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A comprehensive assessment of food parenting practices: development and psychometric testing of HomeSTEAD's family food practices survey

ABSTRACT

Background: Parents' food parenting practices have a significant influence on children's dietary intake and risk for obesity and chronic disease. Understanding the impact and interactions between parents' practices and children's behavior is limited by a lack of development and psychometric testing and/or limited scope of current measures. HomeSTEAD (Home Self-administered Tool for Environmental assessment of Activity and Diet) was created to address this gap.

Objective: This paper describes development and psychometric testing of HomeSTEAD's family food practices survey.

Participants/Design: Between August 2010 and May 2011, a convenience sample of 129 parents of children ages 3-12 years were recruited from central North Carolina and completed the self-administered HomeSTEAD survey on three occasions during a 12 to 18-day window. Demographics and child diet were assessed at Time 1. Child height and weight were measured during the in-home observations (following Time 1 survey).

Statistical analysis: Exploratory factor analysis (EFA) with Time 1 data was used to identify potential scales. Scales with more than three items were examined for scale reduction. Following, mean scores were calculated at each time points. Construct validity was assessed by examining Spearman rank correlations between mean scores (Time 1) and children's diet (fruits and vegetables, sugar-sweetened beverages, snacks, sweets) and BMI z-scores. Repeated measures analysis of variance was used to examine differences in mean scores between time

points; and single-measure intraclass correlations (ICC) were calculated to examine test-retest reliability between time points.

Results: EFA identified 24 factors and retained 124 items; however, scale reduction narrowed items to 86. The final instrument captures five Coercive Control practices (16 items), seven Autonomy Support practices (24 items), and 12 Structure practices (46 items). All scales demonstrated good internal reliability ($\alpha>0.62$), 18 factors demonstrated construct validity (significant association with child diet, $p<0.05$), and 22 demonstrated good reliability (ICC>0.61).

Conclusions: HomeSTEAD's family food practices survey provides a brief, yet comprehensive and psychometrically sound assessment of food parenting practices.

Development of a comprehensive assessment of food parenting practices: HomeSTEAD's family food practices survey

INTRODUCTION

Dietary guidelines offer advice for a healthful diet — one that provides adequate nutrition, promotes a healthy weight, and prevents chronic disease.[1] Unfortunately, data from many countries around the world (Australia,[2] Europe,[3] and North America[4,5]) have demonstrated that children's eating patterns fail to meet these recommendations. For example, few children in the US consume recommended intakes of whole grains (<1%), vegetables (7%), fruit (29%), and milk (37%), and most exceed recommended limits for solid fats (97%) and added sugars (90%).[4]

Parents play an important role in children's socialization, including the norms and habits they adopt with regards to food and eating.[6] Parents' behaviors shape the physical and social environment in which their children grow up, influencing their home environment as well as their children's interactions with the outside world. "Food parenting practices" refers to the behaviors or actions (intentional or unintentional) performed by parents for child rearing purposes that influence their children's attitudes, behaviors, or beliefs around food and eating.[7] Literature in this area suggests that parent practices such as making healthy foods more available, modeling healthy eating, and providing encouragement to eat healthy foods help promote children's consumption of those healthy foods.[7,8] In comparison, practices such as restriction, pressure, and food bribes may inadvertently promote increased intake of unhealthy foods.[9-14]

One of the barriers to fully understanding how the home environment, and specifically food parenting practices, influences children's dietary intake is availability of appropriate measures.[15] While there are many measures available, they are often limited in scope and have not undergone a comprehensive process of development.[15] Development often lacks clear conceptualization of what the instrument is designed to measure, fails to use systematic or informed approaches to selecting and refining items, and includes incomplete reliability and validity testing.[15] In order to advance our understanding of how the home environment influences children's dietary intake and eating behaviors, the field needs a comprehensive measure of food parenting practices with items that have undergone a rigorous development process including reliability and validity testing.

HomeSTEAD, the Home Self-administered Tool for Environmental assessment of Activity and Diet, is a newly developed instrument designed to address this gap in measurement by providing a comprehensive evaluation of home environmental factors thought to influence children's diet and physical activity.[16] HomeSTEAD builds upon our previous work to develop the Healthy Home Survey,[17] an assessment of the home environment related to children's eating and activity. While the Healthy Home Survey provided a useful pilot measure, a more expanded instrument was needed.

