Relating Use of Effective Responsive, Structure, and Non-Directive Control Vegetable Parenting Practices to Subscales from the Model of Goal Directed Behavior

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Abstract: Parents may positively influence children's vegetable consumption through effective vegetable parenting practices (VPP). Research has demonstrated three dimensions of effective VPP: Effective Responsiveness, Structure, and Non-Directive Control, but there is limited research investigating each separately. This study presents the modeling of Effective Responsive, Structure, and Non-Directive Control VPP using constructs from the Model of Goal Directed Vegetable Parenting Practices (MGDVPP). Parents (*n*=307) completed a survey on demographics, MGDVPP constructs, and effective VPP. Block regression modeling tested three models: one for each dimension of effective VPP as the dependent variable. Independent variables included validated subscales representing MGDVPP constructs: Intention, Desire, Perceived Barriers, Autonomy, Relatedness, Self-Efficacy, Habit, Anticipated Emotions, Perceived Behavioral Control, Attitudes, and Norms. Participants were racially diverse, and a majority was female, of higher socioeconomic status, and with a male child. Effective Responsive VPP was positively related to a Habit subscale. Effective Structure VPP was positively related to a Barrier, two Habit, and an Attitude subscales. Effective Non-Directive Control VPP was positively related to being a high school or GED graduate, having younger children, a Habit, and two Intentions subscales, and negatively related to an Intentions and a Perceived Behavioral Control subscales. The adjusted R^2 for the Effective Responsive, Structure, and Non-Directive Control VPP models were 0.432, 0.310, and 0.515, respectively. This was the first study to relate constructs from a theoretical model to effective VPP dimensions. Research is needed to longitudinally assess the MGDVPP and test its utility in vegetable-related interventions.

Keywords: Eating behavior, food parenting practices, nutrition, pre-school child, theory.

INTRODUCTION

Vegetables are an important part of a healthy diet. As rich sources of nutrients, dietary fiber, and phytochemicals [1], vegetables help prevent cardiovascular disease, diabetes, multiple cancers, and obesity in adults [2-8]. Establishing vegetable consumption in early childhood is important because dietary habits track from childhood through adulthood [9-11].

Parents play an important role in influencing a child's vegetable preferences and consumption [12], especially through their parenting practices [13-15]. Food-related parenting practices refer to those behaviors parents use to influence a child's food intake and have been conceptualized in three dimensions: structure, control (demandingness), and warmth (responsiveness) [16]. A factor analysis of items related to vegetable parenting practices (VPP) (i.e. parenting practices for influencing a child's long-term vegetable consumption) confirmed the three dimensions and identified separate factor structures for effective and ineffective VPP [17]. Effective VPP are those related to long-term consumption, rather than immediate compliance [14]. Examples of effective VPP include telling a child that vegetables taste good (responsiveness), including some form of vegetable in most meals (structure), and allowing a child to serve him/herself vegetables (non-directive control) [14]. Understanding why parents use effective VPP is important, especially for interventions designed to promote their use.

The Model of Goal Directed Vegetable Parenting Practices (MGDVPP) provides a useful model for understanding VPP [17-22]. The MGDVPP is a conceptual framework, illustrated in Figure **1**, which is an adaptation of previously published models [17-22]. The MGDVPP is a combination of the Model of Goal Directed Behavior and Self-Determination Theory. As described by the original authors [23-25], the Model of Goal Directed Behavior builds on the Theory of Planned Behavior, adding an Anticipated Emotions construct as a psychosocial predictor, as well as a Desire construct between the psychosocial predictors

