Measuring the Meanings of Eating in Minority Youth

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Abstract

The aim of this study is to present the development of the Meanings of Eating Index (MEI) in a diverse sample of children. Exploratory factor analysis was performed on MEI items. Factors with eigenvalues above 1.0 were retained. Items that loaded on multiple factors or with item-total correlations below 0.50 were discarded. A 24-item, 5-factor scale comprised the final MEI. Personal Negative Emotions and Disturbed Eating were positively associated with frequency of high calorie snack food intake (r=0.21, p<0.05; r=0.33, p<0.01), Personal Well Being was positively associated with eating vegetables more frequently (r=0.20; p<0.05). Eating on Behalf of Others was negatively associated with frequency of vegetable intake (r=-.20; p<0.05). Pleasure Eating was not associated with dietary intake. The MEI shows promise as a tool for understanding the affective determinants of dietary intake in minority youth.

Keywords

Eating behavior; Minority; Children; Latino

Introduction

Over the last three decades, the prevalence of overweight and obesity in youth has dramatically increased in the United States (Ogden et al., 2006; US Department of Health and Human Services, 2001). Minority youth are disproportionately affected (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). In 2007–2008, 38.2% of Latinos and 35.9% of non-Hispanic blacks ages two through nineteen were overweight or obese, compared to 29.3% of non-Hispanic whites (Ogden, et al., 2010). Healthy diets are important for reducing risk of developing overweight, obesity, and obesity-related disorders such as heart disease and type-2 diabetes (Thompson, Edelsberg, Colditz, Bird, & Oster, 1999).

However, research illustrates that minority youths' intake of fruits and vegetables falls short of current recommendations (Basch, Zybert, & Shea, 1994; Colon-Ramos et al., 2009;

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Munoz, Krebs-Smith, Ballard-Barbash, & Cleveland, 1997). Over 40% of Latino and 45% of African American youth reported fast food consumption in two non-consecutive 24-hour dietary recalls over the course of three to ten days (Paeratakul, Ferdinand, Champagne, Ryan, & Bray, 2003). Additionally, the prevalence of urban corner stores in low-income and high-minority communities is significantly associated with consumption of energy-dense, low nutritive foods and beverages among school children in these neighborhoods (Borradaile et al., 2009).

Dietary patterns and preferences are established during childhood (Mikkilä, Räsänen, Raitakari, Pietinen, & Viikari, 2007). Therefore, it is important to intervene and establish healthy dietary behaviors early in life to reduce risk for developing overweight and obesity, especially among high risk minority youth (Thompson, et al., 1999). However, few studies have investigated the determinants of eating behavior in minority youth (McClain, Chappuis, Nguyen-Rodriguez, Yaroch, & Spruijt-Metz, 2009). It is important to study determinants of dietary intake in this population in order to identify points of intervention to improve dietary habits and prevent obesity.

To date, dietary interventions to prevent obesity in youth have been relatively unsuccessful (Kamath et al., 2008; Summerbell et al., 2005), and few have specifically targeted minority youth. Nonetheless, there is evidence that theory-based interventions are more likely to significantly impact dietary behaviors in youth (Baranowski, Cullen, & Baranowski, 1999; Baranowski, Lin, Wetter, Resnicow, & Hearn, 1997; D. Spruijt-Metz, 1999). However, research suggests that the current health behavior theories applied to dietary behavior change may not be appropriate for children and adolescents who, at this stage of development, tend to be less cognitively developed and rely more on feelings to drive their behavior. Neurobiological evidence demonstrates age-related changes in cerebral functioning from lower-order, emotionally-based, sensory processing towards higher-order, more cognitive and rational, processing of stimuli by means of the prefrontal cortical systems that involve reward anticipation, self-monitoring, and behavioral inhibition (Killgore & Yurgelun-Todd, 2005). Therefore, the current, cognitively-based health behavior models that were originally developed for adults may not be appropriate for explaining the behavior of children and adolescents, who are more likely to behave in reaction to an emotion like anger or sadness, rather than think through behaviors and their consequences. Accordingly, assessment of affective predictors of health behaviors in this population is warranted.

