. For example, the item "I discuss why it's important to eat healthy foods" was revised to "My parents discuss why it's important to eat healthy foods".

As most previous studies on parenting practices were conducted in the West and not in Asia, we conducted semi-structured face-to-face in-depth interviews with 14 parents in Singapore to bolster the item pool. After obtaining approval from the university's ethics board (IRB-2017-01-037), the sample of Singaporean parents were obtained through convenience sampling, and each interview lasted 30 to 90 minutes, conducted in a mix of English and Mandarin. Following data collection, the interviews were translated when necessary, transcribed, analyzed, and coded line-by-line. In total, 10 additional items that were dissimilar to the 118 items previously extracted were included in the item pool (displayed in Table 2). These items tended to reflect active and restrictive guidance, manifesting in specific ways that were previously unaccounted for. Among the parents interviewed, culturally-specific ways of "scaring" children into eating and drinking more or less of certain items involve telling them that those particular foods would have no purpose for their bodies, would prevent them from falling seek, or make their teeth look bad. Additionally, some food-related parental communication involved parents spending time discussing *generally* about what their children were eating during recess. Having said that, most parenting practices elicited from the interviews tended to correspond to those measured in previous studies.

In order to minimize the burden on participants during data collection, and to ensure the items reflect the overarching constructs we wanted to measure, a sorting procedure to reduce the number of items in the item pool was conducted with six participants. Participants were given the definitions of active and restrictive guidance and were told to categorize the 128 items as either active or restrictive. A third category labeled "does not fit" was used to categorize items that do not fall neatly under the two categories. After each participant sorted the items, we analyzed the data and extracted items that were categorized in a conflicting manner (where some participants sorted an item into a category that does not agree with how others sorted). In such cases, if 3 participants or more sorted an item in the same category, it was included in the final item pool. In total, 56 items were categorized under active guidance, while 48 items were categorized under restrictive guidance, indicating that 24 items were discarded. The final item pool of 104 items was included in a survey that was used to evaluate its factor structure. All items were adapted to measure on five-point scales, asking participants how much they agree to each statement, with 1 being "Strongly Disagree" and 5 being "Strongly Agree".

Analytical approach

In order to assess the underlying factor structure of the 104 items in the item pool, we conducted exploratory factor analysis (EFA) on SPSS 22. First, we examined the data quality and addressed missing data using the expectation-maximization algorithm, a recommended maximum likelihood estimation-based method of replacing missing values without losing statistical power (Dong & Peng, 2013). Next, we assessed the factorability of the data using both the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. Following that, we selected principal axis factoring (PAF) as the extraction method to extract latent variables from observed variables, as it is the most robust extraction method and is recommended for use with small sample sizes (Carpenter, 2018). Next, we determined the number of factors to be extracted using parallel analysis through the SPSS macro developed by (O'Connor, 2000). Parallel analysis involves the comparison of eigenvalues from one's data with eigenvalues from random datasets, and is considered to be more robust in determining the correct number of factors when compared to the eigenvalue greater than one rule and the Scree test (Humphreys & Montanelli Jr., 1975; Watkins, 2005; Zwick & Velicer, 1982). Once the number of factors was determined by parallel analysis, we fixed the number of factors according to the parallel analysis results and conducted PAF using an oblique (Promax) rotation, as some correlations among factors were expected (Costello & Osborne, 2005). In order to select and retain items, we adopted three recommendations (Comrey, 1988; Floyd & Widaman, 1995; Worthington & Whittaker, 2006) – retaining items with factors loadings more than.50, removing items that cross-loaded with a difference equal or more than .20, and retaining items that were conceptually consistent with the other items on the factor. After the deletion of items, the entire process from parallel analysis to EFA was repeated. This process was repeated until clean factors with items that had loadings above .50 on a single factor, no cross-loadings, and were theoretically sound, were identified.

Study one results

Scale construction and exploratory factor analysis

First, the factorability of the 104 items was examined. The KMO measure of sampling adequacy was .92, while Bartlett's test of sphericity was statistically significant ($\chi 2(5356) = 22383.65$, $p < .001$), indicating that the data was suitable for factor analysis. The initial parallel analysis revealed that eight factors underlie

Table 2. Items added from the in-depth interviews with parents.

