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Dimensions of Vegetable Parenting Practices among Preschoolers

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Abstract

The objective of this study was to determine the factor structure of 31 effective and ineffective vegetable parenting practices used by parents of preschool children based on three theoretically proposed factors: responsiveness, control and structure. The methods employed included both corrected item-total correlations and confirmatory factor analysis. Acceptable fit was obtained only when effective and ineffective parenting practices were analyzed separately. Among effective items the model included one second order factor (effectiveness) and the three proposed first order factors. The same structure was revealed among ineffective items, but required correlated paths be specified among items. A theoretically specified three factor structure was obtained among 31 vegetable parenting practice items, but likely to be effective and ineffective items had to be analyzed separately. Research is needed on how these parenting practices factors predict child vegetable intake.

Keywords

parenting practices; vegetables; psychometrics; preschoolers; factor analysis

INTRODUCTION

Vegetables have been identified as important foods, the high consumption of which helps enhance bone mass (Wosje et al., 2010) and prevent the development of several chronic illnesses, including heart disease (Mikkilä et al., 2007), diabetes, several cancers (Boeing et al., 2012), and obesity among adults (Ledoux, Hingle & Baranowski, 2011). Preferences for foods are learned early in life, possibly the preschool years (Anzman-Frasca, Savage, Marini, Fisher & Birch, 2012). Vegetable consumption appears to track through childhood and into the adult years (Mikkilä, Räsänen, Raitakari, Pietinen & Viikari, 2005); and parents appear to have an important role influencing their child's vegetable preferences and intake (Anzman, Rollins & Birch, 2010).

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Parenting practices are the specific behaviors that parents employ to influence their child's behavior (Hughes, O'Connor & Power, 2008). Specific food parenting practices, such as pressure to eat, have been associated with child dietary intake (Fisher, Mitchell, Smiciklas-Wright & Birch, 2002; Wardle, Carnell & Cooke, 2005). Vegetable parenting practices are those behaviors employed to influence children's vegetable intake. A broad variety of parent behaviors have been identified as likely contributing to a preschool child's vegetable intake (i.e. effective vegetable parenting practices), and others either not influencing or adversely influencing preschool child vegetable intake (i.e. ineffective vegetable parenting practices) (O'Connor, Hughes, et al., 2010; O'Connor, Watson, et al., 2010). For example, restricting a child's access to a palatable food increased the child's preference for and later consumption of that food (Fisher & Birch, 1999). A systematic review identified authoritative parenting, parent modeling of intake, increased home availability, covert restriction, and encouraging children to try vegetables were associated with child vegetable intake (Blissett, 2011).

The general parenting literature has associated parenting behaviors with child outcomes such as socioemotional development, academic performance, and attachment (Baumrind, 1989). Some developmental psychologists have hypothesized that parenting may differ across some domains, such as nutrition (Baumrind, 1989). It has been hypothesized that parenting practices related to nutrition vary along three dimensions: responsiveness, control and structure (Hughes et al., 2008). Responsiveness is the parents' support of their child's autonomy by being mindful, supportive, and accepting of their child's perspective, encouraging them to take initiative, and allowing them to solve problems on their own (Grolnick & Pomerantz, 2009) (e.g. "I tell my child that vegetables taste good"). Control is the extent to which parents exert influence over their child using either coercive practices like pressure, intrusiveness, or dominance, or using reinforcement, supervision, and behavioral control practices that are intended to provide guidance to their child (Grolnick & Pomerantz, 2009) (e.g. "I make my child feel guilty when they don't eat their vegetables"). Structure is the social and physical environmental organization and provision of clear rules and expectations to influence their child's competence and intake (Grolnick & Pomerantz, 2009) (e.g. "I make vegetables easy to eat, such as cleaning, peeling, or cutting them") (Hughes et al., 2008). Much of the existing literature has emphasized responsiveness and control (Clark, Goyder, Bissell, Blank & Peters, 2007; Faith, Scanlon, Birch, Francis & Sherry, 2004). Preschool parent-generated categories of vegetable parenting practices did not conform to the responsiveness, control and structure dimensions (O'Connor, Hughes, et al., 2010), but professional judgments of effectiveness did (O'Connor, Watson, et al., 2010). Effective parenting practices are expected to enable the child to enjoy and consume vegetables beyond the immediate situation (e.g. "I praise my child when I see them eat vegetables"), while ineffective parenting practices may obtain immediate child compliance with eating more vegetables, but will not likely result in longer term enjoyment and consumption (e.g. "I make my child feel guilty when they don't eat their vegetables") (O'Connor, Watson, et al., 2010). Thus, the dimensional structure of preschool vegetable parenting practices is not clear, and it is unlikely that each parenting practice a parent may choose is used completely independently of other parenting practices (Wiggins, Potter & Wildsmith, 2001).

