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4 **Development of an item bank for food parenting practices based on published instruments**
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7 **and reports from Canadian and US parents**
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9 Teresia M. O'Connor¹, Truc Pham¹, Allison W. Watts², Andrew W. Tu³, Sheryl O. Hughes¹,
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11 Mark R. Beauchamp⁴, Tom Baranowski¹, Louise C. Mâsse³
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14 ¹ USDA/ARS Children's Nutrition Research Center, Baylor College of Medicine, Houston, TX,
15
16 USA
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18 ² Division of Epidemiology and Community Health, School of Public Health, University of
19
20 Minnesota, Minneapolis, MN, USA
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22

23 ³ Child & Family Research Institute, School of Population and Public Health, University of
24
25 British Columbia, Vancouver, BC, Canada
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28 ⁴ School of Kinesiology, University of British Columbia, Vancouver, BC, Canada
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37 **Corresponding author:**
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39 Teresia O'Connor, MD, MPH
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41 **Address:**
42

43 Children's Nutrition Research Center
44

45 1100 Bates St
46
47

48 Houston, TX 77030
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50 teresiao@bcm.edu
51
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56 **Abbreviations:** US: United States, NIH: National Institutes of Health, IRM: Item Response
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58 Modeling, CIHR: Canadian Institute of Health Research
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Abstract

Research to understand how parents influence their children's dietary intake and eating behaviors has expanded in the past decades and a growing number of instruments are available to assess food parenting practices. Unfortunately, there is no consensus on how constructs should be defined or operationalized, making comparison of results across studies difficult. The aim of this study was to develop a food parenting practice item bank with items from published scales and supplement with parenting practices that parents report using. Items from published scales were identified from two published systematic reviews along with an additional systematic review conducted for this study. Parents (n=135) with children 5-12 years old from the US and Canada, stratified to represent the demographic distribution of each country, were recruited to participate in an online semi-qualitative survey on food parenting. Published items and parent responses were coded using the same framework to reduce the number of items into representative concepts using a binning and winnowing process. The literature contributed 1,392 items and parents contributed 1,985 items, which were reduced to 262 different food parenting concepts (26% exclusive from literature, 12% exclusive from parents, and 62% represented in both). Food parenting practices related to 'Structure of Food Environment' and 'Behavioral and Educational' were emphasized more by parent responses, while practices related to 'Consistency of Feeding Environment' and 'Emotional Regulation' were more represented among published items. The resulting food parenting item bank should next be calibrated with item response modeling for scientists to use in the future.

INTRODUCTION

Childhood obesity continues to be a public health concern in much of the world, and children's dietary intake is an important contributing factor to the development of obesity. Many children do not meet dietary guideline recommendations; instead their intake patterns increase their risk of developing obesity, diabetes, heart disease and some cancers (Ogata & Hayes, 2014; US Department of Health and Human Services, US Department of Agriculture, Dietary Advisory Guidelines Committee, 2005). In the United States (US), only about 3% of 2-18 year old children met the 2005 US Dietary Guideline (US Department of Health and Human Services, US Department of Agriculture, Dietary Advisory Guidelines Committee, 2005) limits for energy from solid fats and added sugar (Kirkpatrick, Dodd, Reedy, & Krebs-Smith, 2012), while 15% and 0.5% met the recommended total fruit and vegetable intakes, respectively (Kirkpatrick et al., 2012). Moreover, merely 10-37% of US children (Guenther, Dodd, Reedy, & Krebs-Smith, 2006) and about 30-40% of Canadian children (Garriguet D., 2004) consumed at least five servings of fruit and vegetables per day (lower than the 2005 US Dietary Guidelines).

Recommendations by the American Heart Association and the American Academy of Pediatrics state that prevention and treatment of childhood obesity should be targeted at the family level (Barlow, 2007; Daniels et al., 2005), with a growing interest in targeting and understanding how parenting can promote healthier lifestyle behaviors in children. From this, a large body of studies has evolved to assess the impact of food parenting practices on children's food consumption. Parenting practices are the actions parents engage in to influence their child's corresponding behavior in a specific context, such as eating (Darling & Steinberg, 1993). These practices differ from parenting styles, which represent the emotional climate that a parent establishes between him/herself and their child (Darling & Steinberg, 1993).

With the growing interest in food parenting practices, numerous instruments have been developed to measure these practices. Two recent reviews identified 57 unique food parenting practice instruments for children 2 to 12 years old (A. Vaughn, Tabak, Bryant, & Ward, 2013) and 21 unique food parenting practices for children 0 to 5 years old (de Lauzon-Guillain et al., 2012). The large number of available instruments from different fields of study (e.g. nutrition, psychology, and medicine) has led to inconsistency in defining food parenting constructs. There is currently no agreement as to which parenting constructs or dimensions should be assessed by these instruments or how a specific dimension should be operationalized. What has resulted is a field in which different investigators will use a similar item to assess constructs with different labels. For example, versions of the item “Offer/Reward your child with sweets/desserts if they eat (meal or healthy option)” have been used in several measures in which the authors classified it into a different dimension, including instrumental feeding (Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002), parent-centered feeding (Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005), practical methods (O’Connor et al., 2010), pushing the child to eat more (Baughcum et al., 2001), and use of rewards (Hendy, Williams, Camise, Eckman, & Hedemann, 2009). As a result, it is not always clear what these dimensions mean, how they relate, or whether they can be compared across studies. In addition, a wide range of approaches have been used to develop items for food parenting practice instruments and authors have inconsistently reported on the psychometric properties of resulting scales(de Lauzon-Guillain et al., 2012; A. Vaughn et al., 2013), making it even more difficult to compare or aggregate results across studies.