Items added from the in-depth interviews with parents
N1 My parents would use stories to show why eating fruits and vegetables are good for me
N2 My parents explain to me that nutrients in healthy foods help prevent me from falling sick
N3 My parents explain to me that sweet foods and drinks serve no purpose for my body
N4 My parents tell me my teeth will look bad if I consume too much sweet foods and drinks
N5 My parents explain to me why it is important to have a balanced diet
N6 If I had some sweet drinks already, my parents would tell me I can't have it anymore
N7 My parents won't punish me if I take sweets without permission
N8 My parents often show me that they enjoy eating vegetables
N9 My parents serve vegetables during mealtimes
N10 My parents talk to me about the food I eat during recess

Four (N3, N5, N6, and N10) of these items were eventually retained in the 25-item PARQ

the 104 items. An initial EFA with Promax rotation was conducted with the number of factors fixed to eight. Following the initial EFA, 33 items were removed as they either cross-loaded or indicated factor loadings below .50. The parallel analysis and EFA procedures were repeated six times before a clean factor solution of 6 factors explaining 62.04% of the variance was found. As only four factors were found to be theoretically meaningful and consistent, items from the other 2 factors were dropped, resulting in a final factor solution of 4, with a total of 30 items explaining 65.91% of the variance. Table 3 shows the final factor solution of the 30-item PARQ, with all items indicating satisfactory factor loadings above .50 (Hair et al., 2014). Factor 1 consists of 9 items reflecting active parental guidance of food consumption (α = .93). Factor 2 consists of 7 items reflecting general discussion about food consumption (α = .89). Factor 3 consists of 8 items that measures prevention-focused restrictive guidance of food consumption (α = .93), while Factor 4 consists of 6 items measuring promotion-focused restrictive guidance of food consumption (α = .90).

Study two

Study One identified that active and restrictive guidance are multi-faceted. Namely, verbal discussions about food can be categorized as more evaluative in nature (active parental guidance) or more opinion-neutral (general discussion). Furthermore, parental rule-setting to promote healthier types of food consumption (such as fruits and vegetables) was found to be distinctly different from parental rule-setting to prevent the consumption of unhealthier foods (such as sugar-sweetened beverages (SSB)). Study Two aims to (1) confirm and refine the scale and (2) examine its criterion validity.

Parental guidance as communicative factors behind the theory of planned behavior

To test the criterion validity of the scale, we conceptualized the four facets of parental guidance identified in Study One as communicative background factors influencing the proximal predictors of behavior within the theory of planned behavior. The original theory of planned behavior posits that one's intention to perform a specific behavior drives the performance of that behavior (e.g. eating vegetables) (Ajzen, 1991). Intention is further preceded by three proximal predictors – attitude, perceived norms, and perceived behavioral control (Fishbein & Ajzen, 2010). In an integrated model of the theory of planned behavior, Yee et al. (2019) suggests that dimensions of parental guidance can predict the three proximal factors within the theory of planned behavior.

In the theory of planned behavior, attitudes refer to an individual's subjective evaluation of a target object based on the expected value outcome of a behavior (Ajzen, 2001). These beliefs about the expected value of the behavior summates into an overall attitude toward the behavior (Fishbein, 1963). In the integrated model, parents who communicate frequently and emphatically

Table 3. 30-item PARQ = items and factor loadings.

How much do you agree with the following statements?	Loading
Discursive practices	
Factor 1 – Active parental guidance of food consumption	
APG1 My parents discuss with me why it's important to eat healthy foods	.74
APG2 My parents discuss with me the nutritional value of foods	.71
APG3 My parents explain to me why I should eat more or less of a particular food	.75
APG4 My parents discuss with me about the health benefits of a food	.85
APG5 My parents discuss with me the importance of eating a variety of foods	.72
APG6 My parents explain to me the effects of different nutrients (e.g. Vitamin C, calcium)	.77
APG7 My parents explain to me why nutrients in healthy foods prevent me from falling sick	.78
APG8 My parents explain to me why some foods like sweet foods/drinks serve no purpose for my body	.64
APG9 My parents explain to me why it is important to have a balanced diet	.80
Factor 2 – General discussion about food consumption	
GPG1 My parents talk to me about the food I eat during recess	.58
GPG2 My parents reason with me to get me to eat	.62
GPG3 My parents give me reasons for the rules they make about food and eating	.61
GPG4 My parents try to make foods more familiar by telling me where it came from	.76
GPG5 My parents tend to talk more often about foods they would like me to eat	.69
GPG6 My parents advise me on what I should eat during recess	.71
GPG7 My parents try to talk more often about foods they would like me to eat	.77
Rule-based practices	
Factor 3 – Restrictive guidance of food consumption (preventive)	
RPGe1 If I had some sweet drinks already, my parents would tell me I can't have it anymore.	.71
RPGe2 My parents set limits to how much sweet drinks I can drink	.75
RPGe3 When my parents give me a sweet drink, they tell me I can only have one today	.82
RPGe4 My parents set limits to how much sweet drinks I can drink everyday	.86
RPGe5 My parents limit the amount of sweet drinks I drink	.84
RPGe6 My parents limit opportunities for me to drink sweet drinks	.75
RPGe7 My parents limit how often sweet drinks are in the home	.74
RPGe8 My parents tell me which sweet drinks I am allowed to consume	.72
Factor 4 – Restrictive guidance of food consumption (promotive)	
RPGo1 My parents insist that I must eat vegetables during meals with them	.74
RPGo2 My parents give me fruits and makes me eat them	.85
RPGo3 My parents give me vegetables during meals and makes me eat them	.80
RPGo4 My parents insist I must finish my vegetables	.76
RPGo5 My parents demand that I eat fruit every day	.56
RPGo6 My parents demand that I eat vegetables every day	.69