Knowing the dimensional structure of parental use of preschool vegetable parenting practices should enable scientists and practitioners to better understand the co-occurrence of food-related parenting practices, and enable the formulation of dependent variables to test predictiveness of models to understand why parents may use these procedures (Hingle et al., 2012). Validated predictive models would enhance the design of interventions to promote use of effective parenting practices and decrease use of ineffective parenting practices.

This study assesses the dimensional structure of parenting practices related to a child's vegetable intake.

METHODS

Design

A cross-sectional study was designed using a web-based survey mechanism (Survey Monkey, 2012) to collect data to assess the psychometrics of the preschool vegetable parenting practices items and scales. Participants were directed to log into the questionnaire. Given the low risk nature of the study, selecting the "participate" button in the survey was taken as evidence of consent. The Institutional Review Board of the Baylor College of Medicine reviewed and approved the research protocol.

Recruitment and Sample

The inclusionary criteria were being a parent of a preschooler (3–5 years old), being able to read and write in English, and having the child spend most of their time with that caregiver. Access to the internet survey implied access to both a computer and an internet connection. Recruitment procedures included 1) posting flyers at known study recruitment locations around the Texas Medical Center campus (about 100,000 diverse employees); 2) emails to a) the list serve of the Houston Hispanic Health Coalition, b) parents listed in the Children's Nutrition Research Center (CNRC) research volunteer database with preschool aged children, and c) past participants in related studies who had consented to be recontacted; and 3) posting volunteer announcements on the Baylor College of Medicine (COM) and CNRC websites. As compensation, participants were offered a raffle for a \$20 gift certificate upon completion of the survey.

Items

The items were initially generated by lower income parents using a Nominal Group method (Hughes & Shewchuk, 2012; O'Connor, Hughes, et al., 2010). Several items from an existing food parenting scale (Hughes, Power, Fisher, Mueller & Nicklas, 2005) were added. The items were distributed by the authors across the three hypothesized dimensions (responsiveness, structure, and control) of food parenting (Hughes et al., 2008), and divided into likely to be effective and ineffective categories based on professional judgment (O'Connor, Watson, et al., 2010). Based on cognitive interviews (n=15, 5 each with parents of African American, Hispanic, and White 3–5 yo), some items were reworded to enhance clarity for fidelity to a dimension. There were 31 items in the final instrument, with a three category response scale (Always=1, Sometimes=2, Never=3). The 31 items were initially organized with almost equal number by category: Effective Responsiveness (items 01–05), Effective Structure (items 06–10), Effective Non-directive Control (items 11, 12, 14, 15), Ineffective Responsiveness (items 16–21), Ineffective Structure (items 22–25, 30), and Ineffective Control (items 13, 26–29, 31) (Table 2).

