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Development and preliminary validation of the Parenting around SNacking Questionnaire (P-SNAQ)

KK Davison^{1,2}, CE Blake³, A Kachurak⁴, JC Lumeng⁵, DL Coffman⁴, AL Miller⁶, SO Hughes⁷, TG Power⁸, AF Vaughn⁹, RE Blaine¹⁰, N Younginer³, and JO Fisher⁴

¹Harvard T.H. Chan School of Public Health, Department of Nutrition, 665 Huntington Ave, Boston, MA 02445, USA

²Harvard T.H. Chan School of Public Health, Department of Social and Behavioral Sciences, 665 Huntington Ave, Boston, MA 02445, USA

³University of South Carolina, Department of Health Promotion, Education and Behavior, 915 Greene Street, Columbia, SC 29208, USA

⁴Temple University, Center for Obesity Research and Education, 3323 N Broad St, Suite 175, Philadelphia, PA 19140, USA

⁵University of Michigan, Department of Pediatrics, Medical School, Department of Nutritional Sciences, School of Public Health, 300 North Ingalls Street, 10th Floor, University of Michigan, Ann Arbor, Michigan, 48109, USA

⁶University of Michigan, Department of Health Behavior and Health Education, School of Public Health, 1415 Washington Heights, University of Michigan, Ann Arbor, Michigan, 48109, USA

⁷USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine, Department of Pediatrics, 1100 Bates Ave, Houston, TX 77030, USA

⁸Washington State University, Department of Human Development, PO Box 644852, Pullman, WA 99164-4852, USA

⁹University of North Carolina at Chapel Hill, Center for Health Promotion and Disease Prevention, 1700 Martin L. King Jr. Blvd, CB 7426, Chapel Hill, NC 27599-7426, USA

¹⁰California State University, Long Beach, Department of Family and Consumer Sciences, 1250 Bellflower Blvd, Long Beach, CA 90840-0501, USA

Introduction

Snacking is nearly universal among young children and makes significant contributions to dietary intake. US preschoolers snack more frequently than in past decades and currently consume close to a third of daily energy from snacks (Dunford & Popkin, 2017). Snacks contribute to preschool-aged children's intake of many nutrients, providing more than 25%

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of calcium, potassium, and Vitamin D intakes among US children aged 2–5 years in 2013–2014 (U.S. Department of Agriculture & Agricultural Research Service, 2016). However, there is evidence that snacking may contribute to excessive energy intake among children (Hess & Slavin, 2014). Top sources of snacks among US children include desserts, sweetened beverages, and salty snacks which contain high levels of both saturated fat and added sugars (SFAS)(Piernas & Popkin, 2010; D. Wang, van der Horst, Jacquier, & Eldridge, 2016). Despite snacking's important contributions to dietary intake among young children, surprisingly little is known about its determinants.

The family is a fundamental context for understanding how children's snacking habits develop. Among US children aged 2–6 y, 71% of daily energy intake occurs at home (Poti & Popkin, 2011). Parents socialize children's eating behaviors through the types and amounts of foods they make available to children in and outside the home, parent modeling behaviors, and food parenting styles and practices (Birch & Fisher, 1998). While a burgeoning body of research documents the importance of parenting styles, feeding styles, and feeding practices for shaping children's eating habits and weight (Hurley, Cross, & Hughes, 2011; Shloim, Edelson, Martin, & Hetherington, 2015; Sokol, Qin, & Poti, 2017; Vaughn et al., 2016; Ventura & Birch, 2008), parenting influences specifically on children's snacking habits have not been appreciably studied.

While there are numerous measures of food parenting styles and practices, almost all and particularly the most commonly used measures (Birch et al., 2001) are not specific to snacking (Vaughn, Tabak, Bryant, & Ward, 2013). Further, the literature on food parenting practices is predominated by studies of highly controlling approaches, while relatively little is known about strategies and practices that support healthy eating behaviors (Vaughn et al., 2016). Current theoretical understanding of food parenting spans the continuum from practices reflecting coercive control to those that embody permissive approaches to feeding children, and importantly provide structure and autonomy support which are thought to promote healthful eating behaviors in children (Vaughn et al., 2016). Unfortunately, few measures capture the complexity and breadth of these constructs, particularly in reference to child snacking.

This research was conducted to develop and psychometrically evaluate a theoretically grounded, empirically-informed measure of food parenting specific to child snacking and to provide initial evidence of its validity through associations with existing measures of food parenting styles and practices along with child weight status. Research to understand food parenting specific to child snacking will inform anticipatory guidance about a behavior that contributes significant energy to young children's diets but is not well understood.