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(i.e. Attitudes, Norms, Perceived Behavioral Control, and Anticipated Emotions) and Intention. To enhance the Model of Goal Directed Behavior, Autonomy, Competence/Self-Efficacy, and Relatedness constructs from Self-Determination Theory were added as predictors of Desire. Lastly, habit and perceived barriers were added, reflecting research showing that habit and barriers to performing a behavior are related to behavior [26, 27]. A more thorough description of MGDVPP's development has been published [22]. Overall, MGDVPP constructs include Intention (planning to perform a behavior in the future), Desire (motivational drive to perform a behavior), Perceived Barriers (beliefs about the costs of performing a behavior), Autonomy (being the perceived source of one's own behavior), Relatedness (desire to feel connected to others), Self-Efficacy (feeling confident to take action), Habit (automated behavior), Anticipated Emotions (emotional reactions to the prospect of successful or failed decision enactment), Perceived Behavioral Control (how easy it is to perform a behavior related to past skill, experience, ability, and confidence), Attitudes (value placed on perceived outcomes), and Norms (social pressures by significant others and one's motivation to comply with their expectations) [22].

Health professionals need to be more specific and strategic when utilizing behavioral theory for behavior change [28]. The MGDVPP may provide key targets for a food parenting intervention. Previous research showed that composite Effective VPP [21] and Ineffective VPP [20] scales were related to an array of MGDVPP constructs, including Habit, Perceived Barriers, Perceived Behavioral Control, Autonomy, and Attitude. However, Effective VPP has three dimensions (Responsiveness, Structure, and Non-Directive Control) [17]. Examining whether the same or different MGDVPP constructs are related to each dimension may elucidate the need to tailor interventions towards specific effective VPP dimensions.

This manuscript presents the modeling of Effective Responsive, Structure, and Non-Directive Control VPP using validated subscales from the MGDVPP. The authors hypothesized that different MGDVPP constructs would be related to the three dimensions. The findings from this study will provide useful information for future research and interventions, by identifying areas of intervention for improving effective VPP among parents of preschoolers.

METHODS

Sample and Recruitment

In 2009, a convenience sample of 406 parents, each with a preschool-aged child, provided consent and initiated an internet survey on their level of agreement with MGDVPP items. Those with

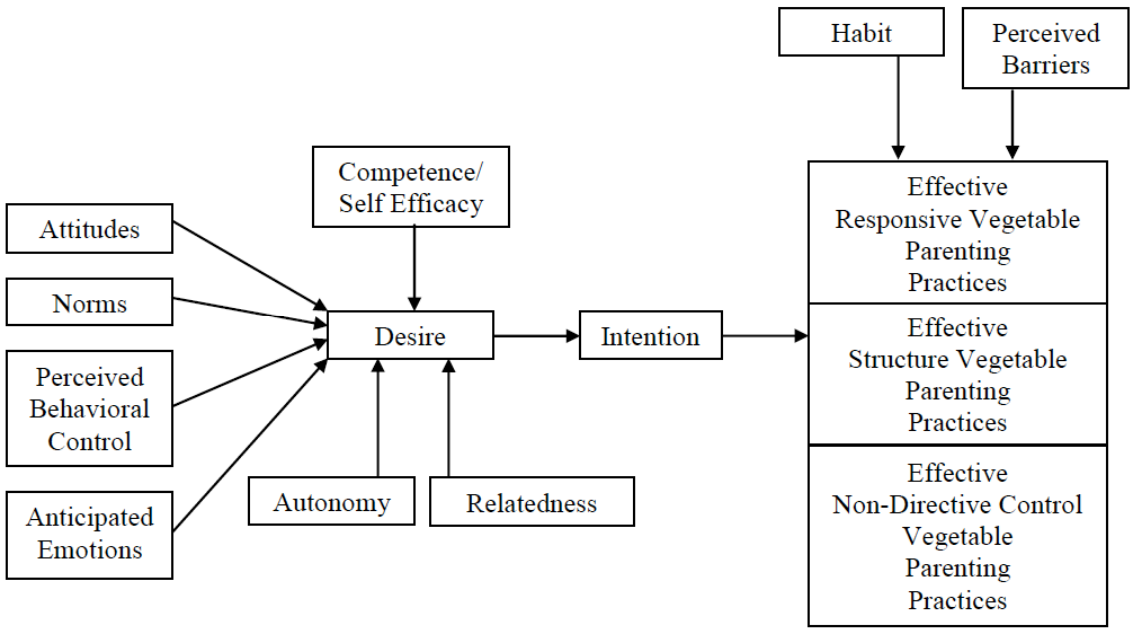

Figure 1: Illustration of the Model of Goal Directed Vegetable Parenting Practices.