Statistical Methods

The vegetable parenting practices scale was assessed using classical test theory (CTT) procedures (Nunnally, 1978), including item difficulty (mean) and item discrimination (the corrected item-total correlation, CITC). Cronbach's alpha assessed the internal consistency reliability. The criterion for acceptable internal consistency reliability was defined as greater than .70 (Nunnally, 1978). A low CITC (<0.20) (Nunnally, 1978) means an item is poorly correlated with the rest of the scale; a low Cronbach's alpha (<0.70) suggests low internal consistency, possibly indicating multiple latent constructs or a need for additional items. Items with CITC lower than 0.20 were deleted from the analyses. CTT analyses were

conducted using Statistical Analysis Systems (SAS Institute Inc., 2011). The effective and ineffective second-order models were analyzed separately. Confirmatory factor analysis (CFA) was used to examine the performance of these two hypothesized second-order factor models.

CFA was conducted using Mplus (Muthén & Muthén, 1998–2011). Because of the ordinal nature of the responses, weighted least square parameter estimation was used to estimate the model. Hu and Bentler's (1999) two-index strategy presentation (Hu & Bentler, 1999) was used to assess the data-model fit. The various combinations of the two indices were summarized in Table 3. Given the complexity of the CFA, it is not unusual that the results showed poor fit of the proposed model. If the data did not fit the hypothesized second-order factor model well, post hoc analyses were conducted including respecifying and re-estimating the model. Post hoc modifications suggested by modification fit indices which made theoretical sense were included in the model if initial assessment did not meet the fit criteria. The paths correlating within-factor error terms were added to the model first, since they were more meaningful than across latent variable correlations.

RESULTS

There were 416 initial attempts to log onto the web site that initiated the questionnaire. Of these, 92 were incomplete and 17 were duplicates. Thus, 307 completed the questionnaire, independently. Sample characteristics are identified in Table 1.

CFA were conducted for several first order and second order models. Acceptable fit (defined in legend below Table 3) was only achieved when the effective and ineffective subscales were tested separately. For the effective items acceptable fit was obtained only with one second order factor (effectiveness) and three first order factors (effective responsiveness, structure, and control) (Table 2). Based on the modification indices, acceptable fit was obtained for the ineffective items with one second order factor (ineffectiveness) and three first order factors (ineffective responsiveness, structure, and control) (Table 2) by allowing four pairs of errors to correlate (items 18&19, 28&29, 29&13, 27&13) (Table 3). One of these additional correlations of error terms was within ineffective responsiveness (items 18&19), and the other three correlations were from ineffective control (items 28&29, 29&13, and 27&13).

Initial assessment of corrected item-subscale total correlations led to deleting three items (item 16: I permit my child to decide whether they get a second or third helping; item 23: I tell my child to eat vegetables, but will not eat any myself; and item 24: I take second helpings in front of my child during dinner) due to low values ($r < 0.2$); and changing subscale membership for others (item 10 to effective non-directive control; 17 to ineffective structure) (Table 2). Items were reverse coded so that higher mean values (closer to 3) indicated the behaviors were frequently performed. The corrected item-subscale total correlations were all above 0.21. The Cronbach's alphas were somewhat low (< 0.7) for all 6 scales (Table 2).

DISCUSSION

Acceptable fit was obtained with one second order factor (Effective or Ineffective Practices) and three first order factors (Responsiveness, Control, Structure) (with items organized as in Table 2) when the effective and ineffective vegetable parenting practices were analyzed separately. This factor structure supports the theoretically proposed three factor structure (Hughes et al., 2008). The current structure from parent reported frequency of performance data reflects the factors obtained from professional reported ratings of effectiveness

(O'Connor, Watson, et al., 2010), but not parent reported groupings of items (O'Connor, Hughes, et al., 2010). More research with larger pools of items and larger samples (Vaughn, Tabak, Bryant & Ward, 2013) is warranted to clarify the measurement structure.

We originally expected that the ineffective practices would be at the opposite end of the three dimensions from the effective parenting practices (i.e. parents performing the effective items would not be using the ineffective items, and vice versa), but that was not found; thus, it appears that families may use both effective and ineffective practices simultaneously. Future research will need to assess the relationship of likely to be effective and ineffective practices to children's vegetable intake.