One approach to address these measurement concerns is to utilize the framework of the NIH PROMIS initiative for developing a repository of calibrated items (i.e., an item bank) with

Item Response Modeling (IRM) which has improved the assessment of patient reported outcomes (see www.nihpromis.org/ NIH PROMIS initiative) (Revicki & Cella, 1997). However, such methods have received little attention in the behavioural sciences (Mâsse, Wilson, Baranowski, & Nebeling, 2006) or food parenting research (Masse & Watts, 2013). IRM item banking provides an ideal platform for creating a repository of items in which only psychometrically-valid items are ultimately included in the item bank. Most importantly, IRM item banking provides the platform for using Computerized Adaptive Testing (CAT) which allows scientists the flexibility of selecting which items are included as relevant in a given study while maintaining the ability to compare results across studies, yet reducing participant burden (Mâsse et al., 2006). The initial step in developing a food parenting practice IRM item bank is to populate the bank with published items that can be further assessed in planned future studies. These items should be “binned” or classified into the appropriate latent construct to represent the dimensions of the conceptual framework (DeWalt, Rothrock, Yount, & Stone, 2007). The pool of items should then be reduced into representative items using a winnowing process to eliminate redundancy, rewritten to eliminate double-barrelled items, and modified to clarify poorly worded items. Finally, new items should be generated to cover missing constructs or concepts less well represented.

The specific aims of this study were to a) populate a food parenting practice item bank with published items, b) supplement the published items with parenting practices that parents report using to get their child to eat healthy (that are/were not included in the published measures), and c) examine the extent to which the parent reported food parenting practices were incorporated in published instruments. The ultimate goal is to develop an item bank of food

parenting practices with expert-derived dimensions to facilitate consistent measurement of food parenting practices.

METHODS

To develop an item bank of food parenting practices for elementary school aged children (5-12 years old), published instruments were systematically identified and scales and items were retrieved. To ensure our final item bank included those parenting practices that parents reported using, data were also collected on Canadian and US parents to determine what practices they commonly used to get their 5 to 12 year old children to eat healthily. After comparison with what was retrieved from the literature, the parent reported practices were used to supplement the published items to create a more complete item bank. This research protocol was approved by the Research Ethics Board at the University of British Columbia and received Institutional Review Board approval from Baylor College of Medicine.

Identifying published instruments

Published food parenting practice (food parenting practice) instruments were identified by: 1) assessing published systematic reviews for related articles, 2) conducting an additional systematic review to include recent studies, and 3) reviewing reference lists from retrieved articles to identify publications not included in the systematic reviews (Figure 1). The process for developing the nutrition-related parenting practice item bank was conducted in parallel with identifying physical activity related parenting practice measures (manuscript submitted). Therefore, instruments were also identified that included both physical activity and nutrition items.

Published systematic reviews

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9 113 All articles and instruments from these reviews were obtained and evaluated to determine their
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12 114 inclusion in the database. If the article did not provide the complete or original measure, the
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14 115 original authors were contacted in attempts to obtain the items.

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16 116 Articles were included in the database if they utilized measures with: a) at least one scale
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19 117 on parenting or caregiver behaviors related to children's eating, nutrition, or food intake; b) more
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21 118 than one item; c) parent, child, or proxy report; d) an English version; and e) a target population
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24 119 that included children between 2 to 16 years old in part or whole (in order to be comprehensive
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26 120 and identify those instruments within our targeted age range of 5-12 years old, such that
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29 121 instruments for 2-5 year olds or 10-16 years old were also included). A broad age range was
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31 122 included for the published articles to capture instruments assessing food parenting from
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34 123 preschool through adolescents to increase the pool of items. Articles that described the
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36 124 development or evaluation of a measure, or the modification or addition of items, structure, or
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38 125 psychometrics to an existing measure were also included.

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41 126 Exclusion criteria were measures that: a) focused solely on breastfeeding, age of
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43 127 introduction of specific food groups, direct observation of behaviors, or children with clinical
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45 128 pathologies or disease; b) assessed only parenting attitudes or styles; or c) assessed only child
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48 129 determinants of behavior, child eating behaviors, food expenditure and time use surveys,
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51 130 children's taste or food preferences, or body image perceptions. Instruments whose items were
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53 131 not published and were not obtained from the authors after multiple requests were excluded.
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56 132 Articles that presented only validity data among children less than two years old, or used an
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58 133 existing instruments without any modifications or new psychometric data were also excluded.
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Additional systematic review

An additional systematic review was conducted by the authors to identify recent articles not captured in previous reviews. (de Lauzon-Guillain et al., 2012; A. Vaughn et al., 2013). This systematic review was conducted in March 2013 using four electronic literature search engines: PubMed, Scopus, PsychINFO, and Educational Resources Information Center (ERIC). Search syntax included terms related to: methodology (i.e. *questionnaire, test, tool, experiment, assessment, measure, instrument, scale*), and parental food parenting practices (i.e. *feeding behavior, feeding practices, food parent practices, feeding styles, parent feeding strategies, parent feeding influences*). *Breastfeeding* was used as an exclusion term to limit results to the target child age range of 2 to 16 years old. Publication dates were limited to January 2009 to March 2013. Titles and abstracts of any new articles identified were evaluated for relevance by two reviewers (Figure 1); those meeting inclusion and exclusion criteria were added to the database. The reference lists of retrieved articles were examined to identify additional articles of interest.