about why eating or avoiding certain foods are important, can increase the accessibility of beliefs that lead to a child's attitude toward consuming certain foods, shaping the likelihood of them eating or choosing to avoid certain foods (Lwin et al., 2017). Similarly, rules indicate parents' own evaluation of a certain behavior, which can inform children's own evaluation of certain behaviors (e.g. drinking SSB are bad for them).

Next, perceived norms refer to the types of beliefs one has about the popularity and social approval of a target behavior (Lapinski & Rimal, 2005). This is derived from significant others (e.g. parents, peers) and the social groups one identifies with (e.g. school, sports team). Parents setting rules or communicating about health benefits of various foods is a direct indication of their approval of various foods. Rule-setting in particular has been found by previous researchers to be related to perceived norms to limit SSB consumption (De Bruijn et al., 2007).

Lastly, perceived behavioral control refers to the degree of control one believes he or she has in performing the behavior (Ajzen, 1991)." Perceptions of control, especially among children, is shaped by the communicative actions of parents. For example, having parents who do not set any rules regarding a behavior would logically entail a greater perception of control over said behavior by children. In contrast, parents who set too many rules can shape a poor sense of control over a behavior. Melbye et al. (2013) provided some support for this proposition, when they found that parental restrictions lead to lower self-efficacy to consume vegetables among children. Another study found perceived parental control of sugary drinks and less healthy foods was associated with lower self-efficacy to consume sugary drinks and less healthy foods (Ma & Hample, 2018).

Based on the above, and using vegetables and SSB as proxies of healthy and unhealthy food consumption contexts, we hypothesize the following:

H1: *Active* parental guidance of food consumption is positively associated with (a) attitude, (b) perceived norms, and (c) perceived behavioral control toward consuming vegetables.

H2: *Restrictive* parental guidance (promotive) of food consumption is positively associated with (a) attitude, (b) perceived norms, and (c) perceived behavioral control toward consuming vegetables.

H3: *Active* parental guidance of food consumption is negatively associated with (a) attitude, (b) perceived norms, and (c) perceived behavioral control toward consuming SSB.

H4: *Restrictive* parental guidance (preventive) of food consumption is negatively associated with (a) attitude, (b) perceived norms, (c) perceived behavioral control, and (d) intention to consume SSB.

While previous research provided theoretical bases for the hypothesizing the effects of active and restrictive guidance, there are no existing studies to our knowledge that has examined the role of general discussion on child food consumption cognitions and outcomes. Although general discussion appears discursive in nature, they are less specific and informative. To better understand its usefulness as a construct for future research, we have posed the following research questions:

RQ1: How will parental general discussion about food be associated with (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming vegetables?

RQ2: How will parental general discussion about food be associated with (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming SSB?

Participants and procedure

For Study Two, we administered a computer-assisted self-administered survey in person with a large-scale nationally representative sample of 1,113 children and adolescents aged between 9 and 18 (M = 12.56, SD = 1.77). The sample had slightly more girls (53.7%) than boys (46.3%), and an ethnic distribution of 77.4% Chinese, 11.4% Malay, 5.3% Indian, and 5.9% of other races, roughly reflecting the ethnic distribution of the population of Singapore (Department of Statistics, 2010).

