THE DEVELOPMENT AND PILOT TEST OF A WHOLE GRAIN YOUTH EVALUATION TOOL FOR THE WISCONSIN NUTRITION EDUCATION PROGRAM (WNEP)

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Abstract

Purpose: The objective of this study was to develop and pilot test a whole grain evaluation tool to measure behavior change in elementary-aged children participating in the Wisconsin Nutrition Education Program (WNEP).

Methods: A new Whole Grain Youth Evaluation tool and accompanying Parent Evaluation tool were developed based on a critical analysis of existing literature on youth evaluation and youth whole grain intake. The evaluation tool was subjected to an expert review/rating to assess for content validity. A cognitive test was conducted with a group of 14 children in a Waukesha-area elementary afterschool program. Both youth and parent evaluation tools underwent pilot testing in WNEP-participating schools in the Waukesha School District during the 2013-2014 school year. Pilot test participants included 1,043 children in fifty-three 2nd-5th grade classrooms in each of six elementary schools: Blair, Banting, Hadfield, Hawthorne, Heyer, and Whittier Elementary in Waukesha, WI. Youth and parent evaluation data was collected and tallied. Each Waukesha County Nutrition Educator was interviewed regarding feasibility of conducting the evaluation.

Results: The youth and parent evaluation tools met the required minimum average rating of 4/5, indicating content validity. Children demonstrated understanding of the taste test questions during the cognitive assessment. Thirty-six percent of youth participating in the classroom taste test reported trying whole grain bread for the first time; 80% reported intention to eat it again; 71% reported intention to eat it at home. Second graders more frequently reported trying whole grain bread for the first time (52.5%) compared to 18.9% of 5th graders. Eleven percent (n=113) parents returned surveys; of those, 99 parents reported willingness to buy a whole grain food again. Nutrition Educators had favorable impressions of the evaluation tool and reported that it was feasible to conduct.

Conclusion: The Whole Grain Youth Evaluation Tool met content validity, cognitive understanding, and feasibility standards set in place by this research and is therefore recommended for use by WNEP. It is recommended that the Parent components be translated into the Hmong language and piloted with this audience due to the importance of reaching parents in counties with a large Hmong population. This would ensure feasibility on a broader scale.

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CHAPTER 1: INTRODUCTION

In community nutrition education, proving program worth and impact is crucial to secure continued funding. The Wisconsin Nutrition Education Program (WNEP) is no exception; WNEP continually strives to measure its effectiveness in teaching limited-resource families about nutritious and economical food choices. The Wisconsin Nutrition Education Program (WNEP) is federally funded through the Supplemental Nutrition Assistance Program (SNAP). Evaluation tools are one of the primary methods WNEP uses to measure program impact and ultimately to secure funding.

While the allocation of funds to SNAP-Education programs is multifactorial and dependent on fluid factors such as current federal nutrition policy and local SNAP eligibility rates, evidence of WNEP impact is also important. Evaluation tools can provide the evidentiary support needed to demonstrate impact and justify funding—a process that will be important in the future as the allocation of federal funds continually undergoes scrutiny.

Evaluation is especially important with audiences that are a particular focus in WNEP education, such as children and parents. Importantly, a large percentage of WNEP/SNAP-Ed programming is conducted with children; 67% of all WNEP teaching contacts in 2010 were made with children and youth (UW-Extension Cooperative Extension, Wisconsin Nutrition Education Program, 2011). Consequently, proving the worth and impact of child nutrition education is an extremely valuable step in the process of securing future funding.

WNEP currently has thirteen evaluation tools for use with youth audiences. Of the thirteen, six measure fruit and vegetable outcomes such as knowing how to choose a variety of fruits and vegetables, intention to eat certain garden-grown vegetables, tracking improved consumption of fruits and vegetables, intention to eat fruit with breakfast, and intention to

consume a newly sampled fruit or vegetable again. The remaining seven tools address portion awareness, limiting sweetened beverages, drinking milk, choosing a healthy snack, washing hands, and making fast food choices (UW-Extension Cooperative Extension, Wisconsin Nutrition Education Program, 2011). Lack of appropriate or relevant evaluation tools is a significant barrier to the assessment of youth programming, as some teaching topics are either not covered or not adequately measured by existing tools. The lack of youth evaluation tools reflects the difficulty in developing nutrition education evaluation tools that are feasible to conduct with youth, practical for the intermittent nature of WNEP education, and able to yield accurate measurements of knowledge or behavior change. The Wisconsin Nutrition Education Program is currently working to adapt or develop new evaluation tools that will be appropriate for use with elementary-aged youth audiences, particularly those that address outcomes of interest. One outcome of interest for fiscal year 2014 is that "participants will choose grain foods so that half of those eaten are whole grains" (UW-Extension Cooperative Extension, Wisconsin Nutrition Education Program, 2014).

The consumption of whole grain foods is a particularly important aspect of healthy eating patterns for both youth and adults. Increasingly, the Dietary Guidelines for Americans is promoting whole grain foods due to evidence that regular consumption of whole grains may help to maintain a healthy weight, promote heart health, and decrease risk for chronic disease (U.S. Department of Agriculture & U.S. Department of Health and Human Services, 2010). According to the U.S Grain Consumption Landscape (Lin & Yen, 2007), children are consuming 32% of the recommended daily whole grain intake. Adult consumption is comparable, meeting 35% of the whole grain recommendation. There are currently no WNEP evaluation tools designed for children that measure knowledge or behavior surrounding the topic of whole grains. Developing

a tool to measure indicators of whole-grain intake in children is crucial for gauging the effect of whole grain nutrition education and guiding future programming in this area.

The development of an evaluation tool to measure the impact of nutrition education is a complex process, particularly for youth. An ideal youth WNEP evaluation tool is simple and feasible to conduct under time constraints and in variable environments (classrooms, afterschool programs, parks), well-understood by youth, accurate in the data it collects, and reflective of actual change. Achieving all of these characteristics is challenging. It is therefore prudent to carefully consider each aspect of the evaluation process including *what* to evaluate (that is, what exactly the evaluation tool will measure) and *how* to conduct the evaluation. Determining *what* to evaluate involves careful consideration of the needs of the population, including children's existing knowledge and behavior regarding whole grains, and environmental or other factors that affect whole grain intake in this population. Determining the *how* requires a thorough review of existing research to identify practical and effective youth evaluation methods.

Research Purpose

The purpose of this study was to develop and pilot test a whole-grain-related evaluation tool that measures behavior change of second- fifth grade children participating in the Wisconsin Nutrition Education Program (WNEP). A review of the literature investigated variables that affect whole grain intake in children and critically reviewed the development of evaluation tools designed to measure behavior change in elementary-aged children. This information guided the development of a new evaluation tool intended to measure impact and guide delivery of whole-grain nutrition education for 2nd-5th grade children participating in WNEP lessons.