Developing item bank of published instruments

Data extraction

To develop a repository of existing food parenting practice items, data were extracted from each article using electronic forms in Microsoft Access. A formal data extraction protocol was developed and pilot tested to ensure consistency and accuracy in the appraisal of each article. Data extracted included: general information about the article and measurement tool including article reference, country, administration mode, measurement structure (uni- or multi-dimensional), and whether the study was linked to any previous measures (supplemental

validation study, modified measure, etc.); sample(s) information; conceptualization of the measure (whether the measure was developed based on theory or qualitative data); psychometric information for the whole instrument; and individual factor levels based on the COSMIN taxonomy (Mokkink et al.,). This included information about the structure of the measure, reliability (alpha levels, test-retest), and validity (content, convergent, and criterion, as well as structural and cross-cultural); and information regarding the measurement instrument (e.g. question stems, instructions, the response options, the actual item and its original structural construct, whether the item was modified during development of the measure, and the primary food type the item refers to).

Reduction procedures to consolidate similar items

To consolidate the item bank using a winnowing process, all items were independently reviewed and coded by two research staff (TP and AWW) with 19 primary food parenting practice categories independent of their original factor structure or other published category. The two coders compared all their initial discrepancies and all codes were triangulated by discussion with at least one of the leaders of the research team (TMO or LCM) and discrepancies were discussed and iteratively reviews among all four members (TP, AWW, TMO, and LCM). Final codes were reached through consensus by all four members. The coding scheme was based on a comprehensive review of all published constructs and was intended to be used as a tool to categorize and reduce similar items rather than as a final conceptual model (Table 1).

Table 1 here

Once all items were coded to one of the 19 food parenting practice categories, duplicate items were removed and very similarly worded items in each category were collapsed together

(i.e. “I say something positive about the food my child is eating during dinner” (Murashima, Hoerr, Hughes, & Kaplowitz, 2011) and “Say something positive about the food the child is eating during dinner” (Hughes et al., 2006)). Next, items in each category that covered similar concepts (i.e. “I say something positive about the food my child is eating during dinner” and “I say something nice about the foods my child eats”) were further collapsed and a ‘representative item’ was developed (i.e. “I say something positive about the food my child eats [. /during dinner.]”). The development of representative items within each category was initiated by one research staff and reviewed by a second staff. Discrepancies were reviewed by two research team members iteratively until all four members agreed on the reduced list/wording of representative items.

Semi-qualitative study

In order to generate new items to cover potentially missing constructs or concepts less well represented in the published literature, we conducted semi-qualitative surveys with parents of 5 to 12 year old children in the United States and Canada. This allowed us to compare parent reported concepts to items published in the literature.

Parents of 5 to 12 year old children in the US and Canada were recruited by an international internet research polling firm (<https://today.yougov.com>) to complete a 15 minute online survey. Inclusion criteria were being a parent or primary guardian of a 5 to 12 year old child. Exclusion criteria included having a child with a health problem that severely restricted the types of food he/she is able to eat. Parents were sampled to yield an equal number of parents with children in the 5 to 8 year old and 9 to 12 year old age ranges and within each of these groups, to represent the ethnic diversity of each country. Further, among each ethnic group, an equal number of parents were recruited from high/moderate and low socio-economic status

groups. For sampling purposes, socio-economic status was categorized based on US and Canadian Census data (DeNavas-Walt, Proctor, & Smith, 2013; Government of Canada,). A low socio-economic status was determined to be below the 40th percentile, a moderate socio-economic status was determined to be between the 40th and 80th percentile, and a high socio-economic status was determined to be greater than the 80th percentile for household income with adjustments made for single parent households. If parents reported having children in both age categories, a child within one of the age ranges was randomly selected and the parent was instructed to answer survey questions based on that particular child. All participants completed an online consent form. Participants were awarded 2000 points on the YouGov site for completing the survey which they could use to redeem for cash or gift cards (< \$5 USD in monetary value).

Food Parenting Practices Assessment

Six open-ended survey questions asked about nutrition parenting practices: 1) What sorts of things do you do to encourage your child to eat healthy? 2) What rules or guidelines do you have that may encourage your child to eat healthy? 3) What sorts of things might you do that may unintentionally affect your child from eating healthy? 4) Thinking about other parents with children the same age as your child, what things do they do that may discourage their children from eating healthy? 5) If your child does not want to eat the things you want him/her to eat, what do you do or say to your child? and 6) Is there anything else that you do to raise your child to value healthy eating as he/she grows? Please include things you do, or have done in the past.

The online survey was piloted with 25 Canadian parents to ensure parents understood the questions and the questions elicited the types of parenting practices of interest in this study.

Based on the length of responses during pilot testing, the online survey allowed parents to provide ten possible answers to each open-ended question and each answer was limited to 160 characters to encourage responses that included no more than one idea/concept. In addition, parents were prompted to be as descriptive as possible if they provided only very short answers (< 50 characters per question).