Prior to the survey, approval from the university's ethics board (IRB-2017-11-012), along with approval from the Ministry of Education (EDUN N32-07-005) was obtained. Following that, we utilized multi-stage cluster sampling in order to obtain a random sample of child and adolescent participants.

First, a list of public schools was obtained from Singapore's Ministry of Education that divided schools into four different regional zones (north, south, east, and west). We randomly selected one primary school and one secondary school from each zone and sent out invites to the principals and heads of department (physical education) of each school to request for their participation in the study. Once permission was granted from the principals of those schools to conduct the survey, informed parental consent forms were sent to the parents of four classes (approximately 160 students) of students. If parents consented to the survey, the child will be invited to complete the survey in his or her respective school's computer lab during a physical education lesson, school assembly, or a free period, in the presence of a teacher and a researcher. Each questionnaire took about 30 minutes to complete.

Measures

The computerized questionnaire consisted of the 30-item PARQ, as well as measures representing variables that would be used for testing criterion validity. These included attitude, perceived norms, and perceived behavioral control toward consuming vegetables and SSB.

Active and restrictive guidance of food consumption using the 30-item PARQ detailed in Chapter IV. All items were measured on five-point scales, asking participants how much they agree to each statement, with 1 being "Strongly Disagree" and 5 being "Strongly Agree".

Attitude toward consuming vegetables/SSB were measured by asking children to rate how much they agree with statements indicating how positive or negative they felt about vegetables and SSB on five-point scales, with 1 being "Strongly Disagree" and 5 being "Strongly Agree". Three statements per food category were utilized to measure their attitude toward each respective food

category. One example of a statement would be "It is enjoyable to eat/drink vegetables/SSB at least once a day". Reliability analyses revealed that the Cronbach's alpha for attitude toward consuming vegetables and SSB are .85 and .81 respectively.

Perceived norms toward consuming vegetables/SSB were measured by asking children to rate how much they agree with statements reflecting both descriptive norms (e.g. "Many people like me eat/drink vegetables/SSB once a day") and injunctive norms (e.g. "It is expected of me that I eat/drink vegetables/SSB once a day) regarding the consumption of vegetables and SSB. Three statements measuring descriptive norms and two statements measuring injunctive norms on five-point scales, with 1 being "Strongly Disagree" and 5 being "Strongly Agree", were utilized in this study. The Cronbach's alpha for perceived norms toward consuming vegetables and SSB are .90 and .91 respectively.

Perceived behavioral control toward consuming vegetables/SSB was measured by asking children to rate how much control they think they have, on five-point scales (with 1 being "Strongly Disagree" and 5 being "Strongly Agree"), over their consumption of fruits, vegetables, and SSB. Four items per food category were utilized to measure their perceived behavioral control toward each respective food category. The Cronbach's alpha for perceived behavioral control toward consuming vegetables and SSB are .86 and .91 respectively.

Items measuring the three proximal predictors within the theory of planned behavior were developed in accordance with guidelines from Fishbein and Ajzen (2010).

Analytical approach

CFA and structural equation modeling (SEM) were executed using the package *lavaan* in *R* to test the factor structure and hypothesized relations between the variables (Rosseel, 2012). The maximum likelihood procedure was used to estimate the unknown parameters in the model. The goodness of fit of the model was evaluated on the basis of the comparative fit index (CFI) of .95 or greater, the non-normed fit index (NNFI) of .95 or greater, root mean square error of approximation (RMSEA) less than or equal to .05, and the standardized root mean square residual (SRMR) less than or equal to .05 (Bentler & Bonett, 1980; Browne et al., 1993; Hu & Bentler, 1999).

Study two results

Confirmatory factor analysis

The four-factor model with the original 30 items from the PARQ provided a decent – but not excellent – fit for the data ($X^2(399) = 1539.16$, $p < .001$; CFI = .93; NNFI = .93; RMSEA = .06, SRMR = .04). Consulting the modification indices highlighted five problematic items that were detrimental to the model fit. We reviewed the five items (APG3, APG7, RPGe4, RPGo5, and RPGo6), and noted that the content within each of these items were either repetitive (APG3, APG7, and RPGe4) or inconsistent with the other items (RPGo5 and RPGo6). As a result, these items were dropped. Following that, the 25-item four-factor model provided good fit for the data ($X^2(246) = 763.31$, $p < .001$; CFI = .97; NNFI = .97; RMSEA = .04, SRMR = .04). All parameter estimates were significant at $p < .001$, and all factor loadings on latent variables were above .60, indicating unidimensionality (Hair et al., 2014). Figure 1 illustrates the CFA results conducted with the 25-item four-factor model of the PARQ.