The purpose of this study encompassed several subproblems that needed to be explored, which included: (1) How are youth nutrition interventions commonly evaluated? (2) What factor(s) are predictors of whole grain intake and dietary behavior change that would be ideal for evaluation tool development in children? (3) What are best practices for developing evaluation tools for a SNAP-Ed program? and, (4) What assessments are useful for establishing feasibility and validity of a newly-developed evaluation tool? The exploration of these issues in the literature was instrumental in identifying areas of focus for the evaluation tool and effective techniques for evaluation administration and validation.

Definitions

Availability: A psychosocial factor identified in the Social Cognitive Theory; presence of or access to particular dietary choices

Construct Validity: the degree to which an evaluation or other measure demonstrates its ability to measure the theoretical constructs that it proposes to measure

Content Validity: the extent to which an item *appears* to measure constructs of interest or the content/subject area it intends to assess

Criterion Validity: the extent to which one variable or set of variables correlates to an outcome of interest; the variable may be predictive of an outcome or a concurrent measure of the outcome

Convergent Validity: a subtype of construct validity**;** the degree to which two tests that are believed to measure closely related skills or types of knowledge correlate with one another

EFNEP: Expanded Food and Nutrition Education Program; a federally-funded nutrition program designed to assist limited resource audiences in acquiring the knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being

Intention: A psychosocial factor identified in the Social Cognitive Theory; determination to make a particular choice or behave in a particular manner

Internal consistency: a measure based on correlations between different items on the same scale (or subscale). Internal consistency measures whether several items that propose to measure the same general construct produce similar scores

Outcome expectancies: A psychosocial factor identified in the Social Cognitive Theory; belief in the positive and negative outcomes resulting from a behavior

Psychosocial: involving both psychological and social aspects; examples of psychosocial factors in the realm of food choice include intention, availability, outcome expectancies, and self-efficacy

Self-efficacy: A psychosocial factor identified in the Social Cognitive Theory; belief in ability to change a behavior. Also referred to as "perceived control"

SNAP-Ed: An education program funded federally through the Supplemental Nutrition Assistance Program encouraging low-income individuals to adopt healthful eating habits. SNAP is a food assistance program which operates through the Food and Nutrition Services (FNS) of the United States Department of Agriculture (USDA).

Social Cognitive Theory (SCT): A theory that proposes that behavior, person factors, and environmental factors interact to explain and predict changes in behavior. Interacting determinants of behavior change include knowledge, perceived self-efficacy, outcome

expectations, behavioral intentions, and perceived facilitators/impediments. SCT is a prominent model of health behavior and has been used in predicting and explaining eating behaviors (Reynolds, Hinton, Shewchuck, & Hickey, 1999)

Theory: a set of interrelated concepts, definitions, and propositions that present a systematic view of events or situations by specifying relations among variables in order to explain and predict events or situations (Ickes & Sharma, 2011)

Whole grain: A food comprised mostly of a cereal grain (wheat, oats, barley, rye, corn, rice) that contains all 3 parts of the grain kernel (bran, germ, and endosperm)

WNEP: Wisconsin Nutrition Education Program; a statewide education program utilizing SNAP-Ed and EFNEP dollars to provide community-based nutrition education programs within a university research-based context

CHAPTER 2: REVIEW OF THE LITERATURE

The articles in this literature review formed the groundwork for the development of an evaluation tool measuring whole grain-related dietary behaviors in 2nd-5th grade children. The review was conducted in PubMed and Elsevier Science Direct databases via University of Wisconsin-Madison Libraries through 2014 and included a special search of the Journal of Nutrition Education and Behavior. Keywords included: child/youth nutrition education, evaluation measures, evaluation tool validity, Social Cognitive Theory (SCT), whole grain, and Supplemental Nutrition Assistance Program (SNAP). Reference lists of included articles were also reviewed to locate additional sources. This search resulted in a thorough review in the areas of past youth evaluation tool development, indicators of whole grain intake in children, and the establishment of evaluation tool validity. The research presented here provided guidance for the development of a youth evaluation tool that is ideally useful for WNEP, feasible to conduct in a variety of educational environments, and capable of yielding accurate measurements of behavior change.

The literature presented here provided context for the development of the new youth evaluation tool by analyzing the methodology of previous child evaluation endeavors. Due to the variety of potential approaches to evaluation of child nutrition interventions, this literature review explored past evaluation methods with the purpose of bringing to light the advantages and drawbacks of varying approaches. Ultimately, the evaluation approach adapted for this study largely relied on the theoretical assumptions regarding the relationship between behavior change and previously studied variables.

Ickes and Sharma (2011) explained the importance of using theory in youth evaluation research prior to their study assessing the use of the Theory of Planned Behavior as a model for

predicting health behaviors in adolescents. Ickes and Sharma define "theory" as "a set of interrelated concepts, definitions, and propositions that present a systematic view of events or situations by specifying relations among variables in order to explain and predict events or situations." Behavioral theories are, therefore, predictive of behavior, outlining known relationships between a myriad of variables and associated behavior. These relationships can guide interventions to target particular variables to incite behavioral change. Application of behavioral theory to the evaluation process assists in the identification of measurable behavior indicators, which are useful for program assessment and evaluation tool development. Since behavior theories are repeatedly studied and variables' relationships to behavior are scrutinized and refined over time, theory-based health behavior change programs are frequently cited as more effective and evidence-based than those that did not use theory. Ickes and Sharma affirm that a reliance on theory is essential for moving the health field forward; researchers should strive to use theory, continually applying, testing and refining theoretical concepts and their relationships to health outcomes (Ickes & Sharma, 2011).

In recent literature, research involving child nutrition education programming and evaluation has focused on behavioral theories as a basis for study. Theories of particular interest in this literature review are the often-used knowledge-attitude-behavior model of behavior change, the Theory of Planned Behavior (TPB), and the Social Cognitive Theory (SCT). Each brings a unique approach to child evaluation and it was important to consider the characteristics of each approach to achieve a full understanding of the pros and cons of each. A careful analysis of past child nutrition education interventions helped to bring to light the application of these behavioral theories, particularly in the development of evaluation tools. The literature presented

here revealed a variety of evaluation techniques and exposed current best practices regarding the use of behavioral theories in evaluation.