Coding

Survey responses were managed and coded using Redcap electronic data capture tools (Harris et al., 2009). Coding of the parent responses was done using the most representative items developed in the literature review stage described above. Two coders independently reviewed all survey responses and identified if parent statements matched existing items from the literature or were new concepts. Each parent statement was assigned a code for the food parenting practice category, sub-category, most representative item, and food type. Each parent response could have up to three codes that included more than one concept. If the parent statement did not match with a representative item derived from the literature review, a new representative item was developed. The first five participants' responses were reviewed by the two coders (AWW & TP) and two members of the research team (LCM & TO) for training purposes. Once the protocol for coding was established, the two coders independently coded all the responses with all discrepancies reviewed and discussed among the two coders and two members of the research team until a consensus was reached. New concepts identified in the parent responses were further examined by the entire study team and compared to the literature to ensure uniqueness before the new item was added to the database. Duplicate responses provided by individual parents were removed.

Comparing food parenting practice concepts between published literature and parent responses

Concepts emphasized by parents were compared to those from the literature to assess the extent to which the food parenting practices reported by parents were represented in the published instruments. Due to the large number of primary food parenting practice categories derived from both datasets, the initial 19 food parenting practice category codes were further collapsed into seven broad categories (based on commonalities) for the subsequent comparative analyses (Table 1). Scale items and parent responses originally coded to the child-control category were split between two broad categories; the child control items related to permissiveness were grouped into “Control” whereas those pertaining to self-regulation were grouped into “Autonomy Promotion.”

To compare differences between US and Canadian parent responses, responses were weighted to reflect the total number of parents in each subgroup. Each parent response was weighted by dividing each response by the corresponding total number of responses according to country (US n=1137; Canada n=848) and multiplying by the corresponding total number of parents (US n=74; Canada n=61). A corrected Pearson chi-square (converted to an F-statistic due to the weighting) was used to assess response differences by country. A similar procedure was used to compare differences between parent responses and literature item categories. Parent responses were weighted by dividing each response by the total number of parent responses (n=1985) and multiplying by the total number of parents (n=135). Literature items were weighted by dividing each item by the total number of items (n=1392) and multiplying by the total number of measures (n=79). A corrected Pearson chi-square compared whether parents emphasized the same items as those reported in the literature.

RESULTS

Identifying published food parenting practice scales and unique concepts

A total of 124 articles were identified from previously published systematic reviews, 39 articles from De Lauzon-Guillain et al. (de Lauzon-Guillain et al., 2012) and 85 articles from Vaughn et al. (A. Vaughn et al., 2013). After removing duplicates there were 109 unique scales. Fifteen additional articles were excluded based on the inclusion/exclusion criteria and 10 were excluded because the items were not available, leaving 84 articles for data extraction (Figure 1). The additional systematic review contributed eight articles into the database (Chan, Magarey, & Daniels, 2011; Dickin, Lent, Lu, Sequeira, & Dollahite, 2012; Gubbels et al., 2011; Jensen et al., 2012; Kroon Van Diest & Tylka, 2010; Lee, Conklin, & Bordi, 2012; Monge-Rojas et al., 2010; Puhl & Schwartz, 2003). The reference lists of retrieved articles revealed three additions, which included two relevant articles (O'Connor, Watson et al., 2010; Robinson, Kiernan, Matheson, & Haydel, 2001) and an unpublished report (M.A. Horodyski, personal communication, March 11, 2013). An assessment of PA related parenting practice instruments identified seven additional measures also containing nutrition items (Johnson, Welk, Saint-Maurice, & Ihmels, 2012; Lehto, Ray, & Roos, 2012; Rodenburg, Oenema, Kremers, & van de Mheen, 2013; Sallis, Grossman, Pinski, Patterson, & Nader, 1987; Singh et al., 2012; Taylor, Wilson, Slater, & Mohr, 2011; Williams & Mummery, 2011).

Of the resulting 102 articles (and 1957 items), 79 articles (and 1821 items) were retained following the removal of articles that provided only supplemental validity of food parenting practice and articles that were coded as Attitudes and/or Other only (see Appendix 1 for references and study details of retained articles). After removal of items coded as "attitudes" or

“other,” and splitting of nine double-barreled items, the final food parenting practice item bank from published instruments consisted of 1392 items. Each item was coded into one of 19 food parenting practice category codes independent of their original factor structure in order to consolidate similar items. Following the consolidation cycles, these published items were reduced to 231 representative food parenting concepts.

Parent reports of food parenting practice to supplement published items

A total of 74 US parents and 61 Canadian parents completed the semi-qualitative survey to assess food parenting practices they reported using related to their children’s eating behaviors. US and Canadian samples were similar by family income, marital status, and gender of surveyed parent, but (consistent with our *a priori* stratified recruitment procedures) ethnicity varied by country (Table 2). The parents provided 2,389 responses, which resulted in identification of 1,985 unique food parenting practices after splitting responses that mentioned multiple food items, removing attitudes (3), non-parenting concepts (89), responses with insufficient information (193), and duplicates (255). Coding these food parenting practices into the categories used for the published literature resulted in 194 different food parenting concepts reported by the parents.

