



Parental Guidance and Children's Healthy Food Consumption: Integrating the Theory of Planned Behavior with Interpersonal Communication Antecedents

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The study of parenting practices on child food consumption has often been characterized as having great utility but lacking in theory. In contrast, the theory of planned behavior (TPB) has often been suggested to be limited in its utility. To address these gaps, interpersonal constructs – the concepts of *active* parental guidance (e.g., nutrition education) and *restrictive* parental guidance (e.g., rule-setting) – were integrated as antecedents to the original TPB variables in predicting child fruits and vegetables (FV) consumption. We surveyed 210 child/adolescent participants, aged between 10 and 16 in Singapore. Results from structural equation modeling showed that the integrative TPB model displayed an acceptable fit. Parental *active* guidance was associated with all three proximal predictors of behavior. Our results suggest that there are promising contributions to the theory of planned behavior in predicting child food consumption behavior by considering interpersonal antecedents.

As Leo Tolstoy once noted in his magnum opus *War and Peace*, “*everything depends on upbringing*”. Indeed, parents, and the way they educate their children, can have a substantial influence on the way children behave across a wide range of behavioral contexts (Maccoby, 2014), from delinquency (Hoeve et al., 2009) to academic performance (Fan & Chen, 2001). The importance of parental guidance extends to the area of nutrition as well. Most notably, the increasing global obesity epidemic has prompted scholars from public health, nutrition, and communication to better understand the role parents play in shaping children's food choices (Davison et al., 2015; Lwin, Shin, Yee, & Wardoyo, 2017). As food preferences are shaped early in childhood, understanding the role parents play in shaping children's food choices is crucial, as their communicative actions can potentially impact the well-being of children throughout their entire lifetime (Ventura & Worobey, 2013).

This study aims to develop and test an integrated model of parental guidance on child healthy food consumption behavior, incorporating both the interpersonal and intrapersonal aspects of child healthy food consumption behavior. Building on theoretical foundations from multiple disciplines (Ajzen, 2015; Lwin et al., 2017), we propose two facets of parental guidance

as key antecedent factors contributing to children's behavioral, normative, and control beliefs towards healthy foods in the form of fruits and vegetables, which then drives children's intention, and subsequently, consumption.

Parental Guidance in Child Food Consumption

To understand how parents influence children's food consumption behaviors, researchers have identified several food-related parenting practices as key determinants of child food consumption (Vaughn et al., 2016; Yee, Lwin, & Ho, 2017). Parenting practices are context-specific behaviors exhibited by parents to achieve various socialization goals (Darling & Steinberg, 1993). As demonstrated since the 1930s (Duncker, 1938), the implicit assumption is that social interaction – both verbal and non-verbal – can impact children's food choices. Although rarely stated explicitly, such an assumption is a core tenet of socialization research, since socialization researchers view children as active learners that influence, and are influenced, by the social interactions they encounter within the web of social contexts they find themselves in, with their primary caregivers as the central agent of influence (Maccoby, 2014).

From this line of research, two parental communication concepts have been identified by health communication researchers to affect food consumption behavior – *active* parental guidance and *restrictive* parental guidance (Lwin et al., 2017). Drawn from the rich history of research in parental mediation of the media environment (Buijzen & Valkenburg, 2005; Dorr, Kovaric, & Doubleday, 1989; Lin & Atkin, 1989;

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Nathanson, 1999) and parenting practices in food consumption (Birch et al., 2001; Melbye, Øgaard, & Øverby, 2013), the concept of parental guidance in food consumption was developed to measure the frequency of different interpersonal communication strategies parents utilize to guide children to more desirable food consumption behavior.¹

First, *active* parental guidance of food consumption refers to how frequent parents actively discuss, instruct, and verbally interact with their children about food (Yee et al., 2017). This includes nutrition education (Melbye & Hansen, 2015), as well as encouraging a child to eat using rationale (Vereecken, Keukelier, & Maes, 2004), which have both been found to be significantly and positively correlated with children's fruits and vegetable consumption. Likewise, a previous study found that aspects of active parental guidance positively predicts attitude towards healthy foods, which drives intention to consume, and subsequently, self-reported consumption of healthy foods (Lwin et al., 2017).

On the other hand, *restrictive* guidance of food consumption refers to how frequently parents set food-related rules and for their children² (Yee et al., 2017). This refers specifically to the verbal setting of food consumption restrictions by parents, rather than controlling a child's access to food through availability and accessibility (e.g., Dave, Evans, Pfeiffer, Watkins, & Saunders, 2010). In previous research, parental permissiveness was found to be negatively correlated with healthy eating in some studies (Holubcikova, Kolarcik, Madarasova Geckova, van Dijk, & Reijneveld, 2016; Kiefner-Burmeister, Hoffmann, Meers, Koball, & Musher-Eizenman, 2014). Relatedly, limits and rules have been found to be positively correlated with fruits and vegetable consumption (Loth, MacLehose, Larson, Berge, & Neumark-Sztainer, 2016).