Many variables have been shown to affect children's usual dietary intake. Several behaviorally-based nutrition intervention studies ascribe to the Social Cognitive Theory, which proposes that personal factors, environmental influences, and behavior continually interact. The SCT emphasizes that the interaction of psychosocial factors such as knowledge, self-efficacy, outcome expectations, behavioral intention (goals), and food availability are together more predictive of behavior change than gains in nutrition knowledge alone (Glanz & Bishop, 2010). Another behavioral theory, the Theory of Planned Behavior, likewise suggests the influence of multiple social, personal, and environmental factors such as attitude, perceived behavioral control (self-efficacy), behavioral intention, and perceived social pressure on behavior. A thorough analysis of available literature describing the psychosocial variables highlighted in these behavioral theories and their relationships to dietary and whole grain intake helped to guide the adaptation and development of a whole grain-related evaluation tool for WNEP.

Empirically determining that a newly developed evaluation tool is valid and feasible to conduct is an integral part of its practical use. Most evaluation instruments developed for school-based nutrition education program evaluation efforts established content validity through expert reviews and pilot studies (Hernandez-Garbanzo, Brosh, Serrano, Cason, & Bhattarai, 2013). Conducting additional validity assessments can also help to ascertain that the indicators utilized in the evaluation tools are accurate measures of behavior change. This literature review includes a critical analysis of studies reporting the establishment of feasibility and validity of piloted evaluation tools and highlights the validity procedures adapted for use in this study.

In summary, the creation of a new evaluation tool for a WNEP required careful development based on theory and collected research, verification of its feasibility to conduct in a classroom setting, and establishment of validity. These steps were necessary to ensure a resulting tool that is practical to conduct, accurate in the data it collects, and reflective of behavior change. The first, essential step to formulating the tool was a thorough review of existing research, beginning with an examination of commonly used evaluation tools in child nutrition intervention.

Commonly Used Evaluation Tools in Child Nutrition Intervention

Prior to initiating the development of a new evaluation tool, it was important to take into consideration the types of evaluations that have been used in past child nutrition interventions. According to review studies by Contento, Randall, and Basch (2002) and Hernandez-Garbanzo, et al. (2013), a wide variety of measures have been used to evaluate effectiveness of child nutrition education intervention, including measures of change in knowledge and skills and measures of numerous psychosocial indicators of behavior.

The theoretical framework for nutrition education intervention most commonly used during the 1980s was the knowledge-attitudes-behavior framework. This theory assumes that change in knowledge or attitude would ultimately change behavior. Measures of knowledge and skills are widely used to evaluate studies with elementary school-aged children (about 85% of studies included in the Contento et al., 2002 review). These studies assumed that although children (particularly young children) may not yet make independent dietary choices, having the appropriate knowledge and skills prepares them to make informed decisions when they have the opportunity to do so. Although measurement of knowledge is often convenient, the correlation between knowledge and behavior is low for all age groups (Contento, et al., 2002).

More recently (since 1990), studies have taken into consideration evidence that nutrition education is more likely to be effective when it is behaviorally focused. Dietary change depends on many factors in addition to knowledge such as individual motivation, belief in ability to make a change, presence of resources to make a change, and environmental/community factors such as availability and accessibility of food. Nutrition education interventions have their greatest impacts on behaviors by addressing these variables.

Many current child nutrition interventions are based on psychosocial theories of behavior change, primarily the Social Cognitive Theory (SCT). The Social Cognitive Theory highlights certain psychosocial mediators of behavior that have been increasingly utilized as indicators of dietary behavior. Common psychosocial indicators that have been measured in past studies include knowledge, self-efficacy, outcome expectancies, behavioral intention, habits, environment, and social influences including social support and modeling (Hernandez-Garbanzo, et al., 2013). Hernandez-Garbanzo et al. searched nutrition intervention literature for trends in predictive capacities of these psychosocial indicators, finding that outcome expectancies/attitude, habits, behavioral intention, and self-efficacy/perceived behavioral control were significantly correlated to dietary intakes in children, making the SCT and TPB promising models for evaluating child dietary behavior change. However, additional research is needed to identify mediating variables that are highly predictive of specific dietary behavior(s) of interest (e.g. whole grain intake) and to demonstrate the effectiveness of interventions directed at these mediating variables.

Some studies have measured parental influence on child behavior change such as adult participation in nutrition interventions, ranging from a tally of the number of activity packets sent home that were completed by a household member to attendance at an organized event

(Contento, et al., 2002). In one study, children with parents involved in home-based nutrition education activities reported more changes in fat consumption behavior than their peers, who had participated only in school-based nutrition education. This finding that highlighted the importance of parental involvement in inciting child dietary behavior change (Perry, et al., 1988).

Taking into account the variety of approaches to child evaluation, considerable preliminary work should be undertaken in the development and testing of a new evaluation instrument before its use in any intervention study. Evaluation tools aimed at capturing changes in behavior should measure indicators of behavior considered reliable given the available evidence.

Determinants and Indicators of Whole Grain Intake in Children

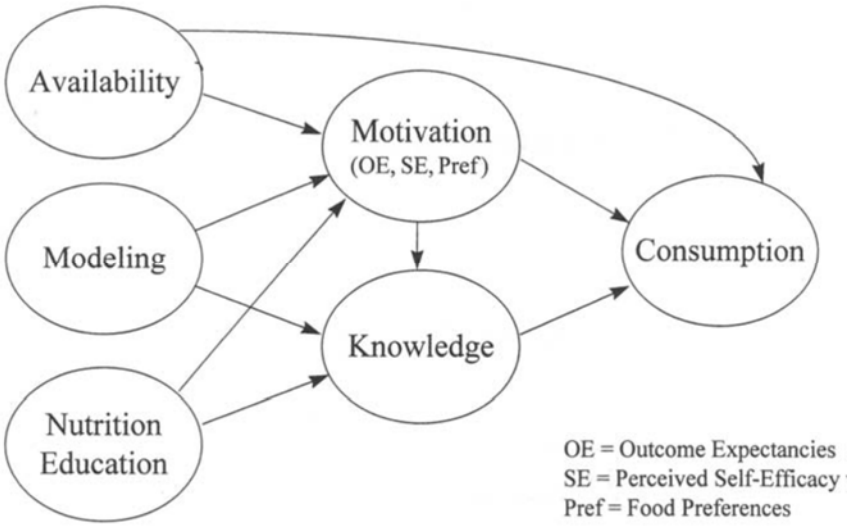
Given that nutrition interventions targeted at behavior change are more impactful than those seeking only to increase knowledge, the whole-grain-related evaluation tool designed for WNEP aimed for behavior change. In order to develop the tool, it was important to identify key determinants and indicators of dietary behavior in children, more specifically, whole grain intake. In a cross-sectional study, Reynolds, Hinton, Shewchuck, & Hickey (1999), sought to identify a theory-based model that would explain and predict the consumption of fruits and vegetables by children. The authors proposed a model (Figure 1) based on Social Cognitive Theory and available literature on nutrition education. The model was ultimately tested using structural equation modeling (SEM) techniques using data from 414 third graders on five behavior predictors; availability, modeling, nutrition education, motivation (i.e., self-efficacy, outcome expectancies, food preferences), and knowledge. Data was gathered using child