Table 2 here

Comparing parent reported food parenting practice to those represented in published scales

There were no significant differences of reported food parenting practice concepts between Canadian and US parents [$F(5, 9920)=1.61$; $p=0.15$] (Figure 2); as a result the samples

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4 317 were combined for the remainder of the analyses. Via the semi-structured interviews, parents
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6 318 reported 31 food parenting practice concepts that were not included in published food parenting
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9 319 scales, resulting in a total of 262 unique food parenting practices concepts identified. Of those,
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12 320 26% were exclusive to previous literature, 12% were exclusive to parent responses, and 62%
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14 321 were represented in both (Figure 3). Concepts identified by parents and not represented in
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16 322 published scales were primarily coded in the ‘Control’, ‘Behavioral and Educational’, and
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19 323 ‘Structure of Food Environment’ broad categories (Table 3).
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24 325 *Figures 2 and 3, and Table 3 Here*
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29 327 Significant differences were detected when comparing the weighted proportion of unique
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31 328 food parenting practice concepts reported by parents to those published in the literature [F(6,
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33 329 20234)=25.2; $p<0.001$] (Figure 4). Food parenting practices related to ‘Structure of Food
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36 330 Environment’ (i.e. “I balance all food groups in my child’s meals and snacks”), and ‘Behavioral
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38 331 and Educational’ (i.e. “I teach my child about how much to eat based on their level of activity”)
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41 332 were emphasized by a larger proportion of parent responses than published scales. In contrast,
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43 333 practices related to ‘Consistency of Feeding Environment’ (e.g. “My child is offered three meals
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45 334 every day”) were more represented among literature items than parent statements. ‘Emotional
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48 335 Regulation’ practices were not reported by surveyed parents. A descriptive comparison of the
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51 336 parent responses and published items (unweighted) coded according to the initial 19 food
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53 337 parenting practice category codes listed in Table 1 can be found in Appendix 2.
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58 339 **Discussion**
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A systematic identification of published food parenting practice scales found a large number of scales that have been developed and are in use for children 2-16 years old. The initial 1392 items from 79 published scales were reduced to 231 representative food parenting practices via a winnowing procedure (DeWalt et al., 2007). Despite the large number of available items, semi-qualitative input from US and Canadian parents revealed 31 (12% of total) representative food parenting concepts not covered by existing scales. These were added to the item bank to supplement the food parenting practice concepts already published.

When comparing what parents emphasize doing to what is emphasized in the literature, differences emerged. Items grouped under ‘Structure of the Environment’ and ‘Behavioral and Education’ were highlighted more often by parents than in the literature, while “Consistency of the Feeding Environment’ and “Emotion Regulation’ were emphasized more in the literature than by parents. It is possible that concepts emphasized in the literature may still be important in influencing children’s behaviors, despite parents not emphasizing them. Parents may not be aware of doing them or may not associate those practices to influencing children’s eating habits. For example, parents may not link giving a food treat (e.g. ice-cream) to help soothe an upset child as influencing the child’s eating behaviors (an example of Emotion Regulation). However, emotional overeating among children has been associated with higher weight (Webber, Hill, Saxton, Van jaarsveld, & Wardle, 2009), suggesting that parenting practices that promote such behaviors are likely important. It is also possible that some difference emerged because the literature review included scales intended for parents with children 2-16 years old, while the semi-qualitative responses were from parents with children 5-12 years old. However, developing an item bank that covers both concepts that scientists have identified as important and those practiced by parents is critical to having a comprehensive list of food parenting practices. We

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4 363 elected to be broad in our literature search of food parenting practice instruments in order to not
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6 364 miss important concepts. The final list of food parenting practices can be reduced in subsequent
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9 365 steps by eliminating those concepts and items that do not describe a latent construct, or those that
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12 366 contain multiple concepts, or are not predictive of children's eating behaviors or weight status.

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14 367 For the purpose of developing the food parenting practice item bank, we used a coding
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16 368 procedure to reduce and categorize over three thousand published or parent reported items into
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19 369 similar categories. This coding framework was not intended to be a final conceptual framework
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21 370 for food parenting, but a tool for our group to process the available data. We instead refer the
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24 371 reader to a content framework for food parenting developed by a group of experts in parenting
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26 372 and feeding that is more comprehensive and can inform studies in the future (A. Vaughn et al.,
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31 374 This study included a systematic approach to identify published food parenting scales,
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33 375 develop a databank of items with sample and psychometric information linked from published
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36 376 studies, and supplemented the published items with additional food parenting practice concepts
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38 377 reported by parents. Limitations include only using scales published in English, only querying
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41 378 parents from the US and Canada for supplemental food parenting concepts; limiting the parent
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43 379 responses to parents of 5-12 year old children, which overlapped but did not exactly correspond
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46 380 to the child age of the literature; and reducing the items into representative concepts to make the
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48 381 next steps more manageable. This reduction of items into representative concepts potentially
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51 382 loses some nuanced differences in items that could be important for understanding how parents
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53 383 interact with their children around food.

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55 384 The next step of this item banking project, involves inviting a panel of food parenting
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58 385 experts to review the reduced number of food parenting practices and sort the concepts into
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dimensions based on their theoretical understanding of food parenting. This sorting will allow us to uncover the underlining conceptual dimensions of a food parenting practice framework by using concept mapping (Burke et al., 2005; Trochim, 1989), a non-parametric multidimensional scaling analysis to visually synthesize and organize the concepts into dimensions. This will help provide a conceptual framework for food parenting practice from which we can ensure we have appropriate items to cover all relevant constructs. The psychometrics of the resulting food parenting practice scales will next be assessed with data collected from a new sample of parents using traditional psychometric analysis, such as internal reliabilities and confirmatory factor analysis, as well as advanced analytical methods such as item response modeling. The ultimate goal is to develop an item bank of calibrated food parenting practice available for researchers such that they can select those relevant for their particular study, while allowing comparison across other studies. Our future aim is for the IRM calibrated item bank to be a platform for using Computerized Adaptive Testing to allow scientists to select relevant items for a given study, while maintaining the ability to compare results across studies; and reducing participant burden(Mâsse et al., 2006).