For HomeSTEAD, two frameworks were adopted to help guide identification of relevant constructs and ensure comprehensive coverage. The Analysis Grid for Environments Linked to Obesity (ANGELO) framework[18] and the Model of the Home Food Environment Pertaining to

Child Obesity[19] both recognize multiple spheres of influence — physical, political, socio-cultural, economic — that influence child weight and weight-related behaviors. When considering their application to the home environment, it resulted in the development of a four-part instrument: a home food inventory (physical food environment), a family food practices survey (social food environment), a home physical activity and media equipment inventory (physical environment around physical activity), and a family physical activity and screen time practices survey (social environment around physical activity).[16] The development of this new instrument, specifically the component for the social environment around food, afforded the opportunity to develop a comprehensive assessment of food parenting practices.

The purpose of this paper is to describe the development and psychometric testing of the scales related to the home's social food environment. This has been conceptualized primarily as food parenting practices.

METHODS

Methods used to develop the HomeSTEAD tool are described in detail elsewhere, but the aspects most relevant to the development of its family food practices survey are provided below.[16] All protocols were approved by the Institutional Review Board at the University of North Carolina at Chapel Hill (09-1177), and all participants provided written informed consent.

HomeSTEAD Instrument Development

HomeSTEAD's family food practices survey was developed using a mixed methods approach, which began with identifying a theoretical framework and conducting a systematic review of the

literature. Following the application of the ANGELO framework,[18,19] a systematic review was conducted to identify current measures of food parenting practices.[15] The review led to the refinement of constructs resulting in a content map of food parenting practices, which has recently been published.[7] Concurrently, items and scales from existing measures identified in this review were cataloged into a database and categorized according to the content map. When existing items were available, the research team reviewed sets of similar items and selected those that were deemed to be the most relevant for that construct. When existing items were not available, the research team developed new items. Where possible, response options were standardized across sections of the HomeSTEAD survey. For example, food parenting-related items generally used 5-point likert-type response scales (e.g., 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always; or 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

Content validity of this initial collection of items was assessed with the help of two expert reviewers. Experts were asked to provide feedback and suggestions related to content coverage, item relevance and intention, and question format and clarity. The instrument was refined based on this feedback.

Then, one-on-one guided cognitive interviews were conducted with parents of 3–12 years old children to examine clarity and comprehension of items. Participants for the cognitive interviews were recruited through newspaper advertisements, listserv notifications, and community postings. Each cognitive interview focused on just one of the four sections in HomeSTEAD, which reduced participant burden and limited interviews to 45 minutes or less. For the family

food practices section, the first round of cognitive interviews included 11 parents. Content analysis of these interviews allowed problematic items to be identified, discussed by the team, and revised. Revised items underwent a second round of cognitive interviews with five additional parents, at which time items were deemed acceptable (no remaining issues regarding clarity or interpretation of items). Participants received $15 as an incentive for participation.

At the end of this stage, HomeSTEAD included 214 items dedicated to assessment of food parenting practices.

Survey Administration

A convenience sample of 129 families with at least one child between the ages of 3 and 12 years old were recruited for instrument testing (August 2010-April 2011). Recruitment strategies employed were similar to those described above for cognitive interviews. The sample size was based on power calculations that would ensure adequate reliability evidence (assuming a kappa of 0.60, 80% trait prevalence, alpha of 0.05, and beta of 0.80).[20] While a larger sample size would be desired for the exploratory factor analysis part of instrument testing,[21] pragmatic constraints (e.g., funding, resources) prohibited it. When participants had more than one child in the target age group, one child was selected to serve as the "reference" child. Initially, selection was random. However, to ensure that there was an even distribution of children across the 3-12 year old age range, older children were often selected as the reference child for participants recruited later. In addition to having at least one child in the target age group, eligibility criteria also specified that the reference child could not have physical limitations that would impact their diet or physical activity behavior (e.g., extreme food allergies, physical disability), the family

must reside in central North Carolina with no plans to move during the study period, and that the parent be able to speak English. Participants were offered up to $100 for completing the full protocol.