psychosocial questionnaires measuring each of these behavior predictors. Knowledge was assessed using ten true/false and multiple choice questions measuring knowledge surrounding the consumption of fruits and vegetables. Self-efficacy, or perceived ability to choose fruits and vegetables, was measured using 21 items with 3-point scales (not sure, a little sure, very sure). Outcome expectancies, or perceived positive and negative outcomes, were also assessed using a 3-point scale (disagree, not sure, agree). A supplemental child questionnaire measured children's food preferences, past nutrition education experiences, and presence of individuals in the child's life who modeled fruit and vegetable consumption. Food preferences were determined via child self-report, indicating how much they liked a particular fruit or vegetable (a lot, a little, not at all). Students indicated which of six people (e.g. teacher, parent) and four media sources (e.g. T.V., educational poster) taught them about fruits and vegetables as a measure of past nutrition education. To assess for modeling, children reported which of five people (e.g. friends, parents) were often seen eating fruits and vegetables.

Parent data was collected via parent questionnaire, which measured availability of fruits and vegetables at home. The questionnaire assessed for presence in the home of eleven fruits and eleven vegetables commonly consumed in the southern U.S. as well as nine other forms of fruits and vegetables (e.g. fruit juice).

To obtain information on fruit and vegetable intake, children's dietary behavior was estimated for each of the seven days of the week using randomly-assigned 24-hour dietary recall interviews. Sunday through Thursday dietary data were collected in schools using face-to-face 24-hour diet recalls using food models to estimate portion sizes. Friday and Saturday 24-hour dietary data were collected on Saturday and Sunday via telephone. One 24-hour recall was collected per student.

Figure 1. Proposed Model of Fruit and Vegetable Consumption in Elementary School Children. (Reynolds, Hinton, Shewchuck, & Hickey, 1999).



Results indicated adequate fit of the fruit and vegetable consumption model for each of four data sets used (random split 1, random split 2, males, females). Indicators of good fit utilized for each data set included a chi-square test, goodness of fit index (GFI) score, and adjusted goodness of fit index (AGFI) score. The model consistently showed for each data set that availability and motivational factors (self-efficacy, outcome expectancies, food preference) were most related to consumption of fruits and vegetables. The authors suggested that based on these findings, future child interventions may be more successful focusing primarily on these factors to influence fruit and vegetable intake. However, it is important to note the limitations of the results. Due to the cross-sectional and self-reported nature of the data, the collection of just one 24-hour recall per child to estimate food intake, and the possibility that other factors not included in the model may affect fruit and vegetable intake, the authors suggested that it is prudent to investigate these relationships further. More research is needed before a causal relationship between these factors and fruit and vegetable intake may be truly established (Reynolds, et al., 1999).

Assuming that these patterns might hold true for other food categories such as grains, one may be able to extrapolate the proposed model and predict that whole grain intake is likewise associated with availability and motivational factors such as self-efficacy, outcome expectancies, and food preference. Additional studies that examine behavior change in children and whole grain intake specifically may help to corroborate this assumption.

When considering what factor(s) would be useful indicators for measurement of behavior change, it is imperative to critically examine the strength of the association between the factor and the desired behavior change. A common concern when formulating an evaluation tool to measure such change is the disconnect between reported confidence in ability to change and actual behavior change. When a child expresses willingness and ability to change a diet-related behavior, will actual behavioral change occur? The purpose of an observational, cross-sectional study by Parcel, et al. (1995) was to evaluate the concept of self-efficacy, or an elementary school child's perceived "ability" to change a diet-related behavior. Self-efficacy in children is defined as the child's belief that he/she is able to perform a certain task, namely, to make dietary choices. The authors note that the Social Cognitive Theory places self-efficacy as a "pivotal construct in understanding and modifying human behavior". Prior to this study, research had demonstrated the predictive ability of self-efficacy measures in children, but only in other learning activities (e.g. mathematics) while dietary self-efficacy among children had been largely ignored in scientific literature.

Due to the importance of self-efficacy in behavior change and the lack of data on self-efficacy and dietary choices among children, this study critically examined the Child Dietary Self-Efficacy Scale (CDSS), which measures child self-efficacy in food choice. The CDSS scale was tested for internal consistency, test-retest reliability, factorial validity, and criterion-related

reliability. Importantly, the relationship between self-efficacy and self-reported usual food consumption was also analyzed, thereby determining the plausibility of using a self-efficacy measure as an estimate of actual food consumption.

The CDSS scale and food consumption questionnaire were components of the Child and Adolescent Trial for Cardiovascular Health (CATCH), which focused on improving child nutrition by lowering total fat, saturated fat, and sodium in the diet. Participants in the study were 1,127 third and fourth grade students enrolled in public schools in California, Louisiana, Minnesota, and Texas. The CDSS measured children's self-efficacy to eat foods lower in fat and sodium rather than the high fat or high-sodium alternative. Researchers developed CDSS questions by gathering a representative sample of age-appropriate food-related behaviors and cross-classifying them with frequently-consumed foods among children in this age group. Questions that used the wording, "how sure are you…" were paired with Likert-style responses ("not sure," "a little sure," and "very sure"). The food consumption questionnaire indicated children's self-reported usual food consumption (food frequency). Children self-reported dietary behavior using a 20-item scale in which they selected most-frequently-consumed foods. The questionnaire used a forced-choice format where a higher fat or higher sodium food was always paired with a lower fat or lower sodium food. Children were asked to circle the food they choose most often (Parcel, et al., 1995).

Of the initial sample, 958 children fully completed the questionnaires. Items on the CDSS were scored -1, 0, or +1 for negative, neutral, and positive responses, respectively. Items on the usual food choice scale were scored -1 for higher sodium/fat choices and +1 for low sodium/fat choices. To estimate convergent validity, a correlation analysis was conducted between the self-efficacy and usual food choice questionnaires. A multiple regression equation

also investigated whether gender, geography, grade, and race were predictors of self-reported usual food consumption. Results of the CDSS scores were skewed to the right, indicating more subjects scored on the high end of the scale or reported "very sure" in response to self-efficacy questions. The CDSS demonstrated a high level of internal consistency and acceptable levels of test-retest reliability. Gender and grade were predictors of healthier food choices, with girls scoring higher (healthier) than boys, and third grade students scoring higher than fourth grade. Self-efficacy, however, was the strongest predictor of food choices that were lower in salt and fat, accounting for about 34% of variance (Multiple R =0.58; Parcel, et al., 1995).