Theoretical Model

The Theory of Meanings of Health Behavior (TMB), developed by Spruijt-Metz (1999), and based on prior work (Ikard, Green, & Horn, 1969; Ikard & Tomkins, 1973; C. Perry, 1999; C. L. Perry & Kelder, 1992), is a theory created to supplement existing cognitive behavioral models, accounting for affective and developmental factors particular to adolescence. The key tenets of TMB propose that adolescents and young adults infuse health-related behaviors with affective meanings (D. Spruijt-Metz, 1995, 1999), defined by Jessor as the symbolic significance of behavior (Jessor, 1984; C. L. Perry & Kelder, 1992; C. L. Perry et al., 1999). These affective meanings reflect an individual's need for emotional balance and psychological comfort (D Spruijt-Metz, Gallaher, Unger, & Johnson, 2004), and influence behavior directly, bypassing knowledge, rationality and cognition. Previous research on the meanings of health behavior illustrated the existence of three basic categories of meanings (D. Spruijt-Metz, 1995, 1999): *personal meanings*, which represent intrapersonal relations such as dealing with bad moods or stress (D. Spruijt-Metz, 1995, 1999); *social meanings,* which represent interpersonal relations such as peer group acceptance; and *functional meanings*, which represent dealing with physical or

environmental problems. TMB further posits that changing the meanings of a behavior will lead to a change in that behavior (D. Spruijt-Metz, 1995, 1999).

Previous research has shown that TMB is predictive of smoking, physical activity, and sexual activity behaviors in adolescents (Giannotta, Ciairano, Spruijt, & Spruijt-Metz, 2009; Jamner, Spruijt-Metz, Bassin, & Cooper, 2004;D Spruijt-Metz, et al., 2004). These findings suggest that constructs from the TMB have potential as mediators of health behavior change in youth. Additionally, considering the cognitive development of adolescents and the affective influences on eating behavior (Ganley, 1989; Greeno & Wing, 1994; Nguyen-Rodriguez, Unger, & Spruijt-Metz, 2009), the TMB seems appropriate to apply to eating behavior among youth. Previous research by Furst and colleagues demonstrates the complex nature of food choice in adult behavior, highlighting how cognitive and material factors drive food choice (Furst, Connors, Bisogni, Sobal, & Falk, 1996), the meanings of health behavior is unique because it would expands on previous efforts by including the emotional factors related to eating behavior in youth. Therefore, the aim of this study is to present the development of the Meanings of Eating Index (MEI) as well as to investigate the meanings of eating behavior and their association with dietary intake in minority youth as a potential avenue for effective dietary intervention.

Formative research was employed to identify the affective meanings that minority children and adolescents infuse into dietary intake behavior, which guided the construction of the MEI scale items that were subsequently tested for psychometric quality. Although developed predominately in Latino youth, it is intended to be applicable to a wide range of minority youth. This study tested the hypothesized factor structure of the MEI (Walsh & Betz, 1999), its internal consistency (Walsh & Betz, 1999), and associations of the final MEI factors with dietary intake in two diverse samples of children. Several hypotheses were formulated. First, a three-factor structure corresponding to the primary categories of meanings of the TMB was expected to emerge in the exploratory factor analysis. Second, the scores on the MEI and the emergent factor subscales were expected to show evidence of internal consistency. Third, the MEI factors would be associated with dietary intake. Fourth, because the MEI was developed in an ethnically diverse sample, we expected there may be ethnic and gender differences in mean MEI scores. However, because this is a preliminary analysis of the meanings of eating and we were testing the psychometrics of the scale, we did not have a priori hypotheses about the direction of associations with specific foods or expected differences based on ethnicity or gender.

METHODS

Development of the Meanings of Eating Index (MEI)

Content validity—The qualitative data used to construct the MEI was taken from focus groups that were conducted as part of formative research for multiple diet and physical activity interventions. Information from these focus groups provided insight into adolescent experiences and meanings of eating behavior which guided development of an assessment tool to measure meanings of eating behavior in minority youth. For this formative phase, a diverse group of 102 girls and 28 boys participated in 24 focus groups and 2 individual interviews. Participants ranged in age from 11 to 17 years. Individual experiences were elicited via semi-structured interviews.