Note: Constructs were assessed using scales and subscales (see Table **1**). This figure is an adaptation of previously published models [17-22].

incomplete surveys or missing demographic information were excluded. Of the 406 parents, 307 were included in this study. Participants were recruited through the Children's Nutrition Research Center newsletter; fliers posted at the Texas Medical Center, public libraries, and YMCAs in Houston; personal emails to previous Children's Nutrition Research Center volunteers; and a posting on the Baylor College of Medicine volunteer website. Eligibility criteria included having a child between 3-5 years of age who spent most of the time with him/her and being able to read and write English.

A more detailed description of the sample and recruitment methods is available elsewhere [17-21]. The reporting of this study conforms to the STROBE statement [29]. Baylor College of Medicine Institutional Review Board approved all study procedures, and all participants electronically provided informed consent.

Measures

Participants completed 227 survey items on demographics, MGDVPP constructs, and effective VPP. Demographics included sex (male or female), race (Black/African-American, White/Euro-American, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, Asian, other), ethnicity (Hispanic), highest educational level for both respondent and household (6th grade or less through post graduate study), marital status (married, single, divorced, other), employment status (yes or no), and annual family household income (less than $10,000 through $60,000 or more). Child demographics included age (three, four, five) and sex (male or female).

The items measuring MGDVPP constructs were generated from qualitative interviews with parents of preschool-aged children about their motivations to use various VPP [22]. As described elsewhere, the authors divided the 192 items across 11 MGDVPP scales (Intention, Desire (Intrinsic Motivation), Perceived Barriers, Autonomy, Relatedness, Self-Efficacy, Habit, Anticipated Emotions, Perceived Behavioral Control, Attitudes, and Norms) based on theory [19], which were then submitted to exploratory factor analysis, followed by confirmatory factor analysis to assess the fit of the exploratory-derived factors [19]. Extracted factors included the 11 MGDVPP scales and 29 component factors (i.e. subscales). Examples of one specific scale, subscale, and survey item are Intentions (scale), Authoritative Parenting Intentions (subscale), and "In the next month I plan to encourage my child to try a couple of bites of a vegetable" (item) (see Table **1**). Three category responses (e.g. "Agree," "Neither agree nor disagree," and "Disagree") were used for all items (see Table **1**). Table **1** includes example items, response options, number of items, and reliability indicators for all subscales. Means, standard deviations, possible ranges, and further details have been published [17-21].

Effective VPP items were generated using the nominal group technique (a specialized focus group method) with parents of preschool-aged children [15]. All items were measured on a three-point scale: "Always," "Sometimes," and "Never." As described elsewhere, the items were originally classified as effective (or not) based on professional judgment [14] and distributed by the authors across the three hypothesized dimensions of structure, non-directive control, and responsiveness [16]. Confirmatory factor analysis elucidated a second-order model [17] with one second order factor (Effectiveness) and three first order factors (Effective Responsiveness, Structure, and Non-Directive Control). For this study, the three first order factors served as the three Effective VPP subscales. The second order factor (i.e. the composite Effective VPP scale) was tested elsewhere [21]. Table **1** includes more information about these subscales.

Tests of construct validity revealed almost all MGDVPP subscales (86.2%) bivariately correlated with the composite Effective or Ineffective VPP scales. In addition, as seen in Table **1**, a majority of internal consistency reliability coefficients for the MGDVPP and Effective VPP subscales were 0.70 or higher. The subscales with lower reliability coefficients comprised only three or four items and had acceptable average inter-item correlations above 0.20, an alternative reliability indicator for scales with few items [30, 31].