Results of the Parcel study support the use of a self-efficacy instrument to evaluate intervention programs that address nutrition-related behavior. While the large sample size of this study is an attribute, the lack of longitudinal data is a limitation. The authors stressed that self-efficacy is simply one determinant of dietary behavior and that other cognitive and environmental factors should be assessed for their role in food consumption (Parcel, et al., 1995).

While child self-efficacy in food choice should be a serious consideration in designing an evaluation to measure behavior change, other psychosocial factors should also be taken into account. Burgess-Champoux, Rosen, Marquart, & Reicks examined psychosocial determinants of whole grain intake in their 2008 study. Prior to the study, the authors were aware of no reliable evaluation instruments sensitive to changes in psychosocial determinants of whole grain intake by children. Due to the fact that child dietary intake is influenced by individual, behavioral, and family environmental factors, interventions designed to address child whole grain intake should consider these factors.

This qualitative study described the development and testing of two questionnaires intended to measure psychosocial determinants of whole grain intake among children as well as

parental modeling and enabling behaviors. In the development of the child questionnaire, the authors utilized Social Cognitive Theory to identify psychosocial factors, specifically knowledge, intention, availability, and self efficacy (previously identified in focus group discussions with children as important targets for change). Each factor was assessed using a six or seven-item scale as follows: Ability to identify a whole grain food from two options was considered to be a "knowledge" indicator and was assessed using seven items, assigning one point per correct answer. Similarly, researchers measured "intention to choose" by awarding one point per whole grain choice selected. Availability of whole grains at home was measured using three response options: almost never=1, sometimes=2, or almost always=3. Finally, choosing between 1= "I'm not sure I can" 2= "I'm a little bit sure I can" and 3= "I know I can" reflected self-efficacy in food choice. The parent questionnaire focused on food frequency (consumption of whole and refined-grain foods over the past month), and availability of whole and refined-grain foods in the home over the past week. Parental modeling, enabling behaviors, and attitude regarding whole grains were assessed using questions developed from literature and focus-group data; parents responded using 5-point response scales where 1=strongly agree and 5=strongly disagree. Since identification of whole grain foods can be difficult for all participants, information regarding how to identify whole-grain foods was provided to both groups (only after knowledge items were completed in the child questionnaire; Burgess-Champoux, et al., 2008).

The study sample was derived from three schools; School A included 39 parent/fifth grade pairs (68 total participants) and served as the pilot sample. Schools B and C provided 119 parent/fourth- and fifth-grade child pairs (353 total participants) and served as the whole-grain intervention sample. Child and parent questionnaires were administered twice, approximately 10-

14 days apart in the pilot study only, then once for a school-based whole grain intervention study (Burgess-Champoux, Rosen, Marquart, & Reicks, 2008).

The intervention study had three parts including a classroom intervention component, a parent component encouraging increased consumption of whole grains at home, and a school foodservice component educating school foodservice personnel to increase whole grain foods in school menus. The classroom component included a five-lesson curriculum designed to provoke positive change in the evaluated variables (whole grain-related knowledge, skill, self-efficacy, intention, expectancies, and preferences). The parent component encouraged increased consumption of whole grains at home through an interactive newsletter and three supporting events; a whole grain quiz bowl event, a bakery tour, and a grocery store tour. The school foodservice component provided information guiding school foodservice staff to increase the number of whole grain foods that are incorporated into school menus (Burgess-Champoux, et al., 2006).

Results from the questionnaire's pilot test (School A) showed that internal consistency of whole-grain availability, whole-grain knowledge, and self-efficacy were all modest ($\alpha =$ $.42\ to\ .63$), while the internal consistency for intention to choose whole grains was low ($\alpha =$ $.19$). Children in School A reported confidence (higher scores) in self-efficacy to choose and eat whole-grain foods than in any other indicator (mean score of 17.8 ±2.4 on a scale ranging from 7-21). On the other hand, the mean score for intention to choose whole-grain foods was 2.8 ±1.3 on a scale ranging from -6 to +6 (however, internal consistency was poor). The authors noted that children had trouble with the "intention to choose" concept; the forced choice format of the questions in this section caused difficulty when children chose between two disliked foods. Internal consistencies in responses were moderate to low for whole grain food frequency, refined

grain food frequency, and availability of whole grains at home (Burgess-Champoux, et al., 2008).

The authors noted that lack of knowledge in classification and identification of whole-grain foods was a significant barrier to the development of a tool that accurately measured psychosocial factors and their relationship to whole grain intake. The authors pointed out that the low internal consistency values show that the scale needs revision and additional testing on a broader scale. The study had several other limitations including a small convenience sample, self-reported data, and potential for social desirability bias in child responses. (Burgess-Champoux, et al., 2008).

Overall, the pilot test indicated that knowledge, availability, and self-efficacy were more easily assessed than intention-to-choose in children, largely due to a difficultly in discernment between intention and preference when using a forced-choice question format. Lack of knowledge in identification of whole grains (in both adults and children) presents a problem for any researcher seeking to accurately measure change in whole grain-related behavior; this should be a consideration for whole-grain-related nutrition interventions and evaluation tools.

In 2011, Rosen, Burgess-Champoux, Marquart, & Reicks revisited their work on whole grain evaluation tool development by studying psychosocial factors affecting whole grain intake. Citing their previous work (Burgess-Champoux, Rosen, Marquart, & Reicks, 2008), the study's purpose was to further explore psychosocial variables thought to predict whole grain intake in children with the intention of developing and refining new evaluation tools. Variables measured were child whole-grain intake, self-efficacy, outcome expectations, preferences, knowledge regarding whole grain food, and whole grain availability at home.

Part of a larger intervention project that gradually increased whole-grain content of school cafeteria items, this cross-sectional survey was conducted with 98 children in fourth through sixth grades and their parents (n=76) from a Minneapolis/St. Paul suburban elementary school. The study was conducted one year after the beginning of gradual whole grain introduction to school lunch. Researchers first conducted individual record-assisted, 24-hour dietary recall interviews with the child participants; from this data, estimated daily whole grain servings were calculated. Parents completed a home whole-grain inventory tool assessing the availability of whole-grain foods in the home. Researchers verified that the whole-grain item reportedly consumed by the child was available at home as reported by the parents. After the interviews, children completed a questionnaire on two occasions (14-17 days apart) to examine psychosocial variables such as food preferences, outcome expectations, and self-efficacy. Preferences for 14 whole-grain food items were measured with a 5-point scale, where 1="I hate it" and 5= "I love it." Nine self-efficacy items were measured on a 3-point scale, 1= "I'm not sure I can," 2= "I'm a little bit sure I can" and 3= "I know I can." Ten outcome-expectation questions were assessed using five response options where 1="strongly disagree" and 5= "strongly agree." One item assessed knowledge, asking children the recommended number of whole grain servings, with the options, "I don't know," "none," "one third of all the grain foods I eat," "one half of all the grain foods I eat," and "all of the grains I eat" (Rosen, Burgess-Champoux, Marquart, & Reicks, 2011).