¹Having been conceptualized for the purposes of understanding the role parents play in managing and regulating children's television usage, the concept of parental mediation was developed to measure the frequency of different interpersonal communication strategies parents utilize to mitigate the effects of television on their children. The core assumption is that social interactions regarding television between parents and children are an important socialization process that can have protective effects on children (Nathanson, 1999; Clark, 2011). While cultivation theory posits that television viewing can potentially have negative effects on people (Gerbner & Gross, 1976), parental mediation suggests that certain interpersonal communication strategies parents use can mitigate and moderate these effects (Nathanson, 1999). Parental mediation have been explicated to comprise of three different strategies with regards to child television viewing: active mediation, which refers to the frequency of discussion between parents and children on television content; restrictive mediation, which refers to the frequency of rule-making about television viewing; and co-viewing, which simply refers to the frequency with which parents watch television together with their children (Nathanson, 1999; Valkenburg, Kremer, Peeters, & Marseille, 1999).

²Vaughn et al. (2016) conceptualized *rules and limits* as distinct from *restriction* that is coercive in nature. Rules and limits reflect the "what, when, where, and how much" (p.105) foods can be eaten by the child. In contrast, restriction refers to "*parent-centered, authoritarian-type limits on a child's access to foods or opportunities to consume those foods*" (p.100). It was further argued that restriction reflected coercive practices that involve no reasoning, and can manifest in threats and punishments. To be clear, this study examines restrictive guidance as the verbal setting of rules and limits, and does not conflate the stylistic imposition of those rules.

Intrapersonal Drivers of Food Consumption – The Theory of Planned Behavior

Adopted from social psychology, the theory of planned behavior is one of the most popular, parsimonious, and predictive causal models of health behavior that have been used in health psychology and health communication (Ajzen, 2015; Armitage & Conner, 2001). The theory of planned behavior views health behavior as being driven directly by one's intention to perform said behavior (Ajzen, 1991). The theory of planned behavior postulates that the performance of a behavior is directly preceded by one's intention to perform a behavior (Ajzen, 1991). According to Ajzen (1991), *intention* refers to "*indications of how hard people are willing to try... (and) how much of an effort they are planning to exert, in order to perform* (p. 181)" a behavior. Accordingly, it is theorized that the stronger one's intention to perform a behavior, the greater probability one would actually engage in the performance of the behavior.

Intention is directly preceded by three factors – attitude towards the behavior, perceived norms regarding the behavior, and perceived behavioral control to perform the behavior (Fishbein & Ajzen, 2010). First, attitudes refer to a general evaluation of an object along dimensions such as pleasant-unpleasant, good-bad, or healthy-unhealthy among people (Ajzen, 2001). Next, perceived norms refer to the types of beliefs one has about the popularity and social approval of a target behavior, derived from either significant others (e.g., parents, peers) or social groups one identifies with (e.g., school, sports team). Perceived norms consist of two distinct types of normative beliefs (Rivis & Sheeran, 2003). First, injunctive norms are beliefs about what others think the person in question ought to do. Second, descriptive norms are beliefs about what others actually do.³ Lastly, perceived behavioral control refers to the amount of control one believes he or she has in

³Originally, Ajzen (1991) defined normative beliefs as "the likelihood that important referent individuals or groups approve or disapprove of performing a given behavior (p.195)". This means that Ajzen (1991) conceived of subjective norms as reflecting a person's belief about the social approval of a behavior. In addition to research on the theory of planned behavior, research conducted within the social norms approach (SNA) has identified two distinct types of normative beliefs (Perkins & Berkowitz, 1986). First, injunctive norms are beliefs about what others think one ought to do (in the context of a specific behavior). In this sense, injunctive norms are similar to the original conceptualization of subjective norms in the theory of planned behavior (Lapinski & Rimal, 2005; Rivis & Sheeran, 2003). Second, descriptive norms are beliefs about what others actually do. In other words, descriptive norms are the perceived popularity of a behavior. In a paper that sought to provide guidance on how to construct a questionnaire that tapped on the theory of planned behavior variables, Ajzen (2006) suggested that the operationalization of subjective norms in the theory of planned behavior should encompass both descriptive and injunctive components. As what *ought* (injunctive norms) is sometimes confused with what *is* (descriptive norms) (Cialdini, Reno, & Kallgren, 1990), the two different types of perceived norms can sometimes be difficult to untangle (Rimal & Real, 2005). This might be especially true for young children and adolescents, who might perceive social approval and popularity as similar. For example, when children are seated in the canteen and see all their friend group having vegetables on their plates, they might think that they ought to eat vegetables too.

performing the behavior. It indicates a person's "perception of the ease or difficulty of performing the behavior of interest (Ajzen, 1991, p. 183)."

According to the theory, the more positive the attitude, subjective norm, and perceived behavioral control, the more likely an individual will formulate an intention to perform a behavior, which is hypothesized to lead to the performance of the behavior (Fishbein & Ajzen, 2010). In addition, perceived behavioral control is hypothesized to lead to behavior directly, as it is argued to contribute to unique variance in the performance of behavior, and can also serve as a proxy for actual behavioral control (Ajzen, 1991). In general, the theory of planned behavior's core variables have been found to be highly predictive of a range of different health behaviors (Hagger, Chan, Protogerou, & Chatzisarantis, 2016), including food consumption choices (Ajzen, 2015), where the theory of planned behavior' has been found to explain substantial amount of variance in healthy eating, such as the consumption of fruits and vegetables (Carfora, Caso, & Conner, 2016; Conner, Norman, & Bell, 2002; McEachan, Conner, Taylor, & Lawton, 2011).