Methods

Participants

Participants were recruited from three ongoing studies with low-income parents with children between the ages of 1–6 years. The studies were conducted by authors of the present study in Ann Arbor, Michigan (sample 1; JCL, ALM), Philadelphia, Pennsylvania (sample 2; JOF) and Houston, Texas (sample 3; SOH). Participants in samples 1–3 were

contacted by the associated research team and invited to complete the P-SNAQ as a supplemental assessment to the study in which they were enrolled. Study procedures were approved by the Institutional Review Board of the home institution for each study. Participants in samples 1–3 provided written informed consent to complete the P-SNAQ and to link their responses to data from the existing studies on family demographics (child gender, child age in months and parent education, age and race/ethnicity), child Body Mass Index (BMI) z-score, and food parenting practices and styles. The linked data for each sample were shared with the first (KKD) and last author (JOF) through data use agreements. The validation data available for each study along with site-specific sample demographics are summarized in Table 1.

Measures

Parenting around Snacking Questionnaire (P-SNAQ)

As depicted in Figure 1, the P-SNAQ was developed over a 12–18 month period using recommended scale development procedures as summarized below (Clark & Watson, 1995; Germain, 2006).

Conceptual model—Drawing on a current theoretical framework of food parenting practices (Vaughn et al., 2016) and qualitative interviews with low-income parents on approaches to feeding young children snacks, the authors developed a conceptual model of snack parenting (Davison et al., 2015). Shown in Figure 2, the model included 20 snack parenting practices reflecting 4 over-arching parenting dimensions of autonomy support, structure, coercive control and permissiveness.

Item development—Seven to ten items were developed for each of the 20 snack parenting practices resulting in an initial scale of 115 items. Items included brief declarative statements (e.g., “I give my child a snack every time she asks”) that used language and phrases from qualitative interviews (Davison et al., 2015). Items utilized a 4-point response scale (1=really not like me; 2=sort of not like me; 3=sort of like me; 4=really like me) modeled after an existing validated survey designed for individuals with low literacy (i.e. young children)(Harter & Pike, 1982).

Expert panel—Four experts in food parenting (authors TGP, SOH, JCL, AEV) reviewed the initial pool of items and construct definitions and provided feedback on: (a) the construct label and substantive meaning for each snack parenting practice; (b) the extent to which each item represented the intended snack parenting construct; (c) the readability and clarity of items; and (d) the response options. The feedback was used to revise item and construct definitions and to drop a number of items, reducing the questionnaire from 115 items to 105 items.

Cognitive testing—The revised questionnaire was pilot tested in English with 9 low-income mothers (3 African American, 3 non-Hispanic white, and 3 Hispanic parents) to gauge the clarity and social desirability of each item. A trained interviewer read each question and asked the mother to do the following: describe what the question meant to her, put the question into her own words, identify any challenges in answering the question and

describe how the “perfect” parent would respond. The items were revised a second time following cognitive testing procedures. Items with a clear social desirability bias (i.e., a specific response was consistently linked with “the perfect parent”) were removed from the scale. Following pilot testing, the final questionnaire (N=105 items) was translated (and back-translated) into Spanish.

Administration of the P-SNAQ in the current study—Trained research assistants at each site administered the final P-SNAQ by phone in English or Spanish to consenting participants in samples 1, 2 and 3. The term “snack” was not explicitly defined because our prior qualitative work shows that low-income parents’ schemas around child snacking may take multiple dimensions of a snack into consideration including (1) type of food, (2) portion size, (3) timing, (4) location, and (5) purpose (Younginer et al., 2016). Consistent with procedures outlined by Harter et al (1982) the interviewers first asked the respondent to indicate whether a statement was “like them” or “not like them”, and subsequently if it was “really” or “sort of like/not like them”. Existing data on child BMI z-score (samples 1, 2 and 3) and parent feeding practices and styles (samples 2 and 3) were used to validate P-SNAQ.

Validation Measures

Child weight status—Child weight (kg) and height (cm) were measured in duplicate by trained research assistants at each study site to the nearest 0.1 kg and 0.1 cm respectively. Child Body Mass Index (BMI) -for-age percentiles and z-scores were calculated in accordance with Centers for Disease Control reference standards (Ogden et al., 2002). Child overweight (85th–95th) and obesity (95th) were categorized using standard sex- and age-specific BMI cut-offs (Barlow, 2007).

Food parenting practices—Mothers’ food parenting practices were measured using the Child Feeding Questionnaire (CFQ)(Birch et al., 2001). Prior research supports the reliability and validity of the CFQ among parents from diverse socioeconomic and racial/ethnic groups and for preschool through adolescent children (CB Anderson, SO Hughes, JO Fisher, & T Nicklas, 2005a; Birch et al., 2001; N Corsini, Danthiir, Kettler, & Wilson, 2008; Geng et al., 2005; Kaur et al., 2006). While the original scale includes 31 items and 7 factors, only data for restriction, pressure to eat and monitoring, the most commonly referenced child feeding practices (Vaughn et al., 2013), were utilized in this study (N=15 items)(Birch et al., 2001).