The one second order factor for effective and one for ineffective vegetable parenting suggests that the items can be summed across the three subscales within effectiveness and ineffectiveness separately, and treated as a dependent variable. However, separate dependent variables and models are needed for understanding what to do to encourage use of effective practices, and what to do to discourage ineffective practices. Future research studies should explore predictors of effective versus ineffective practices and what intervention strategies could help encourage the use of effective practices and discourage ineffective practices.

The strengths of this study include six theoretically proposed vegetable parenting practices subscales, and use of CFA. Limitations included the self-selected nature of the sample and incomplete data from 92 people who initially entered the website, both of which may influence generalizability; data were available primarily from female, not male parents; and sample size didn't permit assessing differences between primary and secondary caregivers; parent report of frequency of use; and modest sample size (approximately 50 cases per dimension or 10 cases per item). Some items specifically mentioned vegetables, while others did not, which could have influenced responses and factor structure. Since the corrected item-total correlations were all in an acceptable range (0.2 to 0.5 in Table 2), the low internal consistency reliabilities were likely due to an inadequate number of items per subscale. Future research will need to generate and test additional theoretically generated items, and relate them to child vegetable intake.

Empirical support was obtained for a three (responsiveness, control, and structure) factor structure in vegetable parenting practices, with separate structures for likely to be effective and ineffective practices. If validated in further research, these factors can inform training on vegetable parenting practices, to include both practices to do because they are likely to work, and those to avoid because they are likely not to, or even have adverse long term effects.

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Highlights

Effective and ineffective practices loaded on hypothesized factors, only in separate analyses

Parenting practices were fit by responsiveness, control and structure dimensions

All factors were organized around parenting theory constructs

Table 1

Demographic Characteristics of Participants

Demographic Characteristics	n	%
Child Gender		
Boy	163	53.1
Girl	144	46.9
Child Age		
3 years old	113	36.8
4 years old	106	34.5
5 years old	88	28.7
Parent Gender		
Male	33	10.8
Female	274	89.3
Marital Status		
Married or Living with a significant other	255	83.1
Single, Never married	21	6.8
Divorced, Separated, or Widowed	31	10.1
Primary Feeding Responsibility		
Me	236	76.9
My Spouse/significant other	28	9.1
A Relative	2	0.7
Child(ren)	2	0.7
Shared among multiple people	39	12.7
Highest Education Level		
Attended some High School	2	0.7
High School Graduate or GED	26	8.5
Technical School	7	2.3
Some College	59	19.2
College Graduate	118	38.4
Post Graduate Study	95	30.9
Race/Ethnicity		
White	114	37.1
Hispanic	31	10.1
African-American	60	19.5
Asian	43	14.0
Other	54	17.6
Missing	5	1.6
Income		
Less than \$10,000	11	3.6
\$10,000 – \$19,999	16	5.2
\$20,000 – \$39,999	56	18.2
\$40,000 – \$59,999	58	18.9

Demographic Characteristics	n	%
\$60,000 or more	166	54.1

Table 2

Means, standard deviations and corrected item-total correlations for items organized by final scale type with the corresponding Cronbach alphas.