As the age of our participants ranged widely, it was possible that there might be age-related differences in the interpretations and responses of the items specified in the PARQ. To examine if the 25-item four-factor model would be robust among younger, as well as older participants, we split the sample between children 12 and below (n = 526) and those 13 and above (n = 585).[1] Using CFA, we found that the model provided good fit for both samples (12 and below: $X^2(246) = 514.03$, $p < .001$; CFI = .96; NNFI = .96; RMSEA = .05, SRMR = .04; 13 and above: $X^2(246) = 564.89$, $p < .001$; CFI = .97; NNFI = .96; RMSEA = .05, SRMR = .04).

Hypothesis testing

To test our hypotheses and research questions, we specified two theoretical models with the four latent variables from the PARQ predicting the three proximal predictors of the theory of planned behavior (vegetables versus SSB), and tested it using SEM. Both models exhibited good model fit (vegetables: $X^2(573) = 1606.11$, $p < .001$; CFI = .96; NNFI = .96; RMSEA = .04, SRMR = .03; SSB: $X^2(573) = 1811.36$, $p < .001$; CFI = .95; NNFI = .95; RMSEA = .04, SRMR = .04). Factor loadings for all latent variables were above .50.

From our analyses, H1 was supported as active parental guidance was positively associated with attitude ($\beta = .23$, $p < .001$), perceived norms ($\beta = .25$, $p < .001$), and perceived behavioral control ($\beta = .20$, $p < .001$) toward consuming vegetables. H2 was also supported as promotive restrictive guidance was positively associated with attitude ($\beta = .25$, $p < .001$), perceived norms ($\beta = .28$, $p < .001$), and perceived behavioral control ($\beta = .25$, $p < .001$) toward consuming vegetables.

H3 posited that active parental guidance would be negatively associated with the three proximal predictors of SSB consumption. This was not supported as active parental guidance was not significantly associated with attitude, perceived norms, and perceived behavioral control toward consuming SSB. However, H4 was supported as preventive restrictive guidance was negatively associated with attitude ($\beta = -.13$, $p < .01$), perceived norms ($\beta = -.12$, $p < .01$), and perceived behavioral control toward consuming SSB ($\beta = -.20$, $p < .001$).

Regarding RQ1 and RQ2, it was found that general discussion about food was not significantly associated with attitude, perceived norms, and perceived behavioral control toward both consuming vegetables and SSB.

Total variances explained by the PARQ for attitude, perceived norms, and perceived behavioral control toward consuming vegetables and SSB was 12%/20.1%/12.4% and 2.7%/2%/3.9% respectively. Taken together, these findings offer support that the 25-item PARQ has good criterion validity.

Overall discussion

In this study, we attempted to develop and validate a scale which assesses active and restrictive parental guidance. The final 25-item PARQ is detailed in Table 4. Some of the factors in the PARQ are similar to parenting practices examined in previous research, such as teaching about nutrition, nutrition education,