Interview protocols included questions on favorite foods, social and environmental cues to eating, eating when not hungry and meanings of eating. The duration of each interview was between 50–75 minutes depending upon the subjects' interest in continuing the discussion and school schedules. All interviews were audio-taped with permission from the participants and then transcribed for the purpose of analysis. Transcribers were instructed to remove all

names from the transcripts. Written parental informed consent was obtained prior to inviting the participants to participate in the interviews. Youth's written assent was obtained before the interviews began. Small gift items were given as compensation for participation. All study procedures were approved by the Institutional Review Board (IRB) at the University of Southern California (USC) as well as appropriate school boards.

QSR NVivo Version 7 software was used to code, store, retrieve, display, and analyze the transcripts from the focus groups and interviews. Scale items were identified and defined through an iterative process of re-reading interview texts, informed by the interview protocol. During this process, questions aimed to glean specifics whenever possible, although still keeping them broad enough to encompass a variety of perspectives and situations.

Finally, several steps were taken to ensure the integrity of each category and item. A.D.M. and S.N.R. consulted each other regarding the content, clarity and parsimony of each category and subsequent items. Scale items were then written until it was determined that the group of items comprehensively and adequately reflected the central characteristics of the interviews and accurately used the words and language of the participants. D.S.M. was also consulted to ensure that the categories and items accurately reflected the content domain. These evaluators then agreed as a team which items should be retained.

Conceptual orientation and item format—To be consistent with the theory of the meanings of health behavior (D. Spruijt-Metz, 1995, 1999), we categorized items based on a priori categories (e.g. personal, social, or function). Items were identified as personal meanings if they encompassed salient themes related to eating as being instrumental for personal pleasure and happiness. Personal meanings also consisted of eating for compensation, to assuage anger, to counteract boredom, and to relieve loneliness or stress. Items were identified as social meanings if they related to eating in order to be close to someone or something such as family, friends, or culture. Finally, items were coded as functional meanings if they achieved physical or environmental goals, such as sating hunger, feeling healthy, or giving in to an 'urge'. Functional meanings also consisted of eating as a form of demonstration, such as compliance, autonomy or independence. 58- items representing each of these three categories were gleaned from the interview data: Functional (17-items), Social (25-items), or Personal (16-items). (The full set of items are available from the authors upon request). The items are scored using a modified Likert scale, in which response options are *never, sometimes,* and *often*. The introduction to the items states "Sometimes I eat because…".

Sample—Various versions of the MEI were tested in different samples. Sample 1 was used to conduct factor analysis of the original 58-item Meanings of Eating Index and test the psychometric properties of the reduced-item MEI and its association with dietary intake. Sample 2 was used to assess the psychometric properties of a 5-item MEI, its association with dietary intake, and ethnic differences.

Sample 1 was drawn from an obesity prevention pilot study (Riggs, Kobayakawa-Sakuma, & Pentz, 2007) conducted in 2006 among a predominantly Latino sample of fourth grade students at five schools in Southern California. Students completed one of four survey versions at baseline; each survey version contained items common to all versions as well as items unique to each version. Only children who completed the MEI were included in Sample 1 (*n*=175). Two sub-samples were drawn from Sample 1 to conduct further analyses. Sample 1A includes the entire sample of children who completed the MEI, consisting of participants with a mean age of 9.43 years (SD=0.57), 55% female, and 94% Latino (Sample 1A; *n=175)*; and Sampled 1B, includes participants who also completed an eating behavior

subscale, consisting of participants with a mean age of 9.52 years (SD = 0.56), 60% female, and 92% Latino (Sample 1B; *n=100)*. There were no significant ethnic, age or gender differences between those who completed the survey with the food intake items (Sample 1B) and those who did not (Sample 1A).

Sample 2 draws baseline data from an obesity prevention intervention study, titled The Pathways Prevention Intervention Study conducted in 2009 among 962 school aged children in Orange County. This survey was designed to constitute a random sample of children in Southern California and over-sampled Latinos. Sample 2 consisted of participants with a mean age of 9.3 years (SD=0.48), 51.8% were female, 30.2% White and 27.8% Latino. Table 1 shows the demographic characteristics of each sample. All procedures were approved by USC's IRB.