Statistical Analyses

Three models were tested: one with Effective Responsive VPP as the dependent variable, another with Effective Structure VPP, and the last with Effective Non-Directive Control VPP. Each model was analyzed using block regression procedures with the 29 MGDVPP subscales as independent variables in separate sequential blocks. All subscales were examined in order to test the entire MGDVPP and determine which constructs were related to each Effective VPP subscale. Modeling began with demographic characteristics, followed by Intention, Desire (Intrinsic Motivation), Perceived Barriers,

Table 1: Model of Goal Directed Vegetable Parenting Practices Scales (Bolded), Subscales, Example Items, Number of Items, and Reliability Indicators

Scale/Subscale	Example Item	# of Items	Cronbach's alpha	Inter-item correlation
Vegetable Parenting Practices *(Response options: Always, Sometimes, Never)*				
Effective Responsiveness	I tell my child that vegetables taste good.	5	0.55	0.22
Effective Structure	I show my child that I enjoy eating vegetables.	4	0.46	0.18
Effective Non-Directive Control	I ask my child to help select vegetables at the grocery store.	5	0.63	0.25
Intentions *(Response options: Will do, May or may not do, Will not do)*				
Authoritative Parenting Intentions	In the next month I plan to set an example by eating vegetables myself.	6	0.83	0.47
Active Child Involvement Intentions	In the next month I plan to ask my child to help with vegetable preparation.	6	0.84	0.48
Controlling Parenting Intentions	In the next month I plan to beg my child to eat their vegetables.	5	0.71	0.33
Permissive Parenting Intentions	In the next month I plan to let my child eat when they want to eat.	2	0.61	0.44
Desire *(Response options: Agree, Neither agree nor disagree, Disagree)*				
Intrinsic Motivation	Encouraging my child to eat vegetables is hard.	4	0.78	0.46
Perceived Barriers *(Response options: Agree, Neither agree nor disagree, Disagree)*				
Child Doesn't Like Vegetables	Getting my child to eat vegetables at meals is difficult.	8	0.88	0.49
Respondent Doesn't Like Vegetables	I don't like vegetables myself.	9	0.85	0.42
Cost of Vegetables	Fresh vegetables spoil too fast.	5	0.67	0.30
Autonomy *(Response options: Agree, Neither agree nor disagree, Disagree)*				
Choice	I have a choice about what vegetables to offer my child.	3	0.31	0.17
Relatedness *(Response options: Agree, Neither agree nor disagree, Disagree)*				
Parent Values	If my child ate at least 3 portions of vegetables most days I would feel I am respected by others	4	0.81	0.52
Child Wellness	If my child ate at least 3 portions of vegetables most days I would feel I am a responsible parent.	3	0.61	0.36
Competence/Self Efficacy *(Response options: Sure, Somewhat sure, Not sure)*				
Strong Competence/Self Efficacy	I can get my child to eat vegetables at most dinners.	8	0.85	0.41
Weak Competence/Self Efficacy	I can always have vegetables available at home so my child can eat them.	10	0.76	0.27
Habit *(Response options: Always, Sometimes, Never)*				
Active Child Involvement in Vegetable Selection	Without thinking about it I ask my child to help with vegetable preparation.	6	0.83	0.45
Controlling Vegetable Practices	Without thinking about it I yell at my child for not eating their vegetables.	5	0.68	0.31
Positive Vegetable Environment	Without thinking about it I include vegetables with most meals.	3	0.67	0.43
Positive Vegetable Communications	Without thinking about it I praise my child when I see them eat vegetables.	5	0.60	0.27

(Table 1). Continued.