Parental Guidance as Communicative Background Factors in the TPB

While the theory of planned behavior has been shown to be predictive in the context of healthy eating, some scholars have suggested that one way the theory of planned behavior is limited, is that it does not specify how cognitions can change (Sniehotta, Presseau, & Araújo-Soares, 2014). Some scholars have suggested that, in order to improve the theory's utility, researchers should look to identify behavior change techniques that might influence the three proximal predictors in the theory of planned behavior (Conner, 2015).

In an interesting parallel, although there is a growing amount of research examining the influence of parents on child food consumption behaviors, most of the studies have looked at direct relationships between parental communication variables and child food consumption behavior, neglecting to examine the cognitively mediated pathways with which child food consumption is influenced (Yee et al., 2017). Since parents often serve as primary socialization agents in children's lives, they are influential in helping children form beliefs about what constitutes good and appropriate food choices (Dotson & Hyatt, 2005; Pedersen, Grønhoj, & Bech-Larsen, 2012). In other words, they potentially represent the levers of change that can influence the behavioral, normative, and control beliefs identified by the theory of planned behavior (Ajzen, 2011).

To address these gaps, we propose to merge these two lines of research by developing a behavior change model that identifies meaningful antecedent communicative change mechanisms.

Conceptual Framework

Our proposed framework is built on the paradigm where children's food consumption behavior is a function of both intrapersonal- and interpersonal-levels of influence (McLeroy, Bibeau, Steckler, & Glanz, 1988). The proposed framework, as illustrated in Figure 1, shows the theory of planned behavior on the right side of the model.

The three proximal predictors of the theory of planned behavior are theorized to mediate the effects of more distant influencing factors such as communication, on child food consumption outcomes. By definition, beliefs are socially constructed and negotiated, as communication is central in the formulation and internalization of evaluative beliefs, normative beliefs, and self-efficacy beliefs. As such, we contend that parenting practices' influence on child food consumption is rooted in a communication process, where parents transmit information about food through their actions, which then shapes a child's various perceptions and beliefs about a target food.⁴ This is in line with existing scholarship in socialization research that highlights the role parents play in developing children's foundational beliefs with regard to well-being (Baxter, Bylund, Imes, & Scheive, 2005).

Accordingly, we hypothesize the following relationships within the proposed conceptual framework:

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

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

H3: Attitude towards consuming fruits and vegetables is positively associated with intention to consume fruits and vegetables

H4: Perceived norms towards consuming fruits and vegetables is positively associated with intention to consume fruits and vegetables

H5: Perceived behavioral control towards consuming fruits and vegetables is positively associated with (a) intention to consume fruits and vegetables and (b) consumption of fruits and vegetables

H6: Intention to consume fruits and vegetables is positively associated with consumption of fruits and vegetables

Method

Participants and Procedures

To test the proposed model, we administered a door-to-door paper-and-pencil in-person surveys with a random sample of 210 children and adolescent participants in Singapore, aged between 10 and 16 ($M = 13.08$, $SD = 1.65$). The sample included

⁴Regarding attitudinal beliefs, the evaluation of an object or behavior is based on the expectancy-value model, which posits that individuals hold beliefs about the expected value outcome of a behavior (Ajzen, 2001). These beliefs about the expected value of the behavior summate into an overall attitude towards the behavior (Fishbein, 1963). Although there can be many differing, and even conflicting, beliefs about the value of a behavior in question, only beliefs that are accessible in memory can contribute to an individual's prevailing attitude about the behavior (Ajzen, 2001), highlighting the central role communication plays in attitude formation in the area of food consumption. Parents who communicate frequently and emphatically about why eating certain foods are important, can increase the accessibility of beliefs that lead to a child's attitude towards certain foods, shaping the likelihood of them eating or choosing to avoid certain foods. On the other hand, rules can also shape attitudes, through the implicit message to children that some foods are explicitly not *good* for them.

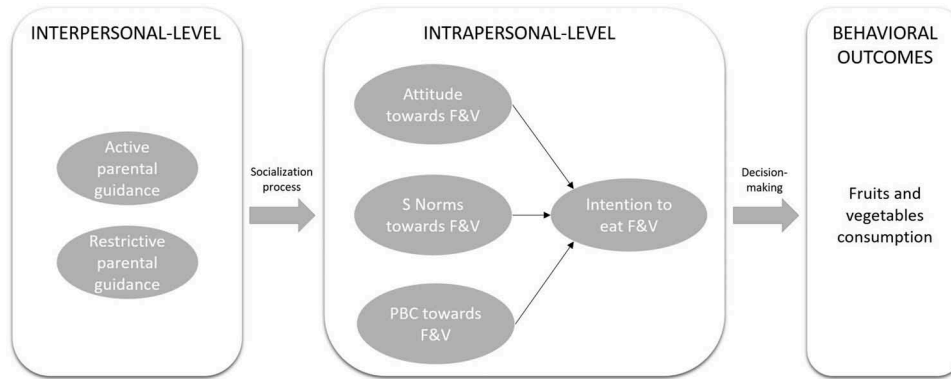


Fig. 1. Proposed conceptual framework linking the theory of planned behavior with parental communication antecedents.

more boys (54.3%) than girls (45.7%), and had an ethnic distribution of 71.9% Chinese, 10.5% Malay, 13.8% Indian, and 3.8% other races, roughly similar to Singapore's national ethnic distribution (Department of Statistics, 2010).