Dietary measure: Dietary intake was measured with food intake items taken from the Nurse's Health Study survey (Willett et al., 1985), which is the instrument upon which the Youth/Adolescent Food Frequency Questionnaire (YAQ) was based (Rockett et al., 1997). Due to constraints of survey length, we used an abbreviated version as it has been shown that short versions of food frequency questionnaires for dietary assessment in school aged youth are valid for capturing consumption of certain foods of interest, although not for capturing total energy intake (Field et al., 1999). Participants indicated how often they had consumed a particular food item in a typical week. Dietary choices included three items that assessed fruit intake (e.g., "How often do you eat any fruit, fresh or canned (not counting juice)," four items that assessed vegetable intake (e.g., "How often do you eat green salad"), and five items that assessed high calorie snack food intake (e.g., "How often did you eat corn chips, potato chips, popcorn, or crackers?"). A 6-point scale response format, ranging from 1 (less than once a week) to 6 (2 or more of these a day) was used. Higher scores indicated higher frequency of consumption for eating a specific food. Mean scores for the scales were computed and internal consistencies ranged from moderate to good (fruit intake: $\alpha = .43$, vegetable intake: $\alpha = .62$, high calorie snack food intake: $\alpha = .77$).

Statistical Analysis: First, exploratory factor analysis (EFA) with an un-weighted least squares factor extraction and Promax rotation was used to examine the factor structure of the MEI. The number of factors to retain was based on eigenvalue criteria (i.e. eigenvalues at or above 1.0). Items were then discarded if they loaded on multiple factors or with item correlations below 0.50. EFA was then repeated with this subset of items and items were again discarded if they loaded on multiple factors or with item correlations below 0.50. Second, internal consistency reliability was assessed via Cronbach's alpha, which is an index that measures the variation accounted for by the true score of the underlying construct for each factor (Cronbach, 1951). Third, preliminary evidence for construct validity, defined as a measure of how well one variable or set of variables correlates with an expected outcome, was tested using Pearson correlations of the full and a reduced item MEI with food intake, using single food items and mean food scale items. We further evaluated the utility of this assessment tool for minority youth by testing group differences in MEI scores by ethnicity using analysis of variance and gender using t-tests in each sample. Analyses were performed using SAS version 9.0 statistical software.

RESULTS

Factor Structure and Reliability

Exploratory Factor Analysis—Several EFAs were performed on the 58-item MEI in Sample 1A. The hypothesis that the MEI would result in a three-factor structure corresponding to the central categories of meanings within the TMB was not supported.

Instead, these procedures resulted in the identification of a 24-item MEI, comprised of 5 factors. Factor 1 consisted of 9-items interpreted as Personal Negative Emotions (e.g. "I eat because it helps me feel better when things are not going well."). Factor 2 consisted of 5-items interpreted as Personal Well Being (e.g. "I eat because it makes me feel smart about my health."). Factor 3 consisted of 3-items interpreted as Disturbed Eating (e.g. "I can't stop eating."). Factor 4 consisted of 3-items interpreted as Pleasure Eating (e.g. "I eat because it makes me feel happy."). Factor 5 consisted of 4-items interpreted as Eating on Behalf of Others (e.g. "I eat because everyone else is doing it"). The results of the EFA are shown in Table 2.

Internal consistency reliability evidence for the MEI—Table 3 shows the internal consistency reliabilities (alphas) for scores in the MEI subscales across samples. In all samples, alphas were acceptable.

Correlations of 24-item MEI factors with food intake—Table 4 shows the correlations between the MEI and food frequency scale and individual items using data from Sample 1B. Correlations greater than 0.50 are considered large, 0.50-0.30 are moderate, and 0.30-0.10 are small (Cohen, 1977). Most of the factors were significantly and positively correlated with one another, with significant correlations values ranging from 0.22 to 0.55. Four of the five subscales were significantly associated with frequency of food intake. Factor 1: Personal Negative Emotions was positively associated with high calorie snack food intake, accounting for 4.4% of the variance of high calorie snack food intake. Factor 2: Personal Well Being was positively associated with healthier dietary behavior. Factor 3: Disturbed Eating was significantly associated with unhealthy dietary behavior, accounting for 11.0% of the variance of high calorie snack food. Factor 4: Pleasure Eating was not significantly associated with food intake. Factor 5: Eating on Behalf of Others was negatively associated with healthier dietary behavior. The relationships are small to moderate in size and consistent with theory and research, illustrating relationships in a theoretically sound direction.

Differences in MEI Scores for Different Demographic Groups—In Sample 1B, there were no significant gender or ethnic differences in MEI factor means (p's > 0.05).