Scale/Subscale	Example Item	# of Items	Cronbach's alpha	Inter-item correlation
Anticipated Emotions *(Response options: Agree, Neither agree nor disagree, Disagree)*				
Negative Child Behavior with Positive Emotional Response	If I served my child a new vegetable and they refused to eat it, I would feel happy.	8	0.92	0.58
Positive Child Behavior with Negative Emotional Response	If I served my child a vegetable that I knew they disliked, and they ate it, I would feel upset.	4	0.83	0.62
Negative Child Behavior with Negative Emotional Response	If I served my child a new vegetable and they refused to eat it, I would feel frustrated.	8	0.79	0.32
Positive Child Behavior with Positive Emotional Response	If I served my child a new vegetable and they ate it, I would feel happy.	4	0.66	0.41
Perceived Behavioral Control *(Response options: Easy, Neither easy nor difficult; Difficult)*				
Control of Positive Influences on Vegetable Consumption	How easy would it be to get my child to eat more vegetables if I ask them to select vegetables at the grocery store.	13	0.85	0.32
Control of Negative Influences on Vegetable Consumption	How easy would it be to get my child to eat more vegetables if I give them something sweet to eat or drink if they are upset.	11	0.82	0.31
Control of Negative Parenting Practices	How easy would it be to get my child to eat more vegetables if I insist they sit at the table until they eat their vegetables.	4	0.54	0.22
Attitudes *(Response options: Agree, Neither agree nor disagree, Disagree)*				
Health Benefits of Vegetable	If my child started eating more vegetables on most days, my child would have better teeth.	6	0.72	0.31
Negative Effects of Vegetable	If my child started eating more vegetables on most days, my child would be exposed to germs on vegetables.	6	0.66	0.25
Benefits of Vegetables other than Health	If my child started eating more vegetables on most days, my child would be exposed to a variety of foods.	4	0.66	0.36
Norms *(Response options: Agree, Neither agree nor disagree, Disagree)*				
Descriptive Norms	Most parents have their child eat enough vegetables.	3	0.13	0.07
Normative Expectations	It is important to the [Most Important Person] that my child eats more vegetables.	2	0.71	0.55

Note: This table includes some data published elsewhere [17-21].

Autonomy, Relatedness, Self-Efficacy, Habit, Anticipated Emotions, Perceived Behavioral Control, Attitudes, and lastly Norms subscales.

Demographic variables were entered first to understand their influences without any MGDVPP subscales in the model. These demographic variables included child age, child sex, parent sex, parent education, household income, and race/ethnicity. Child sex was recoded with "girl" as the reference category, "female" was the reference category for parent sex, "post graduates" for highest educational attainment, "at least $60,000" for household income level, and "Whites" for race/ethnicity.

Because Intentions are theoretically most proximal to behavior and should be the strongest predictor, they were added after demographics. Variables were then added in order of most proximal to least proximal distance from behavior. Habit subscales were entered relatively late to prevent drowning out other independent variables. After entry of each block, all demographic variables were retained, but any other variable not related to the outcome variable at $p< 0.10$ was deleted. After entry of all blocks, non-demographic variables were deleted if they were not related to the outcome variable at $p< 0.0167$ based on a Bonferroni correction for testing three models. All analyses were conducted using Statistical Analysis System (SAS version 9.3, SAS Institute Inc., Cary, NC, 2011).

To assess whether shared method variance was present, the authors performed Harman's one-factor test [32]. Principal components factor analyses on items in the outcome variables and the items in the independent variables were conducted. A single factor would be expected to emerge to account for the majority of the variances if shared method variance was present. When only one factor was extracted, the results showed that only 9.53% of the variance for Effective Responsive VPP, 9.71% for Effective Structure VPP, and 9.77% for Effective Non-Directive

Control VPP was accounted for, indicating that shared method variance was unlikely to be a limitation.

RESULTS

Sample Demographics

Over half of participants were female (89.3%), and the highest percentage were White (37.1%), followed by Black/African American (19.5%), other (19.2%), Asian (14.0%), and Hispanic (10.1%). A majority had a college degree (64.5%), an annual household income of at least $60,000 (54.1%), and a male child (53.1%). Children were aged three (36.8%), four (34.5%), or five (28.7%) years. Sample demographics have been described in detail elsewhere [17-21].

Model for Effective Responsive Vegetable Parenting Practices

In the final model for Effective Responsive VPP, the only statistically significant independent variable was Habit of Positive Vegetable Communications (standardized β = 0.662, p< 0.001). None of the demographic variables were statistically significant at p< 0.0167. The adjusted R^2 was 0.432 (see Table **2**).