Feeding styles—Mothers’ feeding styles, or their global approach to child feeding and the emotional climate in which it occurs, were measured using the Caregiver’s Feeding Styles Questionnaire (CFSQ; 19 items)(Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005). Mean scores for demandingness and responsiveness were utilized in this study. Prior research supports the reliability and validity of the CFSQ (Hughes et al., 2005). CSFQ feeding styles have been associated with child eating behaviors and food intake (El-Behadli, Sharp, Hughes, Obasi, & Nicklas, 2015) as well as weight.

Analyses

Data analysis was performed using SAS, Version 9.4 (Cary, NC), R, Version 3.3.0 (lavaan package)(Rosseel, 2012) and Stata/SE (Version 14.2, College Station, TX). Summarized on the right side of Figure 1, the analyses proceeded in four stages that included item reduction (stage 1), identification of a preliminary factor structure (stage 2), confirmation of the factor structure (stage 3), and preliminary validation of the P-SNAQ (stage 4). Statistical significance was determined by a p-value of $<.05$. In the analyses and results that follow, the higher order parenting dimensions of control, autonomy support, structure and permissiveness are referred to as *parenting dimensions* and conceptually similar groups of items under each parenting dimension are referred to as *parenting practices*. Items are the specific questions used on the survey.

Stage 1. Item reduction—Using data from the full sample (N=305), the following analyses were performed: Item distributions were examined to identify and remove items with restricted variability or excessive skewness; items with high levels of missingness were removed; and principal component analysis (PCA) was performed on the remaining items to identify the top performing 3–4 items (i.e., those with the highest component scores) for each of the 20 snack parenting practices. All remaining items proceeded to stage 2.

Stage 2. Identify preliminary factor structure—The sample was randomly divided into two equal halves prior to stage 2 analyses. Data for first half of the sample (N=153) were used for stage 2 analyses, including preliminary analyses, and data for the second half of the sample (N=153) were used for stage 3 analyses.

In preliminary analyses to stage 2, exploratory factor analysis (EFA) was used to assess whether the data supported the presence of three distinct levels (i.e., low, moderate, high) of two snack parenting practices, namely snack monitoring and snack limit setting. The conceptual model and subsequent P-SNAQ items included all three levels of each snack parenting practice. In both instances, results indicated that moderate and high levels of each parenting practice formed a single factor. Thus, the moderate and high factors for each were merged and the four highest factor loadings were retained. Given that the majority of these items reflected moderate monitoring/limit setting, the scales were labeled as limit setting and monitoring (i.e., without qualifiers) and were considered under the general parenting dimension of structure as postulated in the conceptual model.

Following preliminary analyses, stage 2 used EFA to identify snack parenting factors or practices within each of the 4 general parenting dimensions (i.e. control, permissiveness, structure, autonomy support) (Table 2). Scree plots (i.e., number of factors with eigenvalues above one) and factor loadings (i.e., items with factors loadings $>.40$) were reviewed to determine the number of factors supported by the data for each parenting dimension. Items with factor loadings less than .40 or with factor loadings of .40 or higher on more than one factor were deleted.

Stage 3. Confirmation of factor structure—In stage 3, confirmatory factor analysis (CFA) was performed with the second half of the data to verify the preliminary factor structure of the P-SNAQ from stage 2 (Figures 3a–d). Given sample size restrictions, a

separate CFA analysis was performed for each parenting dimension. This decision was justified given that the primary intent of the study was to create a theoretically informed, and empirically tested, measure of snack parenting; the goal was not to test a theoretical or conceptual model. This was also consistent with the process used for the EFA in stage 2. Following the recommendations of Hu and Bentler (Hu & Bentler, 1999), good model fit was determined based on a Root Mean Square Error (RMSEA) .08 and Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) >.95.

Stage 4. Preliminary psychometrics—Using the full sample (n=305), subscale scores were calculated using item means for the snack parenting items identified for each factor from stage 3 (Table 3). Internal consistency coefficients (Cronbach's alpha) were calculated for each snack parenting practice. Finally, correlations between P-SNAQ parenting practices and child BMI z-score along with two validated parent-report surveys assessing parent feeding practices and feeding styles were estimated to examine the construct validity of the P-SNAQ.

Results

Participant characteristics

Participants included 305 low-income parents or primary caregivers (predominantly mothers, 92%) with children ages 1–6 years at study entry. Children had a median age of 3 years at entry into their respective studies. When parents completed the P-SNAQ, children had a median age of 4 years and mean age of 5 years (sd=1.2). Approximately, a third of caregivers were non-Hispanic white, a third were African American/Black and slightly less than a third were Hispanic. Participants were also from diverse educational backgrounds with approximately half reporting a high school diploma or less and half reporting post high school training. Fifty five percent of parents and 15% of children had obesity.