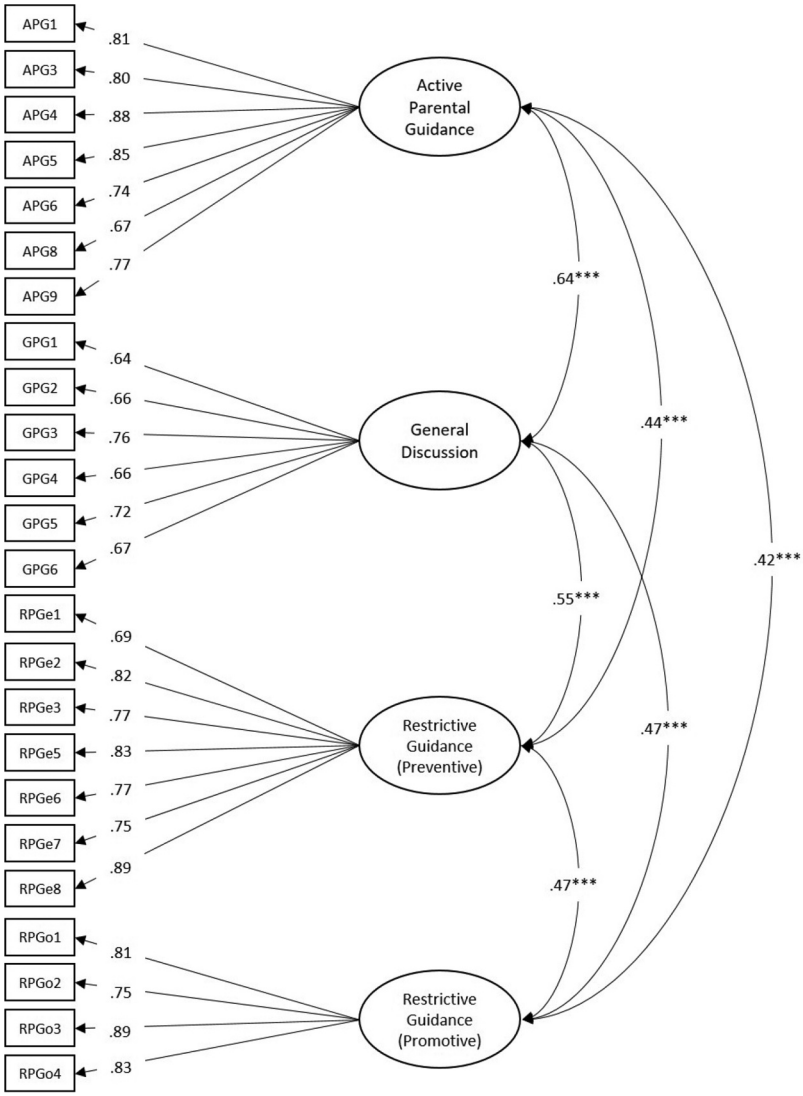

Figure 1. Confirmatory factor analysis of the 25 item four-factor PARQ model. $X^2(246) = 763.31$, $p < .000$; CFI =.97; NNFI =.97; RMSEA =.04, SRMR =.04.*$p < .05$. **$p < .01$. ***$p < .001$.

restriction, and rules and limits (Kaur et al., 2006; Musher-Eizenman & Holub, 2007; Vaughn et al., 2017; Vereecken et al., 2004). Despite this, the study offers some important contributions. First, we found that active guidance constitutes more than just parental nutrition education and contains both *factual* and *evaluative* information about food that parents transmit to children. Second, general discussion about food reflects a less persuasive and less informative approach to talking about food from parents. Such a practice has yet to be examined by researchers in the field. Last, we found a distinct difference between rules that are meant to promote healthier food consumption, and rules that are meant to prevent the consumption of unhealthy foods. The PARQ showed good validity, and a CFA has shown that the factor structure is robust across a second unique sample of participants.

One important contribution of Study Two is that it clarified the concept of active parental guidance about food consumption. Based on the 7-item sub-scale, we can see that our earlier definition of active guidance as "*the degree with which parents actively discuss, verbally interact, and instruct their child with regards to food*" (Yee et al., 2017) needs to be redefined. Specifically, there is an *evaluative* slant to active guidance. Active guidance involves more than the transmission of facts, but also parents' values and judgments about food. It can convey information about whether certain foods are "approved" by parents and have the potential to shape children's attitudes and norms regarding food consumption. In research on parental mediation on media consumption, researchers have distinguished between *factual* and *evaluative* mediation (A. I. Nathanson, 2004; Rasmussen, 2013).

With such a conceptualization, *factual* active mediation refers to children being informed about the technical aspects of television content, and has been found to be ineffectual in alleviating undesirable media effects on children (A. I. Nathanson, 2004; Nathanson & Yang, 2003). On the other hand, *evaluative* active mediation reflect parents' attempts to create evaluations of television content in children's minds by providing positively- or negatively-valenced opinions, and are considered to be more effective (A. I. Nathanson, 2004). Researchers who are hoping to examine effective active guidance or nutrition education should take this into account when conducting future studies on the role active guidance play in shaping children's food

Table 4. Final validated 25-item PARQ.