Results showed that internal consistency and test-retest correlation coefficients for each of the psychometric scales were modest or acceptable ($\alpha = 0.50 - 0.70$). Parents reported a mean of 15 ±7 whole grain products available at home. Child mean daily intake of total grain was about 8 servings, with intake of whole grains at slightly over two servings. Items most liked

by children included snack food (popcorn and chips) and familiar ready-to-eat cereals, breads, and crackers. Whole wheat tortillas and pastas were not rated highly, largely due to lack of familiarity. Outcome expectations indicated that children believed that whole grains were healthy, helped them to be strong, gave them energy, kept their heart healthy, and that eating whole grains pleased their parents. Children were most confident in their ability to choose whole grain food at restaurants (when they had many choices available). Reported home availability and refined grain intake were significantly related to whole grain intake ($p<0.05$), whereas psychosocial variables were not. Children with higher outcome expectations scores consumed more servings of food in the partially-whole-grain category, with fewer servings from the refined grain category (although this only approached significance, with $p<0.07$; Rosen, et al., 2011).

Since home availability was associated with child whole-grain intake, the authors concluded that home availability may be a more important variable associated with whole-grain intake than any other psychosocial variable. Contrary to past studies analyzing child fruit and vegetable intake, whole-grain preference was not an important predictor of intake, possibly due to frequent incorporation in mixed dishes, making the grain itself difficult to isolate and assess for preference. Lack of whole grain familiarity and lack of knowledge in the number of recommended servings of whole grain food could be future areas on which to focus nutrition education efforts with children (Rosen, et al., 2011).

One limitation of the study by Rosen et al. was that lack of knowledge of how to identify whole grains may have affected reports of home availability and food preference. The self-reported nature of the data also introduced the potential for error. However, the 24-hour food recall plus interview methodology may have been more accurate than the often-used food frequency questionnaire.

Overall, the study indicates that the availability of whole grains at home plays a large part in child whole grain intake. The lack of significance in child psychosocial variables as indicators of whole grain intake highlights the significance of environment and parental behavior. Children generally found less-familiar foods less acceptable, so focusing on increasing children's familiarity with these foods may prove to be valuable in future intervention strategies, whether it be through home availability, school offerings, or taste-testing activities. Outcome expectations and intake of partially-whole-grain foods did approach significance; future studies of whole-grain interventions and evaluations should seek to assess this relationship.

In a related 2006 research study, Burgess-Champoux, Marquart, Vickers, & Reicks sought to gain a more qualitative perspective of child and adult perceptions of whole grain foods by utilizing focus groups to examine perceptions of whole-grain foods and factors influencing intake by children, parents, and teachers. The authors hoped that this information would lead to some insights on intervention and evaluation strategies.

This observational study consisted of focus group interviews with questions based on Social Cognitive Theory as well as a tasting activity designed to facilitate discussion. The interviews were conducted in after-school programs in four elementary schools in St. Paul, Minnesota. Seven focus groups were conducted with children (n=40; grades K-6, mean age 8±2 years), three with parents (n=18), and two with teachers (n=11). Questions pertained to individual factors such as knowledge, preference, and outcome expectations as well as socioenvironmental factors such as availability of whole grain foods and adult/peer role-modeling. Additional questions aimed to identify characteristics of new foods that are acceptable to children. Qualitative data analysis procedures generated themes from transcripts. In the taste test portion, children tasted samples of Multi-grain Cheerios and cheese bread made with 50%

whole grain flour. Children rated liking of each product on a 3-point scale (like, OK, dislike with corresponding happy, neutral, and sad faces) for taste, texture, and appearance. Children were also asked to rate their interest in trying the product and in its acceptability in the school cafeteria on 3-point scales. Adults also participated in taste-testing by sampling a sandwich made with commercially available whole-grain bread. Adults were asked to rate their liking on a 9-point hedonic scale (Burgess-Champoux, Marquart, Vickers, & Reicks, 2006).

The results of the study indicated that adults and children were positive about sensory characteristics of whole grain products. Mean ratings of whole-grain bread in appearance, texture, and flavor by adults were in the range of 7.2-7.7, between "like moderately" and "like very much." In general, children had favorable responses to specific characteristics of the sample foods but were less certain about selecting these foods if they appeared in the school cafeteria. Knowledge of how to identify whole grains was found to be limited. Younger children had less knowledge of whole grains than older children. While younger children's knowledge consisted of product names, the identification of grains in the Pyramid, and knowing that grains grow on a farm or in a field, older children identified specific ingredients and products and understood some components of identifying a whole grain food by its label. Adults described whole grains as "less processed," more healthful, and containing more nutrients than their processed counterparts. While adults reported looking for the words "whole grain" when shopping, many admitted lack of confidence in their ability to select a whole grain food. Children's taste preferences were found to strongly influence selection of breads and cereals, and children suggested that new school foods should look and taste good, be familiar, and be promoted through sampling, peer influence, and incentives (Burgess-Champoux, Marquart, Vickers, & Reicks, 2006).

Focus groups were useful in understanding perceptions regarding whole-grain foods and yielded valuable insight for the design of a school-based intervention. Key findings indicated that children and parents need education about identifying whole grain foods, and that children's preferences for refined, sweetened grain products need to be addressed by critically evaluating current cafeteria offerings and increasing availability of whole grains in that environment. Utilizing the children's focus group suggestions regarding acceptability of new foods may improve effectiveness of school-based interventions (Burgess-Champoux, Marquart, Vickers, & Reicks, 2006).

Although taste testing in a focus group context was unique to this study and was seen as an attribute, the authors admitted that tasting ratings collected in a focus group setting are likely to be biased by the attitude of the moderator and the actions of the other group members. Children are also less likely to respond in a valid manner than adults to a food product that is outside of its real-world context. However, these results provide some insight into future whole-grain school-based interventions, particularly in that look and taste was a strong influence on selection. Given that children and parents need education about identifying whole-grain foods, this could form the basis for future intervention and evaluation. Young children did not often remark on the healthfulness of whole grains, therefore the promotion of whole grains to young children might be best accomplished with foods that taste good with less emphasis on health attributes.