The Five-Item MEI: It may not always be feasible to utilize the entire 24-item MEI in large studies. Therefore a short version of the scale developed from Sample 1B, consisting of only three factors and eight items was used as the starting point for development of a brief alternative to the full scale and tested in a large study sample (Sample 2). Because we are most interested in changing unhealthy eating behavior, we chose the two factors significantly associated with High Calorie Snack Food in Sample 1B and the scale items with the highest factor loadings for inclusion in the brief version of the MEI. The final factor structure for the abridged MEI resulted in three-items measuring Personal Negative Emotions ("I eat because it helps me feel better when things are not going well", "I eat because it helps me deal with loneliness", and "I eat because it makes me feel less sad"); and two-items measuring Disturbed Eating ("I eat because I can't stop eating" and "I eat because then my family will leave me alone about my weight").

Internal consistency reliability evidence for the five-item MEI: The internal consistency reliability for the factors in Sample 2 were 0.80 for Personal Negative Emotions and 0.50 for Disturbed Eating, respectively.

Correlations of five-item MEI factors with the original 24-item ME factors: In Sample 2, the short five-item MEI factors were strongly associated with the full 24-item MEI factors

used in Sample 1B: Personal Negative Emotions (r=0.94, p<.0001) and Disturbed Eating (r=0.86, p<.0001).

Correlations of five-item MEI factors with food intake: In Sample 1B, the results were similar to those found in the full 24-item MEI. The abridged-Personal Negative Emotions factor was positively associated with high calorie snack food (r=0.20, p=.04) and French fries (r=0.24, p=.01), accounting for 4.0% of the total variance for high calorie snack food. The abridged-Disturbed Eating factor was also positively associated with high calorie snack food (r=0.32, p<.01), chips and crackers (r=0.23, p=.01), pastries (r=0.35, p<0.001) and soda (r=0.27, p<0.01), accounting for 10.2% of the total variance for high calorie snack food. In Sample 2, dietary intake was measured with the same instrument used in Sample 1B. The 3-item Personal Negative Emotions Factor was significantly associated with unhealthy dietary intake, specifically frequency of high calorie snack food (r=0.20; p=0.04) and French Fries (r=0.24; p=0.01), accounting for 4.0% of the total variance for high calorie snack food. The 2-item Disturbed Eating factor was significantly associated with high calorie snack food (r=0.32; p=0.001), frequency of chips (r=0.23; p=0.02), pastries (r=0.35; p<0.0001), diet soda (r=0.20; p=0.04), and regular soda (r=0.27; p<0.01), accounting for 10.2% of the total variance for high calorie snack food.

Differences in five-item MEI Scores for different demographic groups: In Sample 2, African-Americans had significantly higher levels of Disturbed Eating compared to other ethnicities (p<.05) and boys had significantly higher levels of disturbed eating than girls (p<. 0001). There were no significant ethnic or gender differences in eating due to personal negative emotions.

DISCUSSION AND CONCLUSION

This paper described the development, psychometric testing, and descriptive analysis of a scale designed to measure the meanings of eating behavior in minority youth. The qualitative component offered the unique opportunity to hear directly from youth about their experiences and perspective on why they engage in various eating behaviors. Outcomes of this formative data supported dimensions that had been identified in previous Meanings of Health Behavior research and were used to create items for the MEI. The items that constituted the initial MEI were reduced to a 24-item scale which comprised the final MEI. This final scale was then assessed for reliability and tested for its association with dietary intake in two diverse samples of children.

The MEI elicited more than the expected three factors of social, functional and personal meanings found in prior literature on the meanings of health behavior (e.g. smoking, physical activity, etc.). Rather, five factors were derived. It is possible that this larger number of factors may be due to coding errors, where the initial item pool actually captured more than the intended three dimensions. However, the larger number of factors may also be indicative of the multi-faceted and complex nature of eating behavior compared to previous health behaviors investigated. There are biological and neurological factors that shape and inform the psychological states that guide eating behavior (Wardle & Carnell, 2009; Zald, 2009). There are decisions regarding time (Bisogni et al., 2007) and the social, physical, and macro-environments in which people live (Kumanyika, 2008; Larson & Story, 2009; Story, Neumark-Sztainer, & French, 2002). Additionally, personal development, personal relationships, and changes in life situations and settings over a lifespan alter an individual's eating behavior (Devine, 2005; Devine, Connors, Bisogni, & Sobal, 1998; Gillespie & Johnson-Askew, 2009; McClain, et al., 2009; Sobal & Bisogni, 2009; Wethington & Johnson-Askew, 2009).