Scale Validation

Stage 1—The primary objective of stage 1 was to reduce the 105 item scale to a smaller set of high performing items. Fifteen items were removed during the initial screen in stage 1. Reasons for item deletion included (a) large amounts of missing data because an item was not relevant to all families (e.g., experiences at child care), (b) a lack of variability in responses, (c) and the item being too similar to another item. PCA, performed with the remaining 90 items, identified 16 additional low-performing items (i.e., low correlations with conceptually similar items) which were also deleted. During this process, all items reflecting context driven feeding of snacks (e.g., If we pass a convenience or corner store, I usually buy my child a snack) were deleted and not considered in subsequent analyses. Similarly, only 2 items remained for child-centered feeding (e.g., I let my child decide when she has had enough snack to eat) thus the scale was also removed. A total of 74 remaining items were carried forward to stage 2.

Stage 2—Results from the EFA models shown in Table 2 supported the expected number of factors for permissiveness and autonomy support with all items loading on to the anticipated factor or snack parenting practice. For structure, the data supported a four-factor

model rather than a five-factor model as originally proposed. Availability and accessibility of healthy snacks were identified as a single factor with 7 items. Consequently, the factors were merged and items with the four highest loadings were retained. For control, the data supported the presence of four factors rather than five factors. Items reflecting *using snacks to occupy child* were largely integrated with *using snacks to manage behavior*. In summary, stage 2 analyses supported the presence of 15 of the 17 anticipated snack parenting practices with the vast majority of items loading onto the factor or snack parenting practice they were intended to represent. Twenty three low-performing items were deleted during stage 2 and 51 items carried forward to stage 3.

Stage 3—Results from the CFA analyses confirmed the factor structure identified during stage 2 (Figures 3a–d). With one exception (item 99), standardized factor loadings were consistently greater than 0.40. Model fit statistics for permissiveness (Figure 3a), Autonomy Support (Figure 3b) and Structure (Figure 3c) indicated good model fit with at least two of the three model fit indicators meeting the previously specified criteria. The CFI for Control (Figure 3d) was not above the previously specified cut-off of 0.95, but did provide evidence of satisfactory fit (Hu & Bentler, 1999).

Stage 4—Table 3 presents mean scores for the final P-SNAQ parenting practices for the full sample, internal consistency coefficients of each subscale and correlations with child BMI z-score and validated measures of food parenting practices and feeding styles. The full correlation matrix summarizing correlations between all subscales (i.e., interfactor correlations) is included in Supplemental Table 1. Ten out of 14 internal consistency coefficients (alpha, α) for the final food parenting practices were above the generally accepted threshold of 0.70 demonstrating good internal consistency. Coefficients for *no rules* and *snacks to manage behavior* were close to this threshold at 0.68. Coefficients for *pressure* and *restriction* suggested weak internal consistency across subscale items. None of the P-SNAQ subscales were associated with child BMI z-score. However, correlations between P-SNAQ scores and existing measures of food parenting practices and styles supported the convergent validity of the scale. Slightly fewer than half of the correlations were statistically significant and all were in the anticipated direction.

Discussion

Given the ubiquitous nature of snacking, and the generally high levels of SFAS in common snack foods consumed by young children, detailed understanding of snack parenting practices and their implications for children's dietary behaviors and weight outcomes is critical. To enable such research, a reliable and valid measure of snack parenting is needed. This study outlines the development and preliminary validation of the P-SNAQ, a theoretically grounded, empirically-informed measure of food parenting specific to child snacking. Recommended scale development procedures were utilized (Clark & Watson, 1995; Germain, 2006) including construction of a comprehensive item pool informed by theory and participant feedback, expert panel review, cognitive testing of items, and exploratory and confirmatory validation of the scale's factor structure and content validity. The final P-SNAQ includes 51 items reflecting 14 snack parenting practices under four general parenting dimensions. The factor structure of the P-SNAQ is consistent with current

theoretical frameworks of food parenting and demonstrates good reliability for 10 out of 14 subscales and acceptable reliability for 3 additional scales (Nunnally, 1978; Nunnally & Bernstein, 1988). P-SNAQ subscale scores showed anticipated relationships with previously validated measures of general food parenting practices and styles but not child BMI. Overall, results provide preliminary support for the content validity, construct validity and internal reliability of the P-SNAQ in a low-income racially and ethnically diverse sample of (predominantly female) caregivers of children ages 2 to 8 years.