Developing Evaluation Tools for a SNAP-Ed Program

The successful evaluation of SNAP-Ed programming is essential for the continuation of federal funding. However, the sheer number of SNAP-Ed programming efforts and variability in

program delivery introduces problems to the development of a successful evaluation plan. A recent research article by Wyker, Jordan, and Quigley (2012) highlights the current state of evaluation in SNAP-Ed nationwide. The authors reference a 2004 report compiled by the US General Accounting Office, which concluded that the data used to evaluate trends in the USDA's nutrition education efforts, such as SNAP-Ed, was somewhat haphazard and not associated with any particular evaluation initiative. The lack of a coordinated evaluation effort makes it difficult to determine whether behavior changes in targeted populations are influenced by education or other factors.

To combat these issues, the Food and Nutrition Service (FNS) and state-level SNAP-Ed coordinators have begun to collaborate with the Society for Nutrition Education and Behavior to prioritize specific evaluation needs of SNAP-Ed programming and to develop strategies to meet those needs. Two strategies identified in this process were; (1) identification of an appropriate theoretical model of behavior change, and (2) construction of evaluation instruments appropriate for universal use in program evaluation.

While the selection of a theoretical model of behavior change is a feasible goal, the construction or adaptation of an evaluation instrument that is universally appropriate is very challenging. This is partially due to the way SNAP-Ed is delivered nationwide; state SNAP-Ed agencies have a great deal of flexibility in how programming is delivered. According to Wyker et al., many SNAP-Ed nutrition educators do use established, research-based FNS curriculum and materials for nutrition education; many develop their own materials and use a wide variety of other curriculums and resources. The result of this flexibility is a pool of curriculum and materials from a variety of sources utilizing a variety of behavioral theories; a mixture that would not easily comply with a universal evaluation plan. This amalgamation of resources

explains why current data collection processes utilize individualized evaluation plans that correspond to specific resources.

The downside to this approach is that most SNAP-Ed agencies do not consider their evaluation model to be reliable enough to communicate truly meaningful results. SNAP-Ed agencies also report believing they have insufficient resources and expertise to improve evaluation efforts. Therefore, Wyker et al. aimed to take steps in the direction of improving SNAP-Ed program evaluation by developing a tool that would maintain the program-specific approach to evaluation but improve the process by grounding it in behavioral theory and using validated measurement instruments (Wyker, Jordan, & Quigley, 2012).

The Wyker study focused on the development a survey tool for parents corresponding to the curriculum *Just Say Yes to Fruits and Vegetables* by the New York State Department of Health and the Regional Food Bank of Northeastern New York. Based on the results of a community needs assessment utilizing focus groups to identify factors affecting fruit and vegetable intake, the authors employed constructs from the Transtheoretical Model (TTM) of behavior change as the basis of their new evaluation tool. The TTM theory fits most closely with variables frequently cited as facilitators and inhibitors of fruit and vegetable intake. The Transtheoretical Model of behavior change relies a great deal on stages of change, "decisional balance" (relative significance placed on perceived benefits and barriers of behavior change), and self-efficacy (also identified in the Social Cognitive Theory as confidence in ability to change).

Researchers designed the survey items using items from other surveys used to evaluate TTM mediators of behavior change. In the construction of the questionnaire, the authors considered simplicity of administration and question appropriateness for low-literacy

populations. More specifically, questions addressed perceived benefits (e.g. "eating fruits and vegetables with my family adds variety to what we eat"), perceived barriers (e.g."it takes too much time to prepare fruits and vegetables"), and self-efficacy (e.g. "I feel I can keep fruits and vegetables available at home"). Items were assessed using a 4-point response scale with the options, "I agree a lot," "I agree a little," I disagree a little" and "I disagree a lot." The piloted survey was administered once to a convenience sample of parents (n=149) at nine Summer Food Service Program (SFSP) sites. To validate the survey's use of TTM mediators to predict dietary behavior, a previously validated tool (the Food Stamp Program Fruit and Vegetable Checklist, FVC) was administered simultaneously for the purposes of later statistical analyses and comparisons to the newly-constructed tool. The FVC is designed to measure behaviors related to fruit and vegetable consumption such as servings consumed per day and frequency of consuming fruits and vegetables as snacks.

Statistical analyses for each survey item were conducted. "Difficulty" of each question was determined by calculating the ratio of the question's mean to its maximum score, reflecting the proportion of participants who answered in the desired direction (authors defined an ideal difficulty index range between 0.2 and 0.8 to allow for variability between scores). A discrimination score for each item was calculated through an item/total score correlation analysis. Internal consistency for individual scales (perceived benefits, perceived barriers, self-efficacy, and FVC) were measured using Cronbach alpha.

Results of the statistical analyses of the survey found that only one item (from the perceived barriers scale) met the ideal item difficulty range, while the rest of the items exceeded this range. All items had sufficient item/total score correlation values (≥ 0.40). The scales for

perceived benefits, self-efficacy, and the FVC each met the internal consistency requirement at 0.70, while perceived barriers was 0.60, still deemed "acceptable" by the authors.

Prior to any additional statistical analysis, structural equation modeling (SEM) was conducted to examine the fit of perceived benefits, perceived barriers, and self-efficacy with the TTM model. The chi-square test was nonsignificant, plus other indices suggested good fit of the model. Then, the authors assessed fit by determining how well TTM constructs predicted fruit and vegetable consumption behavior as indicated by the FVC. To test for good fit, the TTM constructs of interest (perceived benefits, perceived barriers, and self-efficacy) were each placed in the structural model as exogenous latent variables. The model assessed how well these exogenous variables regressed onto a latent endogenous variable (composed of FVC indicators). While the chi-square test was significant, all other indices suggested good fit (e.g., GFI=0.90) Then, the relationship between TTM constructs and the FVC was assessed. Results indicated that, holding all other variables in the model constant, every unit change in perceived barriers corresponded to a decrease in fruit and vegetable consumption scores by 0.46 ($p=0.05$). Also, for every unit change in self-efficacy, fruit and vegetable consumption increased by 0.62 ($p=0.006$). The model found that the relationship between perceived benefits and fruit and vegetable consumption was not significant. Ultimately, TTM constructs accounted for 40% of variance in fruit and vegetable consumption behavior.

In describing the process of developing and validating this survey tool, the authors concluded that their research was a demonstration of how application of established theories and survey validation can improve the evaluation processes for SNAP-Ed projects. Since it is difficult (if not impossible) to construct a universally-appropriate evaluation tool for use in SNAP-Ed, the use of credible behavior theories, pilot testing, and validation of new tools while

maintaining the curriculum- or program-specific approach to evaluation is a useful and reasonable compromise (Wyker, et al., 2012).