Prior to the survey, we obtained ethical approval from our university's Institutional Review Board. Following that, we utilized stratified cluster sampling in order to obtain a random sample of child participants.⁵ Following parental consent and child assent, we administered the questionnaire, each lasting 25–35 minutes, with the child in a common living space in order to respect each household's privacy and provide peace of mind to parents; parents were, in turn, reminded not to influence their child's survey responses.

Measures

The interview questionnaire included measures for parental guidance of food consumption behavior, children's attitude, perceived norms, and perceived behavioral control towards consuming fruits and vegetables, children's intention to consume fruits and vegetables, and children's self-reported consumption of fruits and vegetables. Table 1 summarizes the descriptive statistics for the items and scales used in our study.

Active parental guidance of food consumption (APGf) was measured by asking children to rate how often their parents actively discussed and engaged them conversationally about

their food choices on four 5-point scales ranging from “never” (1) to “all the time” (5), using scales adapted from Buijzen and Valkenburg (2005).

Restrictive parental guidance of food consumption (RPGf) was measured by asking children to rate how often their parents set restrictions and limits on food choices and quantities on four 5-point scales ranging from “never” (1) to “all the time” (5), using scales adapted from Buijzen and Valkenburg (2005).

Attitudes toward fruits and vegetable consumption was measured by asking children to rate how they feel towards eating fruits and vegetables. The children were shown several pictures of fruits and vegetables (e.g., apples, broccoli, etc.), and were asked to rate how they feel towards those foods on four 5-point scales ranging from “strongly disagree” (1) to “strongly agree” (5). The scale was adapted from Aikman, Crites, and Fabrigar (2006).

Perceived norms towards fruits and vegetable consumption was measured by asking children to rate what they think about people important to them feel about eating fruits and vegetables towards eating fruits and vegetables. As in the attitude measures, the children were shown a set of pictures of fruits and vegetables, and were asked to rate two items with regard to descriptive norms and two items on injunctive norms, on 5-point scales ranging from “strongly disagree” (1) to “strongly agree” (5). The scale was developed according to guidelines by Fishbein and Ajzen (2010).

Perceived behavioral control towards fruits and vegetable consumption was measured by asking children to rate how much control they think they have over the consumption of fruits and vegetables on three 5-point scales ranging from “strongly disagree” (1) to “strongly agree” (5). The scale was developed according to guidelines by Fishbein and Ajzen (2010).

Intention to consume fruits and vegetables was measured by asking children how much they agreed with two statements concerning their intention to consume fruits and vegetables in the following week, on 5-point scales ranging from “strongly disagree” (1) to “strongly agree” (5). The scale was developed according to guidelines by Fishbein and Ajzen (2010).

⁵First, a list of public schools in Singapore was obtained from Singapore's Ministry of Education. We then divided the list of schools into five regions (North, South, East, West, Central) based on their official administrative regions as demarcated by the Singapore Urban Redevelopment Authority. We randomly selected schools from within each of these administrative regions, and commenced the data collection process at the residential block with the smallest property number immediately adjacent to the school premises. We started recruitment from the top floor of each block and began with the apartment with the smallest unit number. If the attempt was successful, the researcher moved on to the adjacent unit. Otherwise, the researcher skipped one unit. After every floor, the team moved down one level. Upon completion of the residential block, the researchers moved to the block with the next smallest property number and repeated the process until every block adjacent to the school premises had been attempted.

Table 1. Descriptive statistics for key variables

	<i>M</i>	<i>SD</i>	<i>α/r</i>
Active parental guidance of food consumption			.84
1. My parent/guardian(s) explain to me why I should eat more or less of a particular food	3.88	.92	
2. My parent/guardian(s) discuss with me about the health benefits of a food	3.57	1.05	
3. My parent(s) discuss with me the importance of eating a variety of foods	3.62	1.05	
4. My parent/guardian(s) explain to me the effects of different nutrients (e.g., Vitamin C, calcium)	3.22	1.18	
Restrictive parental guidance of food consumption			.79
1. My parent/guardian(s) set specific food items that I should and should not eat	3.13	1.22	
2. My parent/guardian(s) forbid me to eat what I want during meal times	2.72	1.21	
3. My parent/guardian(s) control the amount that I eat during meal times	2.60	1.21	
4. My parent/guardian(s) limit the amount of snacks that I eat	2.98	1.19	
Attitudes toward F&V consumption			.86
1. I feel happy when I eat the above food	3.64	.91	
2. I feel comforted when I eat the above food	3.63	.89	
3. I feel enthusiastic when I eat the above food	3.31	.94	
4. I feel satisfied when I eat the above food	3.60	.96	
Perceived norms towards F&V consumption			.83
1. Most people who are important to me eat the above food every week	4.17	.80	
2. The people whose opinions I value eat the above food every week	3.88	.87	
3. Most people who are important to me think that I should eat the above food every week	4.35	.74	
4. The people whose opinions I value think that I should eat the above food every week	4.10	.81	
PBC towards F&V consumption			.80
1. It is possible for me to eat the above food every week	4.36	.83	
2. It is easy for me to eat the above food every week	4.12	.91	
3. If I wanted to, I could eat the above food every week	4.21	.94	
Consumption Intention			.46
I intend to consume the following item next week:			
1. Vegetables	4.05	1.03	
2. Fruits (not counting juices)	4.16	.94	
Consumption Behavior			.48
How often do you eat the following items during a typical week:			
1. Vegetables	4.29	1.94	
2. Fruits (not counting juices)	3.73	1.95	

Note. For the two-item measures, Pearson's *r* was used instead of Cronbach's *α*.