Participants completed all four sections of the self-administered HomeSTEAD survey at three separate time points over a period of 12 to 18 days and allowed research staff to conduct an in-home observational assessment (see Figure 1 for timeline). The Time 1 HomeSTEAD survey was mailed to participants along with a demographic survey, a child diet screener,[22] and a consent form. The survey instructions reminded parents to keep the reference child in mind when responding to questions and to select responses that best reflected what they actually do, think, and feel. Two or three days later, staff conducted a scheduled home visit. During these home visits, staff collected signed consent and all Time 1 surveys, completed an observational assessment of the home's physical environment (e.g., foods and beverages present in the home), and measured children's height and weight. Height was measured to the nearest 1/8 inch using a Shorr or Seca stadiometer (Shorr Productions, Olney, MD; Seca Corporation, Columbia, MD); weight was measured to the nearest 0.1 pounds using a Seca portable electronic scale (model 770 or 874, Seca Corporation, Columbia, MD). All measures were taken while participants were in light clothing and no shoes. Participants received the Time 2 HomeSTEAD survey at the conclusion of the home visit with instructions to return the survey via mail within 24 hours. Approximately 10 days later, participants were mailed the Time 3 HomeSTEAD survey with instructions to complete and return the survey within 4 days. If the third survey was not completed and returned within an additional 10 days (even after repeated reminder calls), that

participant's data were not included in the analysis. All data were collected between August 2010 and May 2011.

Statistical Analysis

Using Time 1 data, responses to individual items were reviewed to evaluate missingness and variability in responses. Items were flagged if 80% or more of responses fell within two response options, or 75% or more of responses fell within one response option, indicating low variability and questioning the item's usefulness in distinguishing unique participant characteristics. Additionally, items were flagged if correlations between items were 0.75 or higher given that high correlations can suggest duplication of the concepts being assessed.

Following this preliminary review of the data, exploratory factor analyses (EFA) were used to identify potential food parenting practice scales. All EFAs were performed in MPlus Version 7.3[23] using Time 1 data. Given the limited sample size (n= 129) and the large number of items (n=214), preliminary sorting of items was necessary. An emerging content map of food parenting practices (noted earlier)[7] guided the sorting of items into three broad categories: Coercive Control, Autonomy Support, and Structure. Separate EFAs were performed on items from each broad category; however, some items where categorization was less clear were examined in more than one category. A weighted least squares minimum variance estimator and geomin rotated solution were used. Factor solutions were evaluated based on eigenvalues, scree test, and interpretability criteria (e.g., comparative fit index, root mean square of approximation).[21,24] Items with low factor loadings (<0.40) were eliminated individually (item with lowest factor loading eliminated first); the EFA was then repeated. If an item cross-loaded (>0.40 on multiple

194 factors), the item was included in the factor with the higher loading. Items that has been flagged
195 as having high correlations (>0.75) were considered throughout this process of refining which
196 items would be eliminated or retained. Once factors were identified, a composite score for each
197 scale was calculated by averaging scores from its individual items, including reverse coding
198 when necessary.
199
200 Scales with more than three items were examined for possible scale reduction. For each scale,
201 multiple versions of reduced scales were examined, and several criteria were considered when
202 deciding which items to include in the final reduced scale. Criteria included factor loadings of
203 individual items (giving preference to items with higher loadings), comparability of the reduced
204 scale's internal consistency to that of the original scale (giving preference to those maintaining a
205 Cronbach's alpha >0.7),[25] and observed correlations between the full versus reduced scales and
206 child dietary outcomes (with higher correlations suggesting greater construct validity). The latter
207 was assessed using Spearman rank correlations between the reduced scales' composite scores
208 and children's dietary outcomes (weekly intake of fruits and vegetables, sugar-sweetened
209 beverages, snacks, and sweets intake from parent-completed screener of child diet) and BMI z-
210 scores.
211
212 Following the scale reduction process, mean scores (SD) for the final reduced scales were
213 determined from data taken at each time point (Time 1, 2 and 3). Mean differences were tested
214 using repeated measures analysis of variance (ANOVA); single-measure intraclass correlations
215 (ICC) were calculated to examine test-retest reliability. The single-measure ICC, ICC(1,1) from
216 Shrout and Fleiss,[26] estimates reliability given a single random administration. ICCs of 0.61-0.80

indicate moderate agreement, and ICCs of 0.81-1.00 indicate substantial agreement.[27] Correlations, ANOVA, and ICC analyses were conducted using SAS® software, Version 9.4 of the SAS System for Windows (SAS Institute, Cary, NC, released July 2013).