How much do you agree with the following statements?
Active Parental Guidance of Food Consumption
APG1 My parents discuss with me why it's important to eat healthy foods
APG3 My parents explain to me why I should eat more or less of a particular food
APG4 My parents discuss with me about the health benefits of a food
APG5 My parents discuss with me the importance of eating a variety of foods
APG6 My parents explain to me the effects of different nutrients (e.g. Vitamin C, calcium)
APG8 My parents explain to me why some foods like sweet foods/drinks serve no purpose to my body
APG9 My parents explain to me why it is important to have a balanced diet
General Discussion About Food Consumption
GPG1 My parents talk to me about the food I eat during recess
GPG2 My parents reason with me to get me to eat
GPG3 My parents give me reasons for the rules they make about food and eating
GPG4 My parents try to make foods more familiar by telling me where it came from
GPG5 My parents tend to talk more often about foods they would like me to eat
GPG6 My parents advise me what I should eat during recess
GPG7 My parents try to talk more often about foods they would like me to eat
Restrictive Guidance of Food Consumption (Preventive)
RPGe1 If I had some sweet drinks already, my parents would tell me I can't have it anymore.
RPGe2 My parents sets limits to how much sweet drinks I can drink
RPGe3 When my parents give me a sweet drink, they tell me I can only have one today
RPGe5 My parents limit the amount of sweet drinks I drink
RPGe6 My parents limit opportunities for me to drink sweet drinks
RPGe7 My parents limit how often sweet drinks are in the home
RPGe8 My parents tell me which sweet drinks I am allowed to consume
Restrictive Guidance of Food Consumption (Promotive)
RPGo1 My parents insist that I must eat vegetables during meals with them
RPGo2 My parents give me fruits and makes me eat them
RPGo3 My parents give me vegetables during meals and makes me eat them
RPGo4 My parents insist I must finish my vegetables

preferences. In other words, active guidance requires parents to actively interpret facts and communicate the meanings of those facts about food to children for it to be effective. As such, we propose that parental active guidance about food be redefined as *the degree to which parents actively and verbally share their evaluations of food consumption in order to help their children make better decisions regarding food.*

Next, the factor analysis revealed a second factor that reflects a more general form of discussion about food and provides some insight into the complexity and nuance of parental discussion about food. The general discussion subscale consists of 6 items that reflect a less informative and less persuasive way of talking about food, similar to what A. I. Nathanson (2001) termed *neutral* mediation. The criterion validity tests showed that it was not as strong a predictor of food cognitions when compared to active guidance. It reflects a feature of what parents do, but its socialization effects on children is unclear. Future researchers adapting the PARQ for their studies could choose to omit these items if it is not a focal aspect of their study, or if their questionnaires are too lengthy.

Last, we found that restrictive guidance, or rules and limits, is context-driven, where restrictive guidance regarding the eating of healthy foods (promotive) is distinctly different from restrictive guidance regarding the eating of less healthy foods (preventive). This parallels research on parental mediation in the media context which highlight a conceptual difference between *positive* and *negative* mediation (Austin et al., 1999). In media consumption, *positive* mediation refers to parental agreement or approval of media content, while *negative* mediation refers to parental rejection and criticism of media content (A. I. Nathanson, 2002). This has implications for research in both the food and media consumption context. Where previous research has conceptualized positive and negative mediation as facets of *active* mediation (A. I. Nathanson, 2002), our study highlighted the notion that parental approval and rejection can be manifested in *restrictive* forms as well. Future research in parental mediation in the media context ought to examine if this conceptualization holds. In the food consumption context, our conceptualization provides some much-needed clarification for the mixed findings between parental rule-setting and healthy food consumption.

Recent research in parental mediation has found that the style in which active or restrictive parental mediation is delivered needs to be taken into account during measurement (Valkenburg et al., 2013). This includes whether the way in which parental mediation is perceived as autonomy-supportive, controlling, or inconsistent. Despite this, other researchers have earlier put forth that parenting practices ought to refer solely to parental behaviors conducted to achieve a context-specific socialization goal (such as food preferences), with stylistic elements cleanly captured through the measure of parenting style (Darling & Steinberg, 1993). Our conceptualization of parental guidance in the PARQ reflects parenting practices as described in the *contextual model of parenting style* (Darling & Steinberg, 1993). Such a conceptual framework argues that parenting practices (e.g. active and restrictive guidance) are context-specific, and distinct from parenting style, which reflects more global properties of how parents *generally* communicate to their children. In this sense, parenting style refers to the perceived emotional climate in which parenting practices are situated in. Hence, stylistic elements can be more cleanly captured through a more global measure of parenting style, such as the authoritative parenting index (Jackson et al., 1998), which serves as a moderating variable which attenuates or amplifies the effects of different parenting practices. Future research should

examine if parenting style moderates the effects of parental guidance on child food consumption preferences.