Consumption of fruits and vegetables was measured using a brief food-frequency questionnaire. We administered two items asking children how many fruits and vegetables they

consume in a typical week, on a 9-point scale that ranged from "more than or equal to 5 servings per day" (1) to "never" (9). Items were reverse-coded, and summated during

analysis, so that higher scores represented increased levels of consumption for each food item.

Results

First, we examined the zero-order correlations among our key variables to detect for multicollinearity in the dataset (Table 2). Next, using multiple linear regression with consumption of fruits and vegetables as the dependent variable and the other variables as independent variables, we found that all tolerance values and variance inflation factors of the independent variables were above .50 and below 2, respectively (Table 3). These results indicate that no multicollinearity exists among the variables (Hair, Black, Babin, & Anderson, 2014).

To test our hypotheses, we used the *R* package, *lavaan*, to first run Confirmatory Factor Analysis (CFA) with the latent variables in order to assess the factor structure and measurement model fit of the hypothesized model (Rosseel, 2012). Due to the non-normality of the data as illustrated in Table 3,⁶ the maximum likelihood procedure with estimator defined as “MLM” was used to estimate unknown parameters in the model.⁷

CFA showed that all the items loaded onto the latent variables with factor loadings of .60 and higher, and the hypothesized model displayed acceptable fit (CFI = .96, RMSEA = .04, SRMR = .05, NNFI = .96) according to guidelines established by previous researchers (Bentler & Bonett, 1980; Browne, Cudeck, & Chudeck, 1993; Byrne, 1994; Hu & Bentler, 1999). The results of the CFA are presented in Figure 2. Following that,

Table 2. Zero-order correlations among key variables

Variable	1	2	3	4	5	6
1. Parent active guidance	1					
2. Parent restrictive guidance	.49***	1				
3. Attitude	.30***	.18*	1			
4. Perceived norms	.30***	.22**	.32***	1		
5. Perceived behavioral control	.26***	.19**	.50***	.52***	1	
6. Consumption intention	.36***	.33***	.47***	.43***	.48***	1
7. Consumption behavior	.25***	.25***	.27***	.01	.34***	.43***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

⁶In addition to univariate normality illustrated in Table 3, Mardia's multivariate kurtosis was calculated using DeCarlo's (1997) SPSS macro. The multivariate kurtosis calculated was 77.35, with a standardized measure of 9.26 ($p < .001$), indicating non-normal data.

⁷The estimator “MLM” was defined in order to correct for biased estimates among the fit indices, resulting in a mean-adjusted chi-square test statistic that is robust to non-normal data (Satorra & Bentler, 1994).

Table 3. Normality and collinearity diagnostics

Variable	Skewness (SE)	Kurtosis (SE)	Tolerance	VIF
1. Parent active guidance	-.53 (.17)	.14 (.33)	.69	1.46
2. Parent restrictive guidance	-.09 (.17)	-.50 (.33)	.73	1.37
3. Attitude	-.14 (.17)	.22 (.33)	.67	1.50
4. Perceived norms	-.78 (.17)	1.39 (.33)	.67	1.48
5. Perceived behavioral control	-1.04 (.17)	1.24 (.33)	.58	1.71
6. Consumption intention	-.87 (.17)	.26 (.33)	.62	1.62
7. Consumption behavior	-.35 (.17)	-.22 (.33)	-	-

we ran Structural Equation Modeling (SEM) to test our hypotheses within a structural model. We present the results in Figure 3.

H1 posited a positive relationship between *active* parental guidance of food consumption and (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming fruits and vegetables. We found significant positive associations between active parental guidance and attitude ($\beta = .33, p < .01$), perceived norms ($\beta = .29, p < .01$), as well as with perceived behavioral control ($\beta = .23, p < .05$), supporting H1.

H2 posited a positive relationship between *restrictive* parental guidance and (a) attitude, (b) perceived norms, (c) perceived behavioral control, and (d) intention to consume fruits and vegetables. Our analyses showed that restrictive parental guidance was not significantly associated with attitude, perceived norms, as well as perceived behavioral control, offering no support for H2.

Attitude was found to be positively associated with intention to consume fruits and vegetables ($\beta = .27, p < .05$), supporting H3. However, perceived norms were not significantly associated with intention, offering no support for H4. Perceived behavioral control was found to be positively associated with intention ($\beta = .48, p < .01$), but not significantly associated with child fruits and vegetable consumption, providing support for H5a, but not H5b. Lastly, the intention to consume fruits and vegetables was found to be positively associated with fruits and vegetable consumption ($\beta = .47, p < .05$), supporting H6.

The *R* package, *MeMoBootR*, was used to test the indirect effects assumed in the model through bootstrapping⁸ (Buchanan, 2018). Five thousand bootstrapped samples were used. The findings show that active guidance had a significant indirect effect on intention through both attitude (indirect effect = .12, 95% CI = .05 - .19) and perceived behavioral control (indirect effect = .10, 95% CI = .03 - .18). Meanwhile, attitude (indirect effect = .80, 95% CI = .38–1.22), perceived behavioral

⁸*MeMoBootR*, similar to the SPSS PROCESS macro, utilizes a product-of-coefficients strategy to examine the significance of indirect effects, argued to be more powerful compared to the Baron and Kenny approach and the Sobel Test (Preacher & Hayes, 2008). Bootstrapped confidence intervals were estimated to avoid statistical power problems caused by asymmetric and non-normal distributions.