The study had a few limitations. One limitation was that the simplicity and brevity of the survey for the sake of participant ease of completion sacrificed some of the authors' ability to be truly thorough; for instance, additional data collection on stages of change or other TTM constructs could have been collected. The convenience sample also limited ability to extrapolate findings to other populations.

There are a couple of implications of this study for the development of a new evaluation tool in WNEP. Due to the variety of approaches to SNAP-Ed nationwide, developing a tool that is universally appropriate for programming is incredibly difficult. A statewide universal tool may be slightly more feasible, but still faces the same challenges due to variability in statewide youth program delivery. The authors in this study developed their survey tool as an accompaniment to a frequently-used curriculum. An evaluation tool for the state of Wisconsin should either follow this idea or be general enough in scope that it could be used successfully in variety of educational situations. Secondly, the authors of this study stressed the importance of grounding evaluation methods in substantiated behavioral theory as well as validating new evaluation techniques through quantitative analyses. These steps will be essential for the development of a new tool for WNEP.

Although the Expanded Food and Nutrition Education Program (EFNEP) is funded separately from SNAP-Ed, EFNEP is an integral part of WNEP and faces similar funding and evaluation challenges. As SNAP-Ed is similar in nature to EFNEP and targets similar populations, research describing EFNEP evaluation tool development can provide guidance for SNAP-Ed evaluation methods. Dickin, Lent, Lu, Sequiera, and Dollahite (2012) describe in

detail the development of an evaluation tool for EFNEP in New York State. The New York State EFNEP designed a behavior checklist (BC) tool to measure changes in eating, active play, and parenting practices after a parent intervention designed to help parents shape children's food choices and home environment. The authors included several research objectives, including (1) developing an easily-administered tool assessing pre- and post-intervention behavior change that is feasible for use in usual programming; (2) ensuring the understanding and correct interpretation of checklist items; (3) covering key learning objectives of the "Healthy Children, Healthy Families" (HCHF) curriculum; and (4) assessing the scale's test-retest reliability and convergent validity. The study participants included low-income parents of 3- to 11-year-old children as well as Cooperative Extension nutrition and parenting educators. The Behavior Checklist (BC) tool was developed to correspond with the curriculum objectives and revised in phases, utilizing qualitative measures such as an expert panel review and cognitive testing interviews. Quantitative measures included a test-retest reliability assessment and convergent validity assessment using a series of previously validated instruments.

The BC was based on the EFNEP behavioral checklist, which assesses frequency of food-related behaviors using a 5-point scale denoting increasing levels of frequency. An expert panel of five nutrition and two parenting Cooperative Extension professionals familiar with the HCHF curriculum reviewed BC items to establish content validity. The panel rated 36 items on clarity, suitability for program audience, and relevance to the HCHF curriculum on 3-point scales (‘‘poor’’ to ‘‘good’’). Of the 36 reviewed items, 22 items were selected and revised. Further internal review by the authors resulted in a 14-item BC tool.

Audio-recorded, one-hour interviews were conducted with thirteen adults in three communities to investigate whether BC items were understood as intended. Respondents were

"typical" of HCHF participants (responsible for the care of a 3- to 11-year-old child, low-income). An interviewer read each item aloud and showed the item to the respondent, asking them ''think aloud" while answering. The interviewer used verbal probes (e.g.''What does 'regular soda' mean to you?'' ''How did you count up the number of servings of vegetables you ate?'') to clarify the individual's thought process and identify areas that lacked clarity. Three rounds of interviews were conducted and data was compiled regarding respondent interpretation and understanding of terms, ease of responding, and suggestions for improvement. This feedback guided a second revision of the scale.

Both versions of the BC were field tested with usual staff and participants to assess feasibility of use and variability of responses. Both versions were translated into Spanish (and back-translated) and field tested in English and Spanish.

Quantitative assessments included test-retest reliability and convergent validity. To determine test-retest reliability, the BC was administered twice, 14-28 days apart to 38 eligible parents who were not participating in the HCHF program but were participating in similar programs. Pearson correlation coefficients were calculated to show within-person correlation between the two time points. Convergent validity was determined utilizing a more complex procedure. In 45- to 60-minute sessions, respondents who were eligible for but had not participated in HCHF completed the BC plus additional instruments that measure behaviors similar to items in the BC. Six instruments were selected for comparison (Child Food Frequency Questionnaire (CFFQ); Caregiver Feeding Style Questionnaire (CFSQ); Food Behavior Checklist (FBC); Family Eating and Activity Habits Questionnaire (FEAHQ); Parental Dietary Modeling Scale (PMDS); and Sports, Play, and Active Recreation for Kids (SPARK)) based on qualities such as validation, psychometric properties, and appropriateness for the HCHF

audience. The BC was divided into six subscales: vegetables and fruits, low-fat dairy, soda, physical activity, energy-dense foods, and parenting. Convergent validity was then assessed using Pearson correlation coefficients comparing the BC and its subscales with the various comparison instruments.

Following qualitative assessment and revision, the checklist was deemed feasible for use in EFNEP and questions were found to be well-understood. Test-retest reliability was found to be good ($r= 0.83$, $p<0.001$). BC scores correlated significantly (range, 0.25 to –0.60; $p < 0.05$) with the measures of dietary habits, parental modeling, physical activity, and home environment included in the six comparison scales. The authors concluded that this method of development and testing produced a usable tool for community nutrition educators to evaluate educational interventions aimed at helping parents promote healthful eating and activity (Dickin, et al., 2012).

This type of evaluation process presents several challenges, in spite of rigorous attempts to make it as accurate as possible. First of all, the assessment of parenting practices as well as child and adult behavior through parental report introduces potential for inaccurate data. As with any scale, assessing behavior in such a brief format also limits accuracy. Additionally, the cognitive testing and convergent validity portions of the study were time-consuming and likely tedious for participants, although the authors deemed these steps necessary to the development of a tool that would be well-understood by program participants. Overall, this study demonstrated that the development of an effective evaluation tool takes considerable effort and a series of qualitative and quantitative measures to ensure that it is well-understood, reliable, and accurately collects data related to program objectives.

A feasible evaluation tool for WNEP's SNAP-Ed programming is more easily conceptualized when one can examine a "model" tool designed for a similar population (SNAP-Ed youth) in a similar setting (elementary school classrooms). The purpose of research conducted in 2012 by Kaiser, et al. was to develop a tool that could be administered by a teacher for routine program evaluation of food-tasting activities among low income children and adolescents in a SNAP-Ed classroom or afterschool setting. The six-item evaluation tool is intended to capture student willingness to try unfamiliar foods and intent to ask for them at home.

The study was conducted in two phases. In Phase One, the authors determined the feasibility of using the taste test tool (TTT) by conducting one-on-one interviews with nine pre-K -3rd grade teachers who used the draft version