There are some limitations to our study which suggests that the findings should be viewed cautiously. First, our data analysis was based only on child-reported data, even though our measures of parental guidance were collated from items used in exclusively parent- or child-only populations. In addition to resource limitations, we decided to utilize child reports for two reasons. Although the frequency of various parenting practices might differ between parent- versus child-reported data (e.g. Buijzen et al., 2008; Pasch et al., 2010), research on parental mediation have found that the type of parenting practice tend to be perceived similarly across both parent- and child-reports (Nikken & Jansz, 2006). In other words, although parents and children might report different levels of parental mediation, their responses tended to yield similar facets of parental mediation such as active mediation, restrictive mediation, and co-use. Next, although the use of child-reports could be misleading in that it might not reflect the frequency of parental guidance as perceived by their parents, some scholars have argued that it might have a greater association with hypothesized child outcomes (Nelson & Coyne, 2009). From such a perspective, a child's perception of the frequency of parental guidance is what matters most in the context of the intended outcomes of specific parenting practices. Despite this, our study only showed that parental guidance *as perceived by the child* is related to intended food consumption outcomes. Future research ought to examine if such parental guidance *as perceived by parents* is also related to its intended outcomes.

Researchers have suggested that expert feedback is necessary in order to identify if items correspond to overarching constructs during scale development (Carpenter, 2018). Our study did not utilize expert feedback and relied on six non-expert participants instead to identify suitable items to be included in the questionnaire. While the lack of expert feedback could impact the content validity of the selected items, there are two mitigating factors which indicate that content validity was not compromised. First, the item pool was primarily collated from existing research, and hence content validity would likely have been high. Second, the concepts were not overly technical, and most non-experts can exhibit a good grasp of the definitions.

Following that, our conceptualization of parental guidance currently does not specify in which contexts these parental messages about eating are conveyed. Parent-child interaction regarding food consumption can occur during mealtimes, at home, or when families are out doing grocery shopping (Hendy et al., 2009; Wilson & Wood, 2004). It is possible that the situational context in which parental guidance occurs can affect its impact on child food consumption. For example, rules set in advance at home consistently vis-à-vis rules made only during grocery shopping where children invoke "pester power" to convince their parents to purchase them snacks might have different effects on outcomes. Our study conceptualized parental guidance only in terms of its perceived frequency. As such, the PARQ might not capture subtle differences in which parental guidance might manifest in each unique situational context.

Next, our scale development procedure attempted to consider culturally distinct parenting practices by including items extracted from in-depth interviews. Four of these items were retained in the final questionnaire. While the findings suggest that the *types* of parenting practices about food consumption in this study are aligned with previous conceptualizations of active versus restrictive guidance, some items could reflect culturally specific manifestations of those more global strategies. For example, active guidance, while reflecting discursive strategies, could differ in their content across cultures. In Singapore, the term "balanced diet" is a part of public consciousness due to consistent public health campaigns and school-based educational interventions (e.g. Health Promotion Board, 2020). There is shared understanding between parent and child of what a "balanced diet" means, making it a useful operationalization of parental active guidance in the context of Singapore. This might not be the case in countries where school-based nutrition literacy programs are more limited. Researchers planning to use the PARQ should carefully consider if the items reflect realistic parenting practices in the culture it is administered in.

Next, as the initial study was conducted with a smaller convenience sample of children, the data lacks representativeness. Relatedly, while we could ascertain that children in Study Two answered the questions independently, there was no way we could be sure that all the participating children completed the questionnaire on their own in Study One. Despite this, Study Two, with a nationally representative sample and researchers overseeing the completion of survey questionnaires by the young participants, offered support that the factor solution offered by the initial sample was robust.

Finally, the operationalization of restrictive guidance in its preventive and promotive dimensions only reflect two food types – sugar-sweetened beverages and fruits and vegetables. Future research should test the validity of the scales in other contexts by adapting the measurement items to reflect other healthy and unhealthy food consumption, such as consumption of other healthy foods (e.g. water) and unhealthy energy-dense foods (e.g. high energy snacks).

Despite these limitations, this study has provided some clarification into the concepts of active, general, and restrictive guidance of children's food consumption, highlighting theoretical nuances that can affect their effectiveness to shape children's food choices. It offers a tool for researchers to build on in the future, and a conceptual framework to better understand how the communicative actions taken by parents can shape the food consumption of children.

Note

1. Two participants chose not to reveal their age.

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