To our knowledge, the P-SNAQ is the first comprehensive measure of snack parenting developed using rigorous scale development procedures. While a number of existing food parenting measures include items that focus on snacks, few scales provide a detailed, multidimensional assessment of snack parenting. One exception is the Toddler Snack Food Feeding Questionnaire (TSFFQ) which measures parental influences on toddler intake of snack foods (N. Corsini, Wilson, Kettler, & Danthiir, 2010). Items were developed for the TSFFQ using interviews with 22 well-educated mothers. The resulting scale was administered to two samples of mothers and exploratory factor analysis was used to identify five snack parenting subscales. The P-SNAQ extends this early scale through the use of rigorous scale development procedures and the assessment of 17 compared with 5 snack parenting practices. Furthermore, the P-SNAQ was developed and validated with young children in low-income families who are disproportionately at risk of childhood obesity (Y. Wang & Zhang, 2006). The final scale along with implementation and scoring instructions are included as supplemental materials.

Challenges and possible explanations

While results from this study generally support the reliability and validity of the P-SNAQ, three key challenges emerged which warrant further explanation. First, in a number of instances insufficient items remained following the item screening process. As a result, we elected to delete the snack parenting subscales related to *context driven* and *child-centered snack parenting*. Given that the items for the P-SNAQ were originally developed to be widely inclusive, we were comfortable deleting two out of 20 intended subscales. While this decision may negatively affect the content validity of the P-SNAQ, we believe this threat is minimal because the deleted snack parenting practices overlap with practices that were retained; for example, *context-driven snack parenting* (e.g., I usually buy the snacks my child asks for when we are out) is conceptually similar to *no rules or limits* (e.g., I let my child eat whatever she likes for snacks) and *child-centered snacking* (e.g., My child and I decide together what she will have for snack) overlaps with *reasoning and support* (e.g., I explain to my child what a healthy snack is).

A second challenge was the absence of relationships between snack parenting and child BMI. On the surface, this finding is surprising, given that general food parenting practices, particularly controlling practices such as restriction, have been repeatedly linked with elevated child weight status (Hurley et al., 2011). The majority of studies to date, however, have relied on cross-sectional data and high-income, predominantly white, samples. The relationship between food parenting practices (in general and specific to child snacking) and child BMI may differ for low-income populations compared to what has been reported for

high income samples. Indeed, Anderson and colleagues (CB Anderson, SO Hughes, JO Fisher, & T. Nicklas, 2005b) observed no relationships between food parenting practices and child BMI in a cross-sectional sample of low-income, African American and Hispanic parents. Additionally, using the TSFFQ, Corsini and colleagues (N. Corsini et al., 2010) found no relationships between snack parenting and child BMI in moderate- to high-income mothers. Thus, the absence of relationships between snack parenting and child BMI in this study should not be used to repudiate the validity of the P-SNAQ. A reasonable explanation for null BMI findings may be that snack parenting indirectly influences child weight status through a number of mediators including children's dietary quality (including snack consumption), food preferences, eating habits and emotional relationship with food, which were not assessed in this study.

A third challenge was that highly coercive food parenting practices that have received a great deal of attention to date – namely restriction and pressure – had relatively weak measurement properties. It is possible that restriction and pressure to eat are not robust constructs in reference to snacking in low-income populations. Prior studies similarly found weak evidence of reliability and validity for restriction and pressure to eat in low-income samples (Anderson et al., 2005b; Boles et al., 2010; Kong, Vijayasiri, Fitzgibbon, Schiffer, & Campbell, 2015). The observed internal consistencies for pressure and restriction may also be explained by the absence of qualifiers for these items. While the majority of P-SNAQ items explicitly reference whether the healthfulness of snacks is of interest (e.g., I tell my child I am proud of her when she eats a healthy snack; I explain to my child why some snacks are unhealthy), the items for pressure (e.g., I sit next to my child to make sure she eats all of her snack) and restriction (e.g., I keep snacks in a place where my child cannot reach) do not include such qualifiers. While it is highly likely that parents conceptualize pressure in reference to healthy snacks and restriction in reference of unhealthy snacks, it cannot be ruled out that parents interpreted the items differently. As a result, we recommend caution in using these items. Additional research is needed to better understand the extent to which the poor performance of restriction and pressure reflect measurement issues or low contextual and/or cultural relevance.

There have been repeated calls to expand the operationalization of food parenting beyond typical controlling practices to include supportive practices such as structure and autonomy support (Vaughn et al., 2013; Vaughn et al., 2016). In this study, responsive practices reflecting autonomy support (i.e., praising healthy snack choices, modeling healthy snacking) and structure (i.e., planning healthy snacks, making healthy snacks available and accessible) demonstrated robust measurement properties in this study with strong evidence of model fit in the CFA models and internal consistency coefficients above 0.70. Given that common snack foods consumed by children are high in SFAS (Piernas & Popkin, 2010; D. Wang et al., 2016), higher levels of structure in the context of snacking (including planning, monitoring and limit setting) may be necessary to support healthy eating behaviors in children.