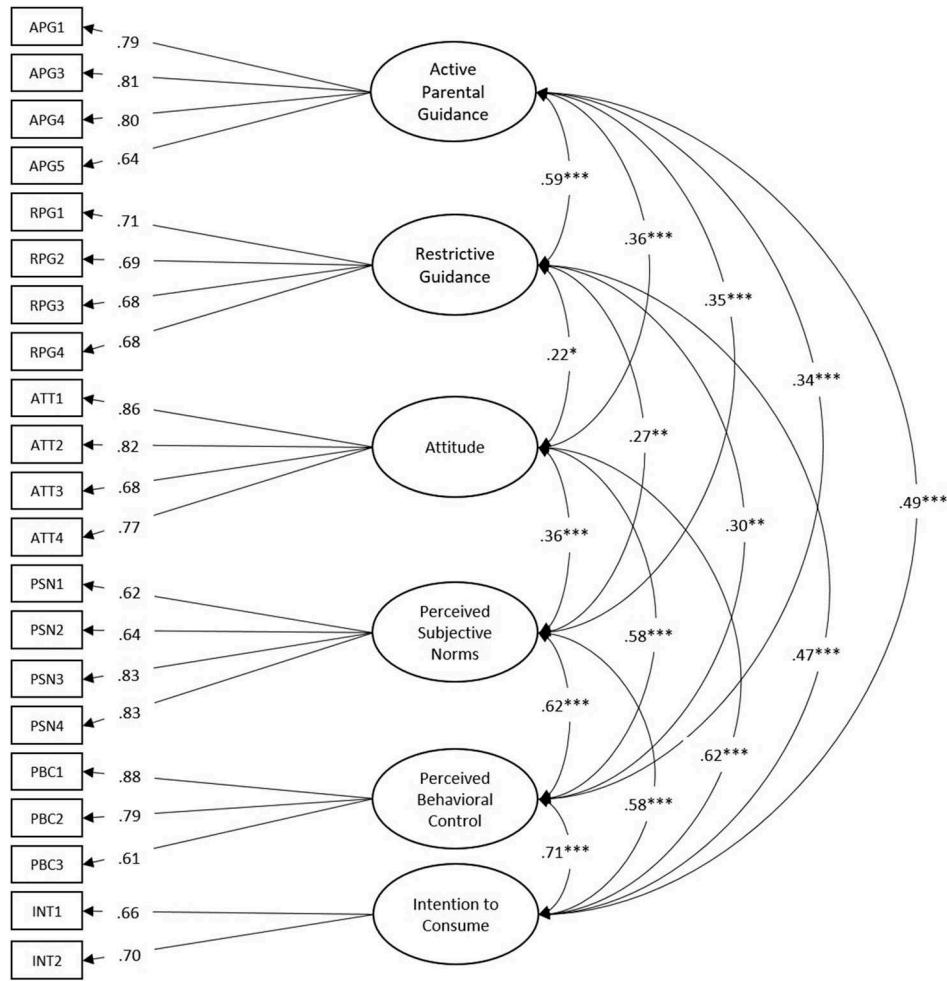


Fig. 2. CFA illustrating the factor loadings and correlations between the latent variables in the hypothesized measurement model. Satorra-Bentler χ^2 (174) = 230.370, $p < .01$; CFI = .96; NNFI = .96; RMSEA = .04, SRMR = .05. * $p < .05$. ** $p < .01$. *** $p < .001$.

control (indirect effect = .75, 95% CI = .33–1.15), and restrictive guidance (indirect effect = .46, 95% CI = .19 - .73) all had a significant indirect effect on consumption through intention. These means that all significant pathways from active and restrictive guidance to fruits and vegetables consumption were mediated.

The total variances explained by the interpersonal factors on attitude, perceived norms, and perceived behavioral control was 14.1%, 13.0%, and 15.3%. The total variance explained by the three proximal theory of planned behavior variables on intention to consume was 58.3%. Lastly, the total variance explained for fruits and vegetable consumption by intention to consume was 25.2%.

Discussion

The purpose of our study was to merge two lines of research, develop, and test a theory-driven model of parental guidance that takes into account both interpersonal and psychosocial factors in predicting child healthy food consumption behavior. We aimed to examine the theory of planned behavior with parental guidance as antecedents, in order to understand

how the levers of change in the interpersonal sphere can lead to cognitive and behavioral changes with regards to child food consumption. Our findings suggest that interpersonal communication in the form of *active* parental guidance can influence child fruits and vegetable consumption through the theory of planned behavior's three proximal predictors of behavior.