Table 2: Regression Models of effective Vegetable Parenting Practices (i.e. Responsiveness, Structure, and Non-Directive Control) Using Subscales from the Model of Goal Directed Vegetable Parenting Practices

	Effective Responsiveness			Effective Structure			Effective Non-Directive Control		
	Parameter Estimates			Parameter Estimates			Parameter Estimates		
	Standardized Estimate	Standard Error	p-value	Standardized Estimate	Standard Error	p-Value	Standardized Estimate	Standard Error	p-Value
Child Age	--	--	--	--	--	--	-0.115	0.107	0.006
Highest Educational Attainment: High school graduate or GED	--	--	--	--	--	--	0.166	0.349	0.001
Barrier of Respondent Not Liking Vegetables	--	--	--	0.204	0.021	<0.001	--	--	--
Habit of Positive Vegetable Communications	0.662	0.043	<0.001	--	--	--	--	--	--
Habit of Active Child Involvement in Vegetable Selection	--	--	--	0.213	0.022	<0.001	0.536	0.034	<0.001
Habit of Positive Vegetable Environment	--	--	--	0.299	0.075	<0.001	--	--	--
Attitude of Negative Effects of Vegetable	--	--	--	0.137	0.037	0.008	--	--	--
Authoritative Parenting Intentions	--	--	--	--	--	--	0.116	0.071	0.011
Active Child Involvement Intentions	--	--	--	--	--	--	-0.155	0.042	0.002
Controlling Parenting Intentions	--	--	--	--	--	--	0.152	0.037	0.001
Perceived Behavioral Control of Positive Influences on Vegetable Consumption	--	--	--	--	--	--	-0.188	0.021	<0.001
Adj R-Sq	0.432			0.310			0.515		

Note. Only statistically significant variables shown. The reference category for Highest Educational Attainment is Post Graduates.

Model for Effective Structure Vegetable Parenting Practices

None of the demographic variables were significantly related to Effective Structure VPP at $p< 0.0167$. The strongest independent variable was Habit of Positive Vegetable Environment (standardized $\beta = 0.299$, $p< 0.001$), followed by Habit of Active Child Involvement in Vegetable Selection (standardized $\beta = 0.213$, $p< 0.001$), Barrier of Respondent Not Liking Vegetables (standardized $\beta = 0.204$, $p< 0.001$), and Attitude of Negative Effects of Vegetables (standardized $\beta = 0.137$, $p< 0.01$). The adjusted R^2 was 0.310 (see Table **2**).

Model for Effective Non-Directive Control Vegetable Parenting Practices

In the final model, high school or GED graduates (standardized $\beta = 0.166$, $p< 0.001$) and those with younger children (standardized $\beta = -0.115$, $p< 0.01$) were significantly more likely to use Effective Non-Directive Control VPP than postgraduates and those with older children, respectively. In order of directional relationship strength, Habit of Active Child Involvement in Vegetable Selection (standardized $\beta = 0.536$, $p< 0.001$), Controlling Parenting Intentions (standardized $\beta = 0.152$, $p< 0.001$), and Authoritative Parenting Intentions (standardized $\beta = 0.116$, $p< 0.05$) were positively related to Effective Non-Directive Control VPP, while Perceived Behavioral Control of Positive Influences on Vegetable Consumption (standardized $\beta = -0.188$, $p< 0.001$) and Active Child Involvement Intentions (standardized $\beta = -0.155$, $p< 0.01$) were negatively related to Effective Non-Directive Control VPP. This model accounted for 51.5% of the variance in Effective Non-Directive Control VPP (see Table **2**).

DISCUSSION

This study makes an important contribution to the parenting/feeding field, and to our knowledge, is the first study to test constructs from a model (MGDVPP) to understand use of specific effective VPP dimensions (Responsiveness, Structure, and Non-Directive Control). The adjusted R^2 for the final Effective Responsive, Structure, and Non-Directive Control VPP models were 0.432, 0.310, and 0.515, respectively. This suggests that the models identified constructs important in effective VPP use and may have utility when designing VPP interventions.