Strengths, limitations and future research

The P-SNAQ is a theoretically grounded measure of snack parenting developed using rigorous scale development methods. Its availability and use will help expand the knowledge base on snack parenting to identify approaches that best support healthy snacking in children and the extent to which they differ from food parenting around meals. These strengths however, need to be balanced against study limitations. The validation sample combined data from three existing cohorts and included children across a relatively wide age range. While the majority of children were between ages 2 and 6 years at study entry, some children were as old as 8 years when the P-SNAQ was administered. The validation data for this study were quite limited and were compiled an average of 18.9 months prior to administration of the P-SNAQ.

Rates of obesity were high among parents (~55%) and children (~15%) in this sample. While obesity rates in this sample are similar to those reported in low-income samples of US adults (Robles et al., 2014; Smith, Colon-Ramos, Pinard, & Yaroch, 2016) and children (Pan, McGuire, Blanck, May-Murriel, & Gummer-Strawn, 2015), these rates may be higher than those reported in other countries which limits the generalizability of this study. Finally, the vast majority of parents were mothers and all were from low-income backgrounds. Thus results from this study are not directly applicable to fathers or middle- to upper-income parents.

We acknowledge these limitations and recognize that scale development is an iterative process. Future research can build on this preliminary work to improve the measurement properties of the P-SNAQ, examine its application to additional populations, and scrutinize its ability to predict child eating behaviors known to affect short and long term health outcomes. Future research could also test the appropriateness of creating feeding dimension scores using higher order factor analysis. We did not perform this analysis as it ideally requires a new sample. While the pattern of interfactor correlations (see supplemental materials) generally supports the proposed higher order factor structure (i.e., correlations for subscales within a feeding dimension generally being higher than those for subscales from different feeding dimensions), this was not always the case. Thus, we do not recommend collapsing subscales to create feeding dimension scores and encourage explicit testing of the higher order structure of the P-SNAQ in future research.

Conclusion

While there is an expansive literature on food parenting practices and predictive associations with children's energy regulation, eating behaviors, and weight status (Hurley et al., 2011; Shloim et al., 2015; Sokol et al., 2017; Vaughn et al., 2016; Ventura & Birch, 2008), much less is known about snack parenting. Given the high prevalence of snacking (Dunford & Popkin, 2017; U.S. Department of Agriculture & Agricultural Research Service, 2016), particularly in young children, the poor nutrient profile of popular snack foods (D. Wang et al., 2016), and links between children's snacking behaviors and their risk of obesity (Murakami & Livingstone, 2016), greater understanding of snack parenting is warranted. The P-SNAQ is a multidimensional measure that creates an opportunity to greatly expand

the knowledge base on snacking parenting and identify approaches to support healthy snacking in children.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Summary of scale development and psychometric testing processes for the Parenting around SNacking Questionnaire (P-SNAQ)

Note: TX = Texas; PA = Pennsylvania; MI = Michigan; CFQ = Child Feeding Questionnaire; CFSQ = Child Feeding Styles Questionnaire

Figure 2.

Previously published conceptual model of snack parenting

Source: Davison et al. 2015. Parenting around child snacking: development of theoretically-guided, empirically informed conceptual model. *International Journal of Behavioral Nutrition and Physical Activity*. 12: <http://ijbnpa.org/content/12/1>.

Figures 3a–d.

Results from confirmatory factor analysis models for each parenting dimension

Table 1

Demographic characteristics

	Total Sample N=305	Sample 1 N=184	Sample 2 N=61	Sample 3 N=60
Caregiver				
Gender, female n (%)	277 (92%)	160 (87%)	57 (100%)	60 (100%)
Race/ethnicity, n (%)				
Non-Hispanic white	104 (34%)	104 (57%)	0	0
African American	102 (33%)	48 (26%)	1 (2%)	53 (88%)
Hispanic	81 (27%)	18 (10%)	57 (98%)	3 (7%)
Other	18 (6%)	14 (8%)	0	4 (5%)
Education, n (%)				
Did not complete high school	60 (20%)	26 (14%)	21 (34%)	13 (22%)
High school grad or GED	85 (28%)	48 (26%)	16 (26%)	21 (36%)
Some college	154 (51%)	109 (59%)	24 (39%)	21 (36%)
College degree or more	5 (2%)	1 (1%)		4 (7%)
Weight status, n (%)				
Normal	65 (25%)	44 (31%)	8 (13%)	13 (23%)
Overweight	51 (20%)	20 (14%)	22 (36%)	9 (16%)
Obese	143 (55%)	77 (55%)	31 (51%)	35 (61%)
Child				
Age (yr), mean (sd) [†]	5.0 (1.2)	4.4 (0.9)	6.5 (0.6)	5.5 (1.1)
Gender, n (%)				
Male	156 (51%)	90 (49%)	36 (59%)	30 (50%)
Female	149 (49%)	94 (51%)	25 (41%)	30 (50%)
Weight status, n (%)				
Normal	192 (63%)	113 (61%)	30 (49%)	49 (82%)
Overweight	49 (16%)	29 (16%)	13 (21%)	7 (12%)
Obese	46 (15%)	25 (14%)	18 (30%)	3 (5%)
Missing	18 (6%)	17 (9%)	0	1 (2%)

Sample 1 = Michigan; Sample 2 = Texas; Sample 3 = Pennsylvania;

child age when parent completed the Parenting around SNAcking Questionnaire (P-SNAQ).