First, active guidance was found to be positively associated with all three proximal predictors of intention within the theory of planned behavior. This suggests that parents' verbal instruction and education can be an effective tool to promote healthier diets in children. Since parents are the primary socialization agents of children (Moschis, 1985), and children might consider parents as authorities with regards to food, active parental guidance in relation to food might be viewed as authoritative and credible. In the same manner, since parents are the primary "gatekeeper" of food at home, their verbal interactions might lead to the impression that the foods they promote are one that is both eaten by the people around them (descriptive norms), and one that people expect they should eat (injunctive norms). Lastly, verbal

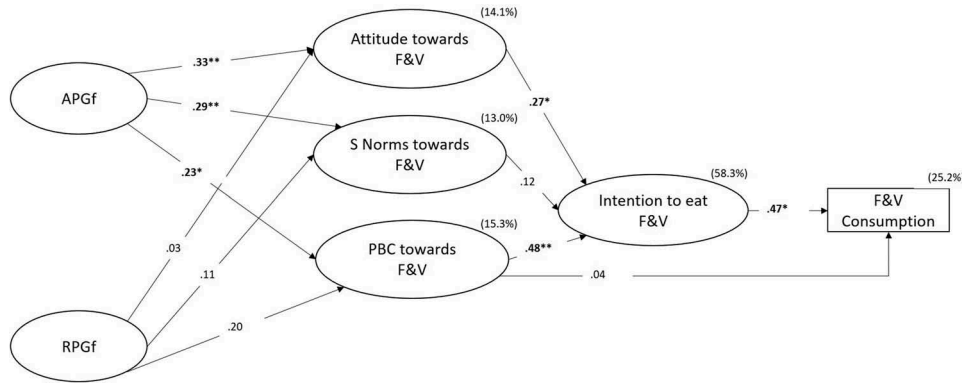


Fig. 3. SEM showing factors predicting fruits and vegetable consumption among children. Standardized estimates are shown for paths between latent variables. Age and gender were used as control variables. Attitude, perceived norms, and perceived behavioral control were covaried to account for shared variance unexplained by APGf and RPGf. Variances explained are shown in brackets on the top right of each dependent variable. Satorra-Bentler $\chi^2(195) = 270.165, p < .001$; CFI = .95; NNFI = .95; RMSEA = .04, SRMR = .06. * $p < .05$. ** $p < .01$. *** $p < .001$.

interactions and nutrition education, especially about healthy foods, can give children the impression that their parents are more willing to prepare or purchase healthy foods for them, leading to greater perceived behavioral control. These findings corroborate existing research that have found active parental guidance to be associated with fruits and vegetable consumption (Lwin et al., 2017; Melbye & Hansen, 2015; Vereecken et al., 2004).

In contrast, restrictive guidance was not significantly associated with attitude, perceived norms, and perceived behavioral control. One possible explanation is that the mere setting of rules without providing sufficient explanation is not enough to influence overall cognitions towards a behavior (Fujioka & Austin, 2003). A second related reason could be that the conditions in which the rules are set can determine the direction of influence for parental restrictive guidance. For example, parental rules about food that are made with together with children might lead to better internalization of those rules. Indeed, researchers have noted that the style in which restrictive mediation matters, where restrictive mediation made in an autonomy-supportive style (as opposed to controlling or inconsistent styles), can moderate the effects of media on pro- and anti-social behaviors, as well as aggressive behaviors (Fikkers, Piotrowski, & Valkenburg, 2017; Valkenburg, Piotrowski, Hermanns, & de Leeuw, 2013). In a similar vein, developmental psychologists have argued that specific parenting practices – domain-specific parenting behaviors such as active and restrictive guidance – are situated in a larger emotional climate generated by the overall behavior of parents toward a child, termed parenting styles (Darling & Steinberg, 1993). It is possible that restrictive guidance might be effective only when situated within healthy emotional climates, such as authoritative parenting, where children might be more receptive to internalizing parental rules. These reasons are particularly important for our sample of adolescents and pre-adolescents, since they are

at a developmental stage that is characterized by a greater desire for autonomy (Eccles et al., 1991; Steinberg, 1988). Previous research has found that rules situated within more positive parenting styles (e.g., greater warmth and responsiveness) and adolescents' perception that rules are justified, are necessary in order for rules to be effective (Baxter, Bylund, Imes, & Routsong, 2009; Eccles et al., 1991; Lessard, Greenberger, & Chen, 2010).

Another possible explanation could be that restrictive guidance might have more of a preventive function, and that parental rules conceptualized to target undesirable behaviors such as eating snacks or drinking sugar-sweetened beverages are less effective in promoting healthier food consumption. Developmental psychologists have highlighted the importance of the need for children to have an accurate perception of parental messages before they are accepted and internalized (Grusec & Goodnow, 1994). Restrictive guidance, especially in our study's current conceptualization and operationalization, where it involves mostly rules about unhealthy eating, might not be effective in changing children's beliefs about healthy eating. Yee et al.'s (2017) meta-analysis suggested as much, where the researchers found that a small but significant negative relationship between restrictive parental guidance and children's unhealthy food consumption, but no significant effect for restrictive parental guidance and healthy food consumption. Future researchers should examine if rule-setting about healthy foods (e.g., "you should eat one fruit a day") are conceptually distinct from rule-setting about unhealthy foods, resulting in promotive effects by virtue of the rules being more in line with the target behavior under study.

Overall, intrapersonal factors explained a large amount of variance in children's intention to consume fruits and vegetables. Attitude and perceived behavioral control were found to be positively associated with intention. This is in line with previous studies examining the theory of planned behavior in the context of healthy eating (e.g., Hagger et al., 2016; McDermott et al., 2015). Interestingly, perceived norms was

not significantly associated with intention to consume fruits and vegetables. This was also found in previous studies (Carfora et al., 2016; Emanuel, McCully, Gallagher, & Updegraff, 2012). Most notably, a previous review of psychosocial predictors of fruits and vegetable consumption suggested that, out of the three predictor variables in the theory of planned behavior, perceived norms was the only variable that had insufficient evidence of its effect on fruit and vegetable consumption (Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008). Other studies have also noted that perceived norms can often be a weak or non-significant predictor of intentions depending on the behavioral context (Hagger & Chatzisarantis, 2006). This could be due to sample differences, or that the perceived norm variable reaching a ceiling effect (Blanchard et al., 2009).