RESULTS

Parents in the study sample (n= 129) were predominately mothers (91%). The sample included a mix of racial and income groups. The majority was white (71%) or African American (25%), but very few were Hispanic or Latino (3%). The majority had a household income above the area's median (68% with annual household income ≥$50,000) and were well educated (79% college degree or higher). Children in the sample included similar numbers of boys and girls (51% vs 49%, respectively), were on average 7.1 ± 2.9 years old, and had a BMI percentile of 59.6 ± 27.1. An additional 19 parents (separate from the 129 already described) completed the screening process but did not end up participating due to ineligibility (child too young (3), moving/distance from project office (2)), scheduling conflicts (11), or participation in other studies that would be disrupted by participation in this study (3). Compliance with study protocols was high with 125 parents (97%) completing the all three self-administrations and the home observation. Participants also completed the multiple self-administrations in a timely manner. On average, there were 3.9 ± 3.7 days between Time 1 and Time 2 self-administrations and 12.4 ± 5.6 days between Time 2 and Time 3 self-administrations.

The initial EFA identified 24 factors and retained 124 of the 214 items, including five factors (28 items) within Coercive Control, seven factors (34 items) within Autonomy Support, and 12 factors (62 items) within Structure. Nineteen of the 24 factors had greater than three items per

factor, and therefore underwent examination for scale reduction. Following the scale reduction process, Coercive Control scales were reduced from 28 to 16 items; Autonomy Support scales were narrowed from 34 to 24 items; and Structure scales were trimmed down from 62 to 46 items; resulting in a final instrument with 86 items.

Coercive Control Scales

The Coercive Control scales included restriction, soothing with food, threats and bribes, "clean plate" policy, and pressure to eat. All scales had 3-4 items and acceptable internal consistency (Cronbach's α all ≥0.62). Table 1 provides the items, factor loadings, and Cronbach's alphas for each of these five scales. Composite scores for each of these scales are calculated by averaging the individual items (i.e., Likert responses) within each scale. For all Coercive Control scales, higher scores reflect greater use of those practices.

Autonomy Support Scales

Autonomy Support scales included encouragement, reasoning, praise, nutrition education, and guided choices around when, what, and the amount of food eaten. Each of the scales was reduced to 3-4 items. The final reduced scales had acceptable internal consistency (Cronbach's α all ≥0.66). Table 2 provides the items, factor loadings, and Cronbach's alphas for each of these seven scales.

Similar to the Coercive Control scales, composite scores are calculated by averaging the individual items, taking into consideration reverse scoring where noted. For most scales, higher scores reflect greater use of that specific practice. The practice of guided choices presents a

challenge for this standard approach to measurement and interpretation. Guided choices represents a balance between parent and child control over when, what, and how much the child eats. For example, the "parent allows the child a choice in what he/she eats, but options from which the child must choose are determined by the parent."[7] Assessing this construct often requires measuring the two extreme behaviors – parents making decisions unilaterally vs. children having unrestricted choice in their eating. Currently, higher scores reflect greater child choice and control and lower scores reflect greater parent control. Scores closer to the middle may be a better reflection of this balance.

Structure Scales

Lastly, the Structure scales captured a broad array of parenting practices that build eating competence in children. These factors included monitoring of unhealthy foods, rules and limits around unhealthy foods, components of the child's eating environment (i.e., meal setting, family eating, atmosphere of meals, eating area, and distractions), planning and preparation of healthy meals, attractive presentation of healthy foods, availability and accessibility of healthy foods, modeling, and weight talk. Some of the final scales in this category were slightly longer (up to 6 items). Again, all had acceptable internal consistency (Cronbach's α all ≥ 0.62). Table 3 provides the items, factor loadings, and Cronbach's alphas for each of these 12 scales. One deviation in the standard factor analysis was the movement of an item (i.e., Do you have fruits and vegetables that your child likes available at home?) from planning and preparation of healthy meals (where its factor loading was 0.60) into availability and access (where its factor loading was 0.32). Movement of this item allowed both scales to be more consistent with how these practices have been conceptualized in the feeding literature.