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Table 2

Results from stage 2 Exploratory Factor Analyses

Model 1: Permissiveness	Factor 1	Factor 2	Factor 3	Factor 4
No rules or limits				
I let my child eat whatever she wants for snack (snack3)	0.62	-0.05	0.02	
I let my child eat snacks whenever she wants (snack1)	0.58	0.02	0.01	
I let my child eat as many snacks as she wants (snack2)	0.57	0.06	-0.01	
No involvement				
I don't know what snacks my child eats (snack6)	0.01	0.96	-0.07	
I don't know how many snacks my child eats (snack9)	0.07	0.47	0.07	
I'm not sure what snacks other people feed my child (snack7)	-0.08	0.41	0.23	
Emotional feeding				
I give my child a snack to make her feel better (snack29)	-0.05	0.06	0.74	
I give my child a snack to improve her mood (snack28)	0.01	-0.02	0.71	
I give my child a snack to show her I love her (snack19)	0.01	0.06	0.65	
I give my child a snack to make her happy (snack18)	0.06	-0.01	0.62	
Model 2: Autonomy support	Factor 1	Factor 2	Factor 3	Factor 4
Praise/encouragement				
I tell my child I am proud of her when she chooses a healthy snack (snack98)	0.81	-0.01	-0.01	-0.04
I compliment my child when she eats healthy snacks (snack95)	0.69	0.13	0.05	-0.02
I praise my child for asking for healthy snacks (snack97)	0.65	-0.14	0.18	0.03
I praise my child for trying new snacks (snack99)	0.46	0.14	-0.08	0.09
Child-centered snacks ^{††}				
I buy healthy snacks that I know my child likes (snack100)	-0.05	0.74	0.08	-0.07
I think about what my child likes when giving her a snack (snack103)	0.10	0.55	0.04	0.07
My child and I decide together what she will have for snack (snack104)	-0.02	0.26 [†]	0.36	0.06
I offer my child a snack when she says she is hungry (snack101)	0.10	0.22 [†]	-0.12	0.09
Reasoning and support				
I explain to my child why some snacks are unhealthy (snack92)	-0.02	-0.04	0.92	-0.07
I explain to my child what a healthy snack is (snack90)	0.02	-0.01	0.81	0.10
I explain to my child why her body needs healthy snacks (snack91)	0.11	-0.10	0.59	0.04
I help my child pick out healthy snacks (snack94)	0.15	0.21	0.54	0.02
My child and I decide together what snacks to buy (snack105)	-0.12	0.19	0.35 [†]	0.04

Model 1: Permissiveness				
	Factor 1	Factor 2	Factor 3	Factor 4
I show my child how much I like eating healthy snacks (snack89)	-0.07	0.03	0.26	0.69
I tell my child how good a healthy snack tastes while I eat it (snack87)	0.20	0.03	0.06	0.60
I make sure I eat healthy snacks in front of my child (snack85)	0.05	0.05	0.01	0.45
I take a bite to show my child a healthy snack tastes good (snack88)	0.33	-0.03	-0.07	0.26 [†]
Model 3: Structure				
	Factor 1	Factor 2	Factor 3	Factor 4
I have a routine for my child's snacks	-0.12	-0.00	0.95	0.06
I give my child snacks at about the same time each day	0.14	0.02	0.47	0.08
I plan my child's snacks	0.21	-0.08	0.49	0.12
I bring snacks for my child when we go out for a few hours	0.02	0.29	0.36 [†]	-0.26
I look for places where I can buy healthy snacks	0.71	-0.13	0.13	0.02
When I buy snacks I always look for healthy ones	0.61	0.04	0.03	0.13
I make sure that most snacks in the house are healthy	0.57	-0.07	-0.00	0.17
I prepare healthy snacks so they are easy for my child to eat	0.47	0.34	-0.06	-0.14
I put healthy snacks in containers or bags for my child	0.42 [†]	0.30	0.15	-0.23
I keep healthy snacks in places my child can easily reach	0.34 [†]	-0.02	-0.01	-0.00
I keep unhealthy snacks out of the house	0.14 [†]	0.10	0.26	-0.05
I know how many snacks my child eats	-0.12	0.72	0.00	0.10
I know how much snack my child eats	0.03	0.62	-0.01	0.18
I know what snacks other people give to my child	-0.00	0.57	0.02	0.05
I always check to see what snacks my child has eaten	0.01	0.38	0.15	0.20
I tell my child how much snack she is allowed to eat	0.14	0.03	-0.01	0.68
I have rules about when my child can have snacks	0.09	-0.00	0.02	0.58
I tell my child when she can have a snack	-0.18	0.11	0.07	0.55
I have limits about what my child can have for a snack	0.14	0.24	-0.08	0.36
Model 4: Control				
	Factor 1	Factor 2	Factor 3	Factor 4
I reward my child with a snack she likes when she is good	0.79	0.07	0.02	0.04
I reward my child with a snack she likes when she does something I want her to do	0.73	-0.04	0.01	-0.06