Lastly, intention was significantly associated with fruits and vegetable consumption, in line with previous research (e.g., Brug, de Vet, de Nooijer, & Verplanken, 2006). However, perceived behavioral control was not associated with child fruits and vegetable consumption. According to Ajzen (1991), under certain conditions, perceived behavioral control might not add to explaining behavioral outcomes above and beyond intention. Specifically, when perceived behavioral control does not serve as a good proxy for actual behavioral control, or when there is limited information on the part of the respondent with regards to the behavior, perceived behavioral control can add little to the prediction of behavior. As parents control most of the meals that children consume, children have little information as to the types of food that will be offered to them, limiting the predictive power of perceived behavioral control in this context. Another possible reason could be that perceived behavioral control serves as a moderating variable either (1) on the effects of attitude and perceived norms on intention (Martinez & Lewis, 2016; Yzer, 2012), or (2) on the effects of intention on behavior (Amireault, Godin, Vohl, & Pérusse, 2008). Future research should further examine these potential interaction hypotheses.

Our study contributes to the study of the theory of planned behavior, by identifying communicative change mechanisms that reside in the most powerful socialization forces of a child's life – parents. Following the recommendation by Conner (2015), the findings showed that identifying key background factors can help to improve the utility of the theory of planned behavior. Our study also helps to understand *why* and *how* parental guidance influences child food consumption, by identifying the theoretical pathways with which the effects take place. An important finding was that active parental guidance facilitates better internalization of favorable healthy eating cognitions.

There are a number of practical implications and caveats for parents and health promotion specialists. First, this study highlights effective ways of promoting healthier eating with children. Providing guidance, explanation, and education with an evaluative slant are effective ways of encouraging a healthier diet with children. According to the findings, rules were not associated with attitude, perceived norms, and perceived behavioral control. A number of potential reasons have been proposed, revolving around the content of rules

(e.g., rules about healthy or unhealthy foods) and the parenting and communication styles in which rules are conveyed. As children approach adolescence, it is increasingly important that rules are situated in a healthy and autonomy-supportive parenting and communication style. Regardless of whether rules are set, it is wise that parents accompany rules with a generous amount of active guidance, since previous research have found that perception of justification is an important precondition for the acceptance of parental rules (Baxter et al., 2009). To build on that, these findings can be used by health promotion professionals hoping to improve children's diet by involving parents. For example, the information gleaned can be used to shape with parental engagement workshops, or be presented in parent guides or brochures meant to reach out to parents to nudge them to practice behaviors that can help improve children's diets.

There are some limitations in our study that needs to be highlighted. First, although our conceptual framework implies causality, the cross-sectional nature of our study design means that the causal claims of our model remain untested. Even though we had strong theoretical reasons for hypothesizing the causal order, cross-sectional data can seriously compromise any predictions of future behavior, as our measure of actual consumption is technically a measure of past behavior. Future research should consider adopting either a longitudinal design, an intervention, or an experiment to manipulate the change mechanisms identified, in order to test the causal claim of our model.

Second, our study is limited in that it only tested the model in a healthy food consumption context. Previous research has shown that the parental influence on child food consumption can differ when applied to a promotive (e.g., encouraging healthy eating) or preventive (e.g., discouraging unhealthy eating) child food consumption outcome (Yee et al., 2017). Future research should test the model in different food consumption contexts in order to examine its generalizability. Relatedly, restrictive guidance, in its current conceptualization and operationalization, reflect a more preventive nature. Future research ought to examine if restrictive guidance serves preventive functions, in the context of unhealthy food consumption such as consumption of junk foods, unhealthy snacks, or sugar-sweetened beverages.

Next, the measures for fruits and vegetable consumption and intention to consume were two-item constructs, limiting its reliability. Although the items in each scale were moderately correlated, future research should utilize more comprehensive measures in order to examine these findings' replicability with more reliable scales.

Last, the theory of planned behavior is a motivational model of human behavior, where intentions might not translate into behavior. This is especially true of difficult-to-change health behaviors such as eating, where the performance of the behavior is potentially automatic. Future research should look to build on the existing model with volitional aspects of behavior such as implementation intentions (Chapman, Armitage, & Norman, 2009; Gollwitzer, 1999; Heckhausen & Gollwitzer, 1987), or consider dual-

systems theories such as the reflective-impulsive model of social behavior (Strack & Deutsch, 2004), to see if they improve the predictive power of the model. A potential way is to integrate these theoretical perspectives at the intra-personal level (e.g., Hagger & Chatzisarantis, 2014), to identify potentially unique mechanisms of change that the interpersonal level can target to change.

Despite these limitations, we believe our study has made several important contributions to research in understanding parental guidance and child food consumption. The integrative theory of planned behavior model was empirically supported, and demonstrated that the identification of interpersonal antecedents such as parental guidance, can improve its utility. Our hope is that our study sparks the greater use of theory to understand *how* and *why* parenting practices influence children's food consumption, so that caregivers, health care workers, and health promotion professionals, can further theoretical insights and translate them into greater well-being among children.

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