As in other sections, composite scores for each of these scales are calculated by averaging the individual items, taking into consideration reverse scoring where noted. Higher scores generally reflect greater use of practices that provide positive structure. Two clarifications to note are the scoring for distractions and weight talk. For distractions, a higher score reflects greater presence of distractions during meals, which in turn reflects a lack of structure. Also, the factor analysis and scale reduction of the distractions scale also suggested that differentiating between weekday and weekend day practices may be unnecessary. While original items asked about weekday and weekend day practices separately, it is likely sufficient to ask about the practices across a typical week. In the current analysis, there was a high correlation between weekday and weekend versions of the item so only the weekday version was retained. Similar findings were also observed in the family eating scale. With regard to the weight talk scale, higher scores reflect greater discussion of weight and dieting by family members. Such practices have been shown to be associated with disordered eating.[28,29] Therefore, for the distractions and weight talk scales, higher scores do not reflect positive structure.

Table 4 provides average composite scores for factors from each of the three sections described.

Reliability

Means (SD) for factor composite scores at Times 1, 2, and 3 and reliability testing (ICC) are shown in Table 4. ANOVA testing did not find any significant differences between the means from the three time points for any of the factors. Of the 24 factors, 22 (92%) had ICC scores greater than 0.61, indicating moderate or better agreement. Four of these 22 factors had ICC

scores greater than 0.81, indicating substantial agreement: (1) meal setting, (2) family eating, (3) eating area/physical space, and (4) planning and preparation of healthy meals. The other two scales had ICC scores just slightly below 0.61 (soothing with food ICC = 0.60, guided choices: what food is eaten ICC 0.57).

Construct Validity

Correlations between factor composite scores and parent-reported children's weekly consumption of fruits and vegetables, sugar-sweetened beverages, snacks, and sweets are reported in Table 5. Observed intakes were as follows: 3.3 servings/day (±1.7) of fruits and vegetables (servings of fruits, but not juices, and vegetables, but not fried potatoes), 0.6 servings/day (±0.9) of sugar-sweetened beverages (fruit and sport drinks, flavored waters, regular soda), 0.8 servings/day (±0.8) of snacks (potato chips, tortilla chips, cheese nibs, chex mix, etc.), and 1.1 servings/day (±0.8) of sweets (candy, breakfast pastries, cookies, brownies, pies, cakes, and ice cream). Correlations between all factor composite scores and child BMI z-scores were also examined but were not significant (results not shown).

Three of the five Coercive Control scales were significantly associated with aspects of child dietary intake. These associations were in the predicted direction with more coercive controlling practices being associated with lower intakes of healthy foods and higher intakes of unhealthy foods. Specifically, more frequent parental restriction was associated with decreased consumption of fruits and vegetables ($r = -0.27$, $p<0.01$) and increased consumption of sugar-sweetened beverages ($r = 0.49$, $p<0.01$). Additionally, coercive control practices related to "clean

plate" policies and pressure to eat were significantly associated with increased consumption of snacks ($r = 0.23$ and 0.22, respectively, $p<0.05$).

Most scales within the Autonomy Support category were significantly associated with child intake of fruits and vegetables, sweetened beverages, sweets, or snacks. In addition, observed associations were generally in the predicted directions, with autonomy supporting practices being associated with greater intakes of healthy foods and lower intakes of unhealthy ones. Specifically, more frequent encouragement and nutrition education were associated with increased consumption of fruits and vegetables ($r = 0.38$ and 0.36, respectively, $p<0.01$). Greater child vs. parent choice over the amount of food eaten was significantly associated with decreased consumption of sugar-sweetened beverages ($r = -0.28$, $p<0.01$) and snacks ($r= -0.37$, $p<0.01$). More frequent nutrition education was significantly associated with decreased consumption of sweets ($r = -0.20$, $p<0.05$). However, a few unexpected correlations were observed between praise and guided choices over what the child eats and consumption of snacks.