Model 1: Permissiveness	Factor 1	Factor 2	Factor 3	Factor 4
I reward my child with a snack she likes if she eats a good meal	0.70	-0.08	-0.05	0.09
I reward my child with a snack she likes for trying a food I want her to eat	0.69	0.05	-0.02	-0.16
Snacks to manage behavior				
I give my child a snack to stop a tantrum or child attack	-0.06	0.77	-0.09	-0.03
I give my child a snack so she won't act up	0.04	0.75	0.03	-0.12
I give my child a snack to keep her busy in the car	0.19	0.42	0.01	0.14
I give my child a snack when she is bored	-0.01	0.38	0.21	0.05
I give my child a snack to keep her busy when I have things to do	0.32	0.28 [†]	0.10	0.30
Pressure				
I make my child finish her snack	-0.00	0.03	0.67	-0.13
I have to stop my child from playing to make her have a snack	-0.07	0.18	0.46	0.01
I sit next to my child to make sure she eats her snack	-0.07	0.05	0.45	0.14
I make my child stay at the table until she has eaten all of her snack	0.18	-0.21	0.45	-0.04
I try to scare my child by telling her some snacks are bad	-0.06	0.13	0.10 [†]	0.11
Restriction				
I keep snacks in a place that my child cannot reach	-0.01	0.08	-0.09	0.51
I have snacks in my home that my child is not allowed to have	-0.06	-0.09	0.11	0.66
I hide snacks from my child	0.00	-0.03	-0.06	0.53

[†]Item dropped due to a low factor loading or evidence of factor cross loading (i.e., loading on to more than one factor)

^{††}Subscale dropped due to retention of fewer than 3 items

Table 3

Preliminary psychometric properties of the P-SNAQ

Feeding dimension and subscale	Mean (sd)	Alpha	BMIz ^a	Concurrent validity (cross sectional correlations, r)				
				CFQ ^b Pressure	CFQ ^b Restriction	CFQ ^b Monitoring	CFSQ ^c Demandingness	CFSQ ^c Responsiveness
Permissiveness								
No Rules	1.61 (.72)	.68	-.06	.10	-.22*	-.27*	.08	-.15
Uninvolved	1.60 (.72)	.71	.04	.12	.09	-.21*	.15	-.11
Snacks as rewards	1.85 (.83)	.79	.05	.33*	.25*	-.14	.27*	-.15
Autonomy support								
Praise/encouragement	3.61 (.56)	.78	.01	-.05	-.08	.11	-.10	.35*
Reasoning and support	3.61 (.66)	.84	.04	-.09	-.14	.17	-.14	.32*
Role modeling	3.54 (.60)	.72	.04	-.11	-.15	.23*	-.22*	.34*
Structure								
Planning	2.89 (.89)	.72	.09	.07	.11	.34*	-.08	.22*
Availability and accessibility	3.43 (.61)	.76	.01	-.02	-.10	.23*	-.07	.24*
Monitoring	3.34 (.37)	.78	.04	-.02	-.04	.27*	-.13	.13
Limit setting	3.26 (.69)	.71	.08	.01	.13	.24*	-.05	.06
Control								
Snack as rewards	2.78 (.87)	.82	.01	.43*	.31*	-.18*	.39*	-.26*
Snacks to manage behavior	1.50 (.62)	.68	.08	.11	.14	-.19*	.22*	-.29*
Pressure	2.17 (.81)	.64	.05	.23*	.13	-.06	.13	-.10
Restriction	2.26 (.88)	.53	.07	.21*	.36*	.01	.21*	-.27*

Bold text p<.05;

^aN=288 (all samples); partial correlations adjusted for time between anthropometric measurements and survey completion;^bN=122 (Pennsylvania=60, Texas=62, Michigan=0);^cN=121 (Pennsylvania=59, Texas=62, Michigan=0)

P-SNAQ = Parenting around SNAcking Questionnaire; CFQ = Child Feeding Questionnaire