All the statistically significant variables in these models were from the Theory of Planned Behavior, which corroborates findings about the Theory of Planned Behavior being the current most highly predictive social cognitive theory [33]. None of the original Self-Determination Theory constructs were significantly related to the Effective VPP subscales presented here, or composite Effective VPP or Ineffective VPP scale presented elsewhere [18, 20, 21]. Perhaps, the Self-Determination Theory constructs were not operationalized optimally, or the items did not fully capture the Self-Determination Theory constructs. Relatedly, the authors originally defined Desire (from the Model of Goal-Directed Behavior) as Intrinsic Motivation (from Self-Determination Theory) and added Autonomy, Competence/Self-Efficacy, and Relatedness as predictors of Desire/Intrinsic Motivation in the MGDVPP. It could be that Desire is not the same as Intrinsic Motivation, particularly in this context. Research is needed to better understand the relationship between Self-Determination Theory and parenting, and how to operationalize the constructs.

One of the independent variables (Habit of Active Child Involvement in Vegetable Selection) was identical across two models (Effective Structure VPP and Effective Non-Directive Control VPP), and some variables (Barrier of Respondent Not Liking Vegetables, Habit of Positive Vegetable Communications, Habit of Active Child Involvement in Vegetable Selection, Habit of Positive Vegetable Environment, and Perceived Behavioral Control of Positive Influences on Vegetable Consumption) were also related to the composite Effective VPP scale [21]. Unique variables that appeared in only one model included child age, high school graduate or GED, Attitude of Negative Effects of Vegetable, Authoritative Parenting Intentions, Active Child Involvement Intentions, and Controlling Parenting Intentions. Thus, the influences on one dimension of effective VPP or on composite effective VPP did not generalize to other dimensions. Interventions may need to be targeted at each parenting dimension and then combined, rather than creating a single more general intervention to increase long-term vegetable intake among children.

Effective Responsive VPP included items such as “I tell my child that their favorite cartoon characters eat vegetables,” “I praise my child when I see them eat vegetables,” and “I tell my child that vegetables taste good” [17]. Only greater Habit of Positive Vegetable Communications (such as automatically praising the child when the parent sees him/her eating vegetables) was related to more Effective Responsive VPP use. Thus, habit of one aspect of responsive parenting was

strongly related to responsive parenting, supporting recent findings on the importance of habit for predicting behavior [34]. Research is needed to better understand how to target habit in behavior change programs [35]. One study showed that the primary predictor of Habit of Positive Vegetable Communications was negative parent emotional response to child vegetable refusal [35], so it may be important to target decreasing a parent's negative emotional response to child vegetable refusal through cognitive behavioral [36] or desensitization [37] interventions.

Effective Structure VPP items included "I give my child vegetables for their snacks"; "I serve meals for my family to eat together"; and "I make vegetables easy to eat, such as cleaning, peeling, or cutting them" [17]. Two habit variables – Positive Vegetable Environment (e.g. automatically including vegetables with most meals) and Active Child Involvement in Vegetable Selection (e.g. automatically asking their child to help select vegetables at the grocery story) – were positively related to Effective Structure VPP use, also supporting the primacy of habit [34]. Both habits of Positive Vegetable Environment and Active Child Involvement in Vegetable Selection were correlated with parents liking or not liking vegetables [35], so interventions may need to address parent's preference for vegetables.

Two variables, however, had unexpected relationships with Effective Structure VPP use. First, Barrier of Respondent Not Liking Vegetables (e.g. parents not liking vegetables themselves or no one in the family eating vegetables) was related to greater Effective Structure VPP use. Perhaps, parents who did not like vegetables were motivated to obtain the benefits of vegetables for their child by making them readily available and accessible. Second, Attitude of Negative Effects of Vegetable (e.g. exposure to germs or stomach problems if the child started eating more vegetables on most days) was related to greater Effective Structure VPP use. It is possible that despite perceived negative effects, parents still wanted their child to eat vegetables. Qualitative research with parents of preschool-aged children may elucidate their reasons for making vegetables available and accessible, despite their negative attitudes towards them.