	Mean ^a	SD	Corrected item-total correlation	Factor loading
Effective: Responsiveness (alpha=0.55)				
BEH02 - I tell my child that vegetables taste good.	2.78	0.46	0.35	0.82
BEH01 - I tell my child eating vegetables will make them strong and healthy.	2.83	0.40	0.34	0.70
BEH03 - I encourage my child to try a couple of bites of a vegetable.	2.82	0.43	0.31	0.59
BEH04 - I praise my child when I see them eat vegetables.	2.64	0.56	0.38	0.52
BEH05 - I tell my child that their favorite cartoon characters eat vegetables.	1.77	0.74	0.25	0.31
Effective: Structure (alpha=0.46)				
BEH07 - I show my child that I enjoy eating vegetables.	2.76	0.48	0.32	0.66
BEH08 - I give my child vegetables for their snacks.	1.93	0.53	0.20	0.63
BEH09 - I make vegetables easy to eat, such as cleaning, peeling or cutting them.	2.72	0.50	0.28	0.58
BEH06 - I serve meals for my family to eat together.	2.62	0.52	0.26	0.42
Effective: Non—directive Control (alpha=0.63)				
BEH11 - I ask my child to help select vegetables at the grocery store.	1.99	0.69	0.47	0.79
BEH14 - I ask my child to choose their vegetables for meals and snacks.	1.98	0.64	0.50	0.73
BEH12 - I ask my child to help with vegetable preparation.	1.73	0.63	0.43	0.68
BEH15 - I allow my child to serve themselves vegetables.	1.96	0.73	0.30	0.34
BEH10 - I offer vegetables without forcing my child to eat them.	2.46	0.59	0.21	0.27
Ineffective: Responsiveness (alpha=0.55)				
BEH18 - I give my child something to eat or drink if they are bored.	1.35	0.52	0.43	0.70
BEH20 - I get too busy to notice when my child talks about the food.	1.34	0.49	0.36	0.62
BEH19 - I give my child something to eat or drink if they are upset.	1.43	0.53	0.37	0.56
BEH21 - I feel like not responding when my child asks about the food.	1.24	0.44	0.21	0.45
Ineffective: Structure (alpha=0.50)				
BEH25 - I keep a lot of snack foods (such as chips, cheese puffs, crackers) in our house.	1.90	0.64	0.27	0.64
BEH30 - I allow my child to drink sweet drinks.	1.91	0.50	0.33	0.54
BEH17 - I let my child wander around during a meal.	1.37	0.55	0.25	0.48
BEH22 - I let my child watch TV at meals.	1.65	0.63	0.33	0.41
Ineffective: Control (alpha=0.63)				
BEH31 - I make my child feel guilty when they don't eat their vegetables.	1.34	0.53	0.41	0.69

	Mean ^d	SD	Corrected item-total correlation	Factor loading
BEH29 - I reward my child with sweets if they eat their vegetables.	1.61	0.57	0.37	0.63
BEH26 - I yell at my child for not eating their vegetables.	1.23	0.44	0.32	0.60
BEH13 - I keep my child from going to play if they don't eat their vegetables.	1.44	0.60	0.37	0.57
BEH28 - I promise my child something other than food if they finish their vegetables.	1.68	0.58	0.38	0.55
BEH27 - I keep my child from having sweets if they don't finish their vegetables.	2.07	0.72	0.34	0.32

^dAll items were reverse coded; the higher the number, the more frequently the parent reported doing the practice

Table 3

Indicators of Model Fit

Model	Effective PP ^a	Ineffective PP ^b
Chi-square	154.72	146.60
df	75	71
p	0.00	0.00
Root Mean Square Error of Approximation	0.06	0.06
Comparative Fit Index	0.90	0.86
Tucker-Lewis Index	0.88	0.82
Standardized Root Mean Square Residual	0.09	0.09

Criteria of Model Fit Indices:

RMSEA: <.05 (good); <.08 (acceptable)

CFI/TLI: >.95 (great); >.93 (better); >.90 (good)

Hu and Bentler's Two-Index Presentation Strategy (1999)

1) TLI >=0.96 & SRMR <=0.09

2) RMSEA <=0.06 & SRMR <=0.09

3) CFI >=0.96 & SRMR <=0.09

^aFor effective PP, there was one 2nd order factor: three 1st order factors (effective responsiveness, effective structure, and effective non-directive control), and one 2nd order factor (effective vegetable parenting practice)

^bFor ineffective PP, there was one 2nd order factor adding paths between BEH18 with BEH19, BEH28 with BEH29, BEH29 with BEH13, and BEH27 with BEH13; three 1st order factors (ineffective responsiveness, ineffective structure, and ineffective control), and one 2nd order factor (ineffective vegetable parenting practice).

To have the data fit the model, four additional paths were included (each of these additional paths correlated items' error terms from the same sub factor): BEH18 with BEH 19, BEH 28 with BEH 29, BEH 29 with BEH 13, and BEH 27 with BEH 13.