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413 **References**

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Tables

Table 1. Primary and collapsed coding categories of food parenting practices.

Primary food parenting practice dimension codes	Collapsed dimensions for analyses
Restriction	Control
Pressure to eat	
Covert control	
Expressing negative emotions/reactions	
Rewards/discipline	
Coercive control	
Redirection	
Child control (permissiveness/self-regulation)	
Child engagement	Autonomy promotion
Autonomy support	
Food availability/accessibility	Structure of food environment
Food preparation	
Parental encouragement to eat	Responsiveness
Expressing positive control/reactions	
Monitoring	Consistency of feeding environment
Feeding/meal environment	
Modeling	Behavioral and educational
Teach/reason	
Emotional feeding/regulation	Emotion regulation
Attitudes	Dropped
Other	Dropped

*Child control items related to permissiveness were grouped into “Control” whereas self-regulation items were grouped into “Autonomy Promotion.”

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Table 2. Demographics of parent sample surveyed

Description		US (N=74)		Canada (N=61)
Income (below median)		54%		57%
Ethnicity	White	47%	White	49%
	Black	17%	East/Southeast Asian	20%
	Hispanic	18%	South and West Asian	21%
	Other/Asian	18%	Other	10%
Sex of parent – female		59%		62%
Marital status – married/common-law		74%		82%

Table 3. Unique food parenting practice concepts from parent reports, not represented in published literature.

Collapsed food parenting practice category	Primary food parenting practice category	Most Representative Food Parenting Concept
Control	Child control	I allow my child to eat unhealthy food when we are away from home and on the go (e.g. doing errands, driving to practices, at the movie theatre).
Control	Child control	I allow my child to eat unhealthy food when we are on vacation/traveling.
Control	Child control	I allow my child to eat/drink [unhealthy food type] if s/he buys it.
Control	Child control	I remind/encourage my child to stop eating when s/he feels full.
Control	Parental control	I make my child include fruits and/or vegetables on his/her plate when we are eating away from home.
Control	Parental control	I make sure my child eats his/her fruits or vegetables first at mealtimes or snacks.
Control	Parental control	I use scare tactics to discourage my child from eating unhealthy foods.
Control	Parental control	If my child eats junk food, s/he must also include something healthy.
Control	Pressure to eat	I tell my child that there are starving children around the world to get my child to eat all the food on his/her plate.
Control	Pressure to eat	If my child does not want to finish his/her meal, I make him/her eat it later.
Control	Restriction	I encourage my child to control his/her portion by sharing unhealthy foods/drinks.
Control	Rewards/discipline	I use fruits and vegetables as a reward.
Autonomy promotion	Autonomy support	I ask my child to suggest healthy food alternatives.
Autonomy promotion	Autonomy support	I try to understand why my child does not want to eat certain foods.
Autonomy promotion	Autonomy support	If I allow my child an unhealthy meal/snack the next meal snack must be healthy.
Autonomy promotion	Autonomy support	I ask my child to suggest healthy food alternatives.
Structure of food environment	Food accessibility & availability	I balance all food groups in my child's meals and snacks.
Structure of food environment	Food accessibility & availability	I provide my child with more healthy options than unhealthy options.
Structure of food environment	Food accessibility & availability	I regularly serve dessert.
Structure of food environment	Food accessibility & availability	I serve water at meal times and snacks
Structure of food environment	Food accessibility & availability	I've consistently given fruits and vegetables to my child since he/she was little.
Structure of food environment	Food preparation	I do not have the time and/or energy to prepare meals from scratch.
Structure of food environment	Food preparation	I prepare food in a variety of ways for my child.
Responsiveness	Parental encouragement to eat	I encourage my child to drink water when s/he feels hungry.
Responsiveness	Parental encouragement to eat	I encourage my child to eat [vegetables] by challenging him/her to eat it.
Behavioral and educational	Modeling	My child sees me skipping meals.
Behavioral and educational	Modeling	I tell my child not to eat/drink [unhealthy food type], but do so myself.
Behavioral and educational	Teach/reason	I incorporate fruits and vegetables in educational activities or games to teach my child about healthy eating.
Behavioral and educational	Teach/reason	I read food labels with my child to go over nutrition facts of different foods.
Behavioral and educational	Teach/reason	I teach my child about how much to eat based on their level of activity.
Behavioral and educational	Teach/reason	I tell my child that eating [food type] will make him/her feel better about him/herself.
Behavioral and educational	Teach/reason	I watch shows and read books with my child about healthy eating.

Figure 1. Flow chart process for identifying published food parenting practice instruments and

Figure 2. Percentage of food parenting practices identified by parents for each collapsed category by country.

Legend: No significant differences were found via corrected Pearson chi square between Canada and US parents overall, $F(5, 9920)=1.60$; $p=0.15$.

Figure 3. Proportion of unique food parenting practices identified in literature and by parents (N=262).

Figure 4. Percentage of unique food parenting practice concepts for each broadly collapsed category by parents and published scales.

Legend: Overall significant differences found via corrected Pearson chi square between items emphasized by parents surveyed compared to those reported in the literature, $F(6, 20234)=25.2$; $p < 0.001$.