Ten of the 12 Structure scales were significantly associated with various aspects of child intake. Once again, associations were in the predicted direction with greater structure being associated with higher intakes of healthy foods and lower intakes of unhealthy ones. Specifically, most of the Structure practices were significantly associated with increased consumption of fruits and vegetables ($r = 0.23$ to 0.50, $p<.05$) and decreased consumption of sugar-sweetened beverages ($r = -0.18$ to -0.42, $p<.05$). In addition, greater rules and limits around unhealthy foods, planning and preparation of healthy meals, and modeling were associated with decreased consumption of sweets and snacks ($r = -0.21$ to -0.31, $p<.05$). Increased consumption of sweets and snacks was

associated with more frequent use of TV during meals (i.e., distractions) ($r = 0.21$ and 0.25, respectively, $p<.05$). In contrast, distractions or more frequent use of TV during meals was significantly associated with decreased consumption of fruits and vegetables and increased consumption of sugar-sweetened beverages ($r = -0.21$ and 0.39, respectively, $p<.05$).

DISCUSSION

The development of this instrument represents a significant advancement in the measurement of food parenting practices. Unlike many other measures to date, the instrument provides a comprehensive set of scales to measure food parenting practices created through a rigorous process of development. The Healthy Home Survey represented an initial attempt by this team to produce a comprehensive measure; however, it was guided more by the literature and factors that had already been identified as predictors of child diet (and physical activity) behaviors.[17] For HomeSTEAD, development was guided more by theory, specifically the ANGELO framework. Its development was also informed by a systematic literature review[15] and an emerging content map developed by experts in the field;[7] keeping this instrument aligned with the most current thinking in the field. The development process also included a review of potential items by an expert panel, cognitive testing with a sample of parents, factor analyses of scales, assessment of construct validity, and evaluation of test-retest reliability. The resulting instrument offers a comprehensive assessment of the variety of food parenting practices that have been identified in the literature using scales with solid psychometric properties. HomeSTEAD's rigorous development process included five of the six key elements that were recommended as part of a recent review of measures of food parenting practices (conceptualization of instrument purpose, development and refinement of item pool, and assessment of reliability and validity).[15]

The scope and breadth of HomeSTEAD's family food practices survey will facilitate a greater understanding of how parents' practices influence child diet and weight. Prior to the development of the HomeSTEAD instrument, the most comprehensive measures captured only 10-12 practices.[30-33] HomeSTEAD, in comparison, captures 24 practices. Also, there is a nice overlap between the scales assessed and the most recent food parenting practices content map (see Figure 2 for illustrated comparison). Having a comprehensive assessment of food parenting practices will allow future researchers to assess the relative importance of these practices and how the use of practices might interact to influence child eating habits and weight.

Assessment of construct validity (i.e., associations between food parenting practice scales and markers of child diet) provides some initial assessment of the relative importance of these practices. For example, restriction, nutrition education, guided choices, rules and limits, family eating, distractions, planning and preparation of healthy meals, and modeling appear to be more important, while atmosphere, eating area, and weight talk may be less important. Future studies are needed to confirm these associations using more rigorous diet assessment protocols (e.g., 24-hour diet recall, food diary) in larger, more diverse samples with longitudinal data.

The construct validity testing did produce some unexpected results, specifically for praise and guided choices, which may help the field refine how each of these practices are conceptualized. In the literature, verbal praise and encouragement have been shown to be associated with increased intake of healthy foods (e.g., fruits and vegetables) in children.[8,34-36] However, similar associations were not observed in the current study. In contrast, a significant positive association