In previous research on food choice in adults, Furst et al (Furst, et al., 1996) identified five main categories that influence food choice decisions: cultural ideals, personal factors, resources, social factors, and present contexts. Similar to Furst et al's research on food choice (Furst, et al., 1996), the Meanings of Eating Index was designed to identify factors that influence eating behavior. However, the MEI was specifically developed for minority youth. Additionally, the MEI's sole focus is to understand the emotional/affective determinants of eating behavior, rather than the cognitive or material factors associated with eating behavior. Thus, these findings build upon and enhance previous findings. The factor, "Personal Negative Emotions" represents how minority youth may use food as a distraction from dealing with emotions. The factor, "Personal Well Being" represents a personal identity that minority youth may develop with eating certain foods. In this case, the identity created is of someone who is healthy and wants to eat healthy. The factor, "Pleasure Eating" represents how minority youth may eat for the pure enjoyment of it. The factor, "Disturbed Eating" represents how eating may be a form of rebellion against harsh self or externally inflicted constraints (i.e. family members who harass minority youth about their weight) (Loro & Orleans, 1981). Lastly, the factor "Eating on Behalf of Others" represents the learned values in a society. Minority youth may eat to gain social approval or sense of being part of group that allows them to emotionally connect with others, rather than feeling left out and isolated. Additionally, in Latino culture, the factor may relate to the values of *familsmo* and *respeto*. Therefore, Latino children may eat when they are not hungry because Latino culture ingrains the belief that it is disrespectful to refuse a meal prepared for family meal time.

In summary, previous research demonstrates the complex nature of food choice in adult behavior (Furst, et al., 1996). The Meaning of Eating Index can expand upon extant literature by capturing emotional personal factors related to eating behavior in youth. The larger than hypothesized number of factors derived from the MEI supports previous findings regarding the complexity of dietary choices (Bisogni, et al., 2007; Devine, 2005; Devine, et al., 1998; Furst, et al., 1996; Gillespie & Johnson-Askew, 2009; McClain, et al., 2009; Sobal & Bisogni, 2009; Wardle & Carnell, 2009; Wethington & Johnson-Askew, 2009; Zald, 2009). This finding provides evidence that the intricate nature of eating behavior also applies to minority youth, specifically individual psychosocial determinants.

Outcomes also support the psychometric quality of the Meanings of Eating Index as a measure the affective determinants of eating behavior in children. The moderate intercorrelation among factors suggests that the respective items are tapping distinct factors. Additionally, the MEI factors demonstrated acceptable internal consistency reliability across all samples, suggesting that the items function together to consistently measure different meanings of eating among children. Although the amount of variance accounted for the meanings of eating behavior in predicting dietary intake was relatively small, these and other affective determinants may still be important. Knowledge of both affective and cognitive determinants of eating behavior in youth may inform the development of more comprehensive and effective interventions aimed to improve and maintain eating habits. For instance, Social Cognitive Theory's is one of the most commonly used theories in the design of nutrition education interventions (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003). However, in a study investigating the psychosocial predictors of fruit and vegetable intake among elementary school children, Social Cognitive Theory's constructs only accounted for 2% of the variance in vegetable intake and did not account for any variance in predicting fruit intake (Domel et al., 1996). These and other theories have not been entirely successful in changing behavior, however, collectively they could contribute to develop a body of knowledge to help us better understand and predict dietary behavior and thus provide stepping stones to the development of more effective interventions in minority youth.

The major impetus for the development of the MEI was to measure affective meanings of eating behaviors in minority youth and to assess relationships between factors of the MEI and eating behaviors in youth. Significant associations in theoretically sounds directions were observed for most factors. A positive meaning of eating behavior, Personal Well Being, was associated with more frequent healthy dietary behavior, while other more negative meanings of eating subscales were associated with less frequent healthy dietary intake. Personal Negative Emotions and Disturbed Eating were associated with frequency of consuming unhealthy high energy-dense foods, specifically French fries, chips and soda and accounted for 4–11% of the total variance. Eating on Behalf of Others was associated with consuming green salads less often. Even though Pleasure Eating was not significantly associated with dietary intake in this sample, it is possible these factors may differ by weight status or across time. Although research is needed to further substantiate its utility, these results suggest that the MEI shows promise as a tool for understanding the affective determinants of dietary intake in minority children.