References

- Barlow, S. E. (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics*, 120(Suppl4), S164-S192.
- Baughcum, A. E., Powers, S. W., Johnson, S. B., Chamberlin, L. A., Deeks, C. M., Jain, A., et al. (2001). Maternal feeding practices and beliefs and their relationships to overweight in early childhood. *Journal of Developmental and Behavioral Pediatrics : JDBP.*, 22(6), 391-408.
- Burke, J., O'Campo, P., Peak, G., Gielen, A., McDonnell, K., & Trochim, W. (2005). An introduction to concept mapping as a participatory public health research method. *Qual Health Res*, 15, 1392-1410.
- Chan, L., Magarey, A. M., & Daniels, L. A. (2011). Maternal feeding practices and feeding behaviors of Australian children aged 12-36 months. *Maternal and Child Health Journal*, 15(8), 1363-1371.
- Daniels, S., Arnett, D., Eckel, R., Gidding, S., Hayma, L., Kumanyika, S., et al. (2005). Overweight in children and adolescents: Pathophysiology, consequences, prevention, and treatment; AHA scientific statement. *Circulation*, 111, 1999-2012.
- Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin*, 113(3), 487-496.
- de Lauzon-Guillain, B., Oliveira, A., Charles, M., Grammatikaki, E., Jones, L., Riqui, N., et al. (2012). A review of methods to assess parental feeding practices and preschool children's

- 467 eating behaviors: The need for further development of tools. *J Acad Nutr Diet*, 112(10),
468 1578-1602.
- 469 DeNavas-Walt, C., Proctor, B., & Smith, J. (2013). Income, poverty, and health insurance
470 coverage in the united states: 2012: Current population reports. *United States Census*
471 *Bureau.*
- 472 DeWalt, D., Rothrock, N., Yount, S., & Stone, A. (2007). Evaluation of item candidates: The
473 PROMIS qualitative item review. *Med Care*, 45, S12-S21.
- 474 Dickin, K., Lent, M., Lu, A. H., Sequeira, J., & Dollahite, J. (2012). Developing a measure of
475 behavior change in a program to help low-income parents prevent unhealthful weight gain in
476 children. *J Nutr Educ Behav*, 44(1), 12-21.
- 477 Garriguet D. (2004). *Overview of Canadians' eating habits* No. Catalogue no 82-620-MIE)
478 Government of Canada. *Statistics Canada. table 111-0009 - family characteristics, summary,*
479 *annual (number unless otherwise noted), CANSIM (database).* Retrieved December 10,
480 2015, from <http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=1110009>
- 481 Gubbels, J., Kremers, S., Stafleu, A., de Vries, A., Goldbohm, A., Dagnelie, P., et al. (2011).
482 Association between parenting practices and children's dietary intake, activity behavior, and
483 development of body mass index: The KOALA birth cohort study. *International Journal of*
484 *Behavioral Nutrition & Physical Activity*, 8, 18.
- 485 Guenther, P. M., Dodd, K. W., Reedy, J., & Krebs-Smith, S. M. (2006). Most Americans eat
486 much less than recommended amounts of fruits and vegetables. *Journal of the American*
487 *Dietetic Association*, 106(9), 1371-1379.

- Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42(2), 377-381.
- Hendy, H. M., Williams, K. E., Camise, T. S., Eckman, N., & Hedemann, A. (2009). The parent mealtime action scale (PMAS). development and association with children's diet and weight. *Appetite*, 52(2), 328-339.
- Hughes, S. O., Anderson, C. B., Power, T. G., Micheli, N., Jaramillo, S., & Nicklas, T. A. (2006). Measuring feeding in low-income African-American and Hispanic parents. *Appetite*, 46(2), 215-223.
- Hughes, S. O., Power, T. G., Orlet Fisher, J., Mueller, S., & Nicklas, T. A. (2005). Revisiting a neglected construct: Parenting styles in a child-feeding context. *Appetite*, 44(1), 83-92.
- Jensen, J. D., Bere, E., De Bourdeaudhuij, I., Jan, N., Maes, L., Manios, Y., et al. (2012). Micro-level economic factors and incentives in children's energy balance related behaviours - findings from the ENERGY European cross-section questionnaire survey. *The International Journal of Behavioral Nutrition and Physical Activity*, 9, 136-5868-9-136.
- Johnson, R., Welk, G., Saint-Maurice, P. F., & Ihmels, M. (2012). Parenting styles and home obesogenic environments. *International Journal of Environmental Research and Public Health*, 9(4), 1411-1426.
- Kirkpatrick, S., Dodd, K., Reedy, J., & Krebs-Smith, S. (2012). Income and race/ethnicity are associated with adherence to food-based dietary guidance among US adults and children. *J Acas Nutr Diet*, 112(5), 624-635.

- Kroon Van Diest, A. M., & Tylka, T. L. (2010). The caregiver eating messages scale: Development and psychometric investigation. *Body Image*, 7(4), 317-326.
- Lee, K., Conklin, M., & Bordi, P. (2012). Predicting caregiver behaviors toward restaurants providing healthful children's menus with nutrition information: A pilot study. *Topics in Clinical Nutrition*, 27(2), 95-104. Retrieved from SCOPUS database.
- Lehto, R., Ray, C., & Roos, E. (2012). Longitudinal associations between family characteristics and measures of childhood obesity. *International Journal of Public Health*, 57(3), 495-503. doi:10.1007/s00038-011-0281-5; 10.1007/s00038-011-0281-5
- Masse, L., & Watts, A. (2013). Stimulating innovations in the measurement of parenting constructs. *Childhood Obesity*, 9(S1), S5-S13.
- Mâsse, L., Wilson, M., Baranowski, T., & Nebeling, L. (2006). Improving psychometric methods in health education and health behavior research. *Health Education Research*, 21(Suppl 1), i1-i3.
- Mokkink, L., Terwee, C., Patrick, D., Alonso, J., Stratford, P., Knol, D., et al. (2010) International consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient reported outcomes: Results of the COSMIN study. *J Clin Epidemiol*, 63(7), 737-45
- Monge-Rojas, R., Smith-Castro, V., Colon-Ramos, U., Garita-Arce, C., Sanchez-Lopez, M., & Chinnock, A. (2010). Parental feeding styles and adolescents' healthy eating habits. structure and correlates of a Costa Rican questionnaire. *Appetite*, 55(2), 253-262.