was observed between parent's use of praise and children's intake of snacks. These unexpected findings may suggest that the construct of praise, and the scale used to assess it, may be interpreted differently by different parents and would benefit from refinement to focus on praise offered for eating healthy foods (e.g., fruits and vegetables, whole grains, and lean proteins) and not just foods offered. Guided choices is a relatively new construct in the feeding literature; however, experts hypothesize that the practice of guided choices should promote healthier intakes in children.[7] The current study showed mixed results around guided choices. When parents allow children greater choice in what foods are eaten, children appear to eat more snacks and sweets. However, when children are allowed greater choice in the amount of food eaten, children appear to consume fewer sugar sweetened beverages and snack foods. These findings appear to support Satter's Division of Responsibility in Feeding,[37-39] which suggests that parents decide what foods are offered and children decide how much of those foods to eat. Therefore, the construct for guided choices may need refinement to emphasize how parents and children share responsibility in food choices – balancing greater parent choice in what is eaten with greater child choice over the amount eaten. Hence, measurement of guided choices may be improved by merging these two scales in a way that emphasizes this more specific division of responsibility in food choices. These unexpected findings around praise and guided choices offer an opportunity and guidance for advancing the conceptualization of these practices.

A few limitations to this study are important to acknowledge. First, a brief dietary screener that included only a few markers of child dietary intake was used to assess construct validity. Several additional markers of diet quality were not assessed, including intakes of dark green vegetables, whole grains, and lean proteins. Despite the limitations of the screener, the associations that were

observed between food parenting practices and the markers of child diet were generally in the hypothesized direction. Our sample size, selected for psychometric evaluation, limited our ability to explore differences across age groups. The sample included only about 40 children in each age group (i.e., 3-4 years, 5-8 years, 9-12 years). Child age likely influences parent use of various food parenting practices and the impact those practices have on child intake (e.g., younger children need greater assistance and support, but older children can build off of basic skills and be more independent). While it was beyond the scope of the current study to explore these age-related differences, the final HomeSTEAD instrument is appropriate for the full age range and will be useful in future studies trying to understand the evolution of parents feeding practices. Our limited sample size also necessitated the presorting of items prior to the EFA. While an emerging content map of food parenting practices was used to guide this process, it did make certain assumptions about grouping of items and influenced the identification of factors. Confirmatory analysis in a larger sample is needed. Another limitation of the sample was the lack of socio-economic diversity. Future research will need to evaluate instrument performance in a more diverse population, including low-income parents. Additionally, the short period of time between administrations might explain in part the high ICCs (and lack of significant differences) observed during the reliability testing. However, only 4 of the 24 factors showed "substantial agreement", thus illustrating some variability even during this short period of time. Finally, the study lacked evidence for criterion validity and sensitivity to change. The HomeSTEAD study was designed to capture criterion validity evidence for characteristics of the physical environment using a comparison of the parent survey to an in-home assessment by trained data collectors. While the physical environment was measured (e.g. food availability), this 1-hour home visit provided insufficient opportunity to accurately assess parent food

practices. Scheduling of these home visits often avoided meal times (which would have been necessary to observe food parenting practices), and the process of data collection tended to disrupt normal routines. Evidence for sensitivity to change is also lacking as it would require employment of the instrument in an intervention study. Several of the limitations noted were beyond the scope of the current project. These limitations are far outweighed by the numerous study strengths, one of which was the rigorous process used to develop and refine the item pool (incorporating a systematic review of existing measures[15] and an emerging food parenting practices content map[7]). Additionally, identification of the final scales used a multi-step process that began with an EFA, but also worked to simplify and shorten scales to create an efficient assessment instrument. Furthermore, the study allowed for assessment of variation in responses across repeat administrations, test-retest reliability, and construct validity. Results of this extensive testing demonstrated sound psychometric properties and supports the usefulness of the HomeSTEAD family food practices survey in future research.

CONCLUSIONS

The HomeSTEAD instrument is intended to provide a comprehensive assessment of environmental factors in the home that influence children's food, physical activity, and screen time behaviors. HomeSTEAD's family food practices survey, the focus of this study, is an integral piece of this larger tool. The scales within this survey align closely with the current literature, integrating up-to-date terminology and definitions for food parenting practices. Psychometric testing demonstrated moderate to high levels of internal and external reliability and construct validity. While HomeSTEAD was designed to be comprehensive, it does not have to be used in its entirety. When used in future research, it will likely need to be customized based on

what constructs are identified as most relevant for the study as well as the age of the children involved.

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