The use of this scale to describe meanings most relevant to minorities is also highlighted in these findings. In Sample 2, there were gender and ethnic differences in Disturbed Eating. This serves as evidence that meanings of eating may be affected by other contextual factors related to culture and ethnicity. Further research should examine the causes of these differences as a means to gain further understanding of the specific meanings that are most salient to different groups.

These data also suggest that the two-factor, five-item scale may provide a useful measure of the meanings of eating behavior for use in telephone interviews or in settings where use of the longer scale is not feasible. The shorter scale will allow for repeated measures of the meanings of eating behavior in large samples. However, it should be noted that the internal consistency of the abridged scale is not optimal, and therefore provides a weaker estimate of these meanings of eating behavior compared to the full-length scale.

Limitations

A major limitation of this study is that its sample size precludes the ability to perform confirmatory factor analysis. Second, data were collected in a school setting which limits the external validity of our findings. This study was validated in a predominantly Latino population, therefore generalizability to other populations may be limited. Factor structure and scale properties may be different in other populations. Meanings may differ depending on weight status within the Latino population. However, weight status was not measured in this population to assess these differences. Third, there are limitations due to the self-report nature of our measurements. This may especially be an issue with younger children who may not be able to accurately recall details regarding dietary intake. Fourth, the food frequency items used to measure dietary behavior were not comprehensive, so future research may benefit from a more inclusive measure of dietary behavior such as 24 hour recalls or dietary records. Fifth, the amount of variance accounted for by the meanings of eating was relatively small. However, the statistical significance in this study illustrates that meanings may be one piece of the puzzle. Therefore, even though the amount of variance accounted for by the meanings of eating behavior in predicting dietary intake may be small, these and other affective determinants may still be important. Finally, the psychometrics of the MEI were tested in children, because we research indicates that interventions to promote healthy diet should begin early. However, middle school students participated in the focus groups because their level of cognitive development allows for clearer verbalization of their thoughts. Therefore, there may be important meanings of eating behavior for younger children that were not elicited through interviews. Testing the properties of the MEI in a younger population does provide confidence in comprehensibility and generalizability of the scale to larger age ranges.

Future Directions

The MEI may help to identify and gain insight into the affective determinants of eating behavior in minority youth that can be applied to the development of successful theory-based intervention strategies. This offers a unique opportunity to discover modifiable factors that can be targeted in interventions. However, more extensive validation of these scales in larger, more diverse study populations is needed. Generally, a number of independent studies are required to establish the credibility of a tested construct. Additionally, discriminant and predictive validity should be assessed to provide further validation of the MEI as a psychometrically sound instrument. The associations between subscales of the MEI and eating behaviors suggests that targeting meanings of eating in order to change eating behaviors might offer new strategies to improve dietary habits.

Implications

The observed correlations among the meanings of eating behavior and dietary intake lend support to the importance of the meanings of eating behavior and the theory of meanings of behavior as a possible target for interventions. Previous research in preventive health for youth has focused mainly on cognitive health behavior theories and more cognitively based factors such as knowledge, outcome expectations, and self-efficacy as factors to intervene on. In contrast to cognitive models, affective meanings bypass cognition and knowledge, influencing behavior directly. Since the latter is more salient to youth health behavior, the constructs from the TMB may be more effective in guiding strategies to increase healthy dietary intake in this population. Consequently, interventions designed to increase healthy dietary behavior should focus on increasing positive personal meanings of healthy foods. Interventions could also focus on finding healthy alternatives to eating unhealthy food when children are feeling negatively and turning to food to improve negative affect.

Acknowledgments

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Research Highlights

- We developed and validated a Meanings of Eating Index (MEI) in a diverse sample of children.

- Personal Negative Emotions and Disturbed Eating were positively associated with high calorie snack food.

- Personal Well Being was positively associated with vegetables more frequently.

- Eating on Behalf of Others was negatively associated with vegetable intake.