- 1
2
3
4 530 Murashima, M., Hoerr, S., Hughes, S., & Kaplowitz, S. (2011). Confirmatory factor analysis of a
5
6 531 questionnaire measuring control in parental feeding practices in mothers of head start
7
8 532 children. *Appetite*, 56(3), 594-601.
9
10
11
12 533 O'Connor, T., Hughes, S., Watson, K., Baranowski, T., Nicklas, T., Fisher, J., et al. (2010).
13
14 534 Parenting practices are associated with fruit and vegetable consumption in preschool
15
16 535 children. *Public Health Nutrition*, 13(1), 91-101.
17
18
19
20 536 O'Connor, T., Watson, K., Hughes, S., Beltran, A., Hingle, M., Baranowski, J., et al. (2010).
21
22 537 Health professionals' and dietetics professionals' perceived effectiveness of fruit and
23
24 538 vegetable parenting practices across six countries. *Journal of the American Dietetic*
25
26 539 *Association*, 110(7), 1065-1071.
27
28
29
30
31 540 Ogata, B., & Hayes, D. (2014). Position of the academy of nutrition and dietetics: Nutrition
32
33 541 guidance for healthy children ages 2 to 11 years. *J Acad Nutr Diet*, 114(8), 1257-1276.
34
35
36 542 Puhl, R. M., & Schwartz, M. B. (2003). If you are good you can have a cookie: How memories
37
38 543 of childhood food rules link to adult eating behaviors. *Eating Behaviors*, 4(3), 283-293.
39
40
41
42 544 Revicki, D., & Cella, D. (1997). Health status assessment for the twenty-first century: Item
43
44 545 response theory, item banking and computer adaptive testing. *Qual Life Res*, 6(595), 600.
45
46
47 546 Robinson, T. N., Kiernan, M., Matheson, D. M., & Haydel, K. F. (2001). Is parental control over
48
49 547 children's eating associated with childhood obesity? results from a population-based sample
50
51 548 of third graders. *Obesity Research*, 9(5), 306-312.
52
53
54
55
56
57
58
59
60
61
62
63
64
65

- Rodenburg, G., Oenema, A., Kremers, S. P., & van de Mheen, D. (2013). Clustering of diet- and activity-related parenting practices: Cross-sectional findings of the INPACT study. *The International Journal of Behavioral Nutrition and Physical Activity*, 10, 36-5868-10-36.
- Sallis, J. F., Grossman, R. M., Pinski, R. B., Patterson, T. L., & Nader, P. R. (1987). The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine*, 16(6), 825-836.
- Singh, A. S., Chinapaw, M. J., Uijtdewilligen, L., Vik, F. N., van Lippevelde, W., Fernandez-Alvira, J. M., et al. (2012). Test-retest reliability and construct validity of the ENERGY-parent questionnaire on parenting practices, energy balance-related behaviours and their potential behavioural determinants: The ENERGY-project. *BMC Research Notes*, 5, 434-0500-5-434.
- Taylor, A., Wilson, C., Slater, A., & Mohr, P. (2011). Parent- and child-reported parenting associations with child weight-related outcomes. *Appetite*, 57(3), 700-706.
- Trochim, W. (1989). An introduction to concept mapping for program planning and evaluation. *Evaluation and program planning* (pp. 1-16)
- US Department of Health and Human Services, US Department of Agriculture, Dietary Advisory Guidelines Committee. (2005). *Dietary guidelines for Americans 2005*. Retrieved 8/23, 2005, from <http://www.health.gov/dietaryguidelines/dga2005/document/default.htm>
- Vaughn, A., Tabak, R., Bryant, M., & Ward, D. (2013). Measuring parent food practices: A systematic review of existing measures and examination of instruments. *Int J Behav Nutr Phys Act*, 10(61)

- Vaughn, A., Ward, D., Fisher, J., Faith, M., Hughes, S., Kremers, S., et al. (2016). Fundamental constructs in food parenting practices: A content map to guide future research. *Nutrition Reviews*, [74\(2\) 98-117](#)
- Wardle, J., Sanderson, S., Guthrie, C. A., Rapoport, L., & Plomin, R. (2002). Parental feeding style and the inter-generational transmission of obesity risk. *Obesity Research*, *10*(6), 453-462.
- Webber, L., Hill, C., Saxton, J., Van jaarsveld, C., & Wardle, J. (2009). Eating behavior and weight status in children. *Int J Obes (London)*, *33*(1), 21-28.
- Williams, S. L., & Mummery, W. K. (2011). Links between adolescent physical activity, body mass index, and adolescent and parent characteristics. *Health Education & Behavior : The Official Publication of the Society for Public Health Education*, *38*(5), 510-520.