Effective Non-Directive Control VPP items included "I ask my child to help with vegetable preparation," "I allow my child to serve themselves vegetables," and "I ask my child to choose their vegetables for meals and snacks" [17]. Authoritative Parenting Intentions (e.g. planning to encourage their child to try a couple of bites of a vegetable or planning to tell their child eating vegetables will make them strong/healthy) were positively related to Effective Non-Directive Control VPP. Authoritative parenting encompasses non-directive control [38], so intentions of being authoritative were related to this non-directive control parenting style. Given that some research has revealed an intention-behavior gap and weak relationships between intention and behavior [39-41], VPP interventions will need to ensure a strong link of intentions to behavior [42], perhaps through implementation intentions or explicit commitments [43, 44]. Habit of Active Child Involvement in Vegetable Selection was also positively related to Effective Non-Directive Control VPP. As with the other dimensions of effective VPP, the habit of giving the child more control of their vegetable consumption was related to the corresponding parenting practice. Targeting parents' preference for vegetables, such as through multiple exposures, may increase this habit [35].

The remaining correlates of Effective Non-Directive Control VPP were not expected. First, Controlling Parenting Intentions (e.g. planning to keep their child from going to play if he/she doesn't eat his/her vegetables or planning to insist their child sit at the table until he/she eats his/her vegetables) were positively related to Effective Non-Directive Control VPP. These controlling practices are classified as ineffective by health and nutrition professionals [14], yet parents who intended to use these ineffective practices were more likely to use Effective Non-Directive Control VPP. Parents may be unaware of what is considered non-directive control (effective) *vs.* control (ineffective) VPP, and may use multiple practices, including ineffective ones, to encourage their child to eat vegetables. The researchers created the effective *vs.* ineffective labels and classified parenting practices based on research with child feeding experts [14], so it is important to further investigate these results and determine whether parents understand the differences between ineffective and effective parenting practices. This may require future qualitative studies with parents and refinement of measures to more accurately assess these constructs in parents, as well as interventions to educate parents on what are effective practices.

Second, Perceived Behavioral Control of Positive Influences on Vegetable Consumption (e.g. parents finding it easy to ask their child to select vegetables at the grocery store or showing their child that they

themselves enjoy eating vegetables) and Active Child Involvement Intentions (e.g. planning to ask the child to help with vegetable preparation or ask the child to choose vegetables for meals/snacks) were negatively related to Effective Non-Directive Control VPP. All of these practices are considered to be effective, so it would be expected that parents who find it easy or intend to perform these effective practices would be more likely to use Effective Non-Directive Control VPP. The opposite was found. Again, parents may be unaware of what constitutes effective or ineffective controlling practices, and thus, utilize any and all practices to get their child to eat vegetables.

Strengths of this research include use of a comprehensive theoretical framework and validated measures. The limitations, however, include its cross-sectional nature (the results cannot be interpreted to establish causality [45]); the measures were all self-reported (there may be reporter bias); the sample mostly included respondents with higher educational levels and household incomes from the Houston area (self-selection bias limiting generalizability to other populations); and there was a limited sample size, which did not allow for certain multivariate analyses, such as structural equation modeling. It is possible that more complex modeling is needed to test the hypothesized relationships in this study. In addition, data were not collected on children's vegetable consumption or actual parenting practices behaviors, so the authors could not investigate whether the self-reported behaviors were related to actual behaviors in parents or children's vegetable consumption. It is important to investigate these findings in other and larger populations, with longitudinal designs, and with more objective measures, where possible.

In conclusion, this study was the first to test MGDVPP constructs to understand use of specific effective VPP dimensions. Mainly habit constructs were significantly related to Effective Responsive, Structure, and/or Non-Directive Control VPP. To increase a child's vegetable consumption, interventions should target use of habit, which is not a usual behavioral intervention target and will require novel intervention techniques [35]. Other statistically significant variables were Barriers, Attitude, Intentions, Perceived Behavioral Control, and some demographics. Further research is needed to assess the scales from this study longitudinally, their utility in vegetable-related interventions, and their actual meaning to parents.

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