- The MEI shows promise for understanding the determinants of dietary intake in minority youth.

Table 1

Study Participant Characteristics Across Samples

	Sample 1A	Sample 1B	Sample 2
N	175	100	962
Age	9.43 (0.57)	9.52 (0.56)	9.27 (0.48)
Gender			
Male	79(45%)	40 (40%)	464 (48%)
Female	96 (55%)	60 (60%)	498 (52%)
Ethnicity			
White	5(2.9%)	3(3%)	290 (30.2%)
African Americans	5(2.9%)	5(5%)	27 (2.8%)
Latino	163(94%)	90 (92%)	267 (27.8%)
Asian	0(0%)	0(0%)	78 (8.1%)
Biracial	0(0%)	0(0%)	146 (15.2%)
Other	0(0%)	0(0%)	154 (16.0%)

Table 2

MEI Factor Structure from Sample 1A

I eat because...	Factor1	Factor2	Factor3	Factor4	Factor5
I feel like I have no control.	0.57864				
it makes me feel like I am in control.	0.60690				
it helps me deal with anger.	0.61346				
it helps me deal with sadness.	0.68251				
it helps me get over fights with friends or family.	0.69345				
makes me feel less lonely.	0.72651				
it helps me deal with loneliness.	0.78739				
it helps me feel better when things are not going well.	0.79109				
makes me feel less sad.	0.90879				
it makes me feel smart about my health.		0.62286			
it makes me feel more energetic.		0.73794			
it makes me feel stronger.		0.75751			
it makes me feel healthy.		0.79242			
if makes me feel like I am taking care of myself.		0.82083			
eating certain foods makes me and my friends stand out.			0.58811		
I can't stop eating.			0.65645		
then my family will leave me alone about my weight.			0.66890		
it makes me feel happy.				0.63973	
it makes me feel better.				0.72635	
it makes me feel good.				0.82604	
it is part of being with my family.					0.51789
I don't want my parents to be mad at me.					0.59515
so my friends/family members don't have to eat alone.					0.69599
everyone else is doing it.					0.79257

Table 3

Cronbach's Alphas for the MEI Factors Across Samples

	Sample 1A	Sample 1B	Sample 2
Personal Negative Emotions	0.90	0.91	-
Personal Negative Emotions (Short)		0.83	0.80
Personal Well Being	0.82	0.85	-
Disturbed Eating	0.72	0.73	-
Disturbed Eating (Short)	-	0.61	0.50
Pleasure Eating	0.76	0.77	-
Eating on Behalf of Others	0.59	0.65	-

Table 4

Correlations between MEI and Dietary Intake Items in Sample 1B

	1	2	3	4	5
Personal Negative Emotions (1)	1.00	0.34**	0.55***	0.49***	0.51***
Personal Well Being (2)		1.00	0.22*	0.45***	0.39***
Disturbed Eating (3)			1.00	0.31**	0.50***
Pleasure Eating (4)				1.00	0.42***
Eating on Behalf of Others (5)					1.00
High Calorie Snack Food	0.21*	0.13	0.33**	0.13	0.13
Fruits and Vegetables	0.01	0.13	−0.04	−0.06	−0.08
Sugar Sweetened Beverages	0.06	0.12	0.14	0.04	−0.01
Fruit juice	−0.05	0.02	−0.07	−0.09	−0.11
Fruit (fresh or canned, not counting juice)	0.10	0.12	0.03	−0.08	−0.10
Vegetable juice	0.01	0.05	−0.05	0.06	0.09
Green salad	−0.12	−0.03	−0.09	−0.13	−0.20*
Vegetable soups or stew with vegetables	0.12	0.20*	−0.05	−0.02	0.07
Vegetables (any other)	0.01	0.11	0.09	0.01	−0.01
French fries or fried potatoes	0.20*	0.11	0.13	0.09	0.08
Corn chips, potato chips, popcorn, or crackers	0.19	0.07	0.25**	0.02	0.01
Doughnuts, pastries, cake, or cookies (not low-fat)	0.12	0.03	0.35**	0.16	0.15
Diet soda	0.17	−0.08	0.20*	0.07	0.23*
Soda – not diet	0.14	0.15	0.27**	0.13	0.10

***
p ≤ .0001;

**
p ≤ .01;

*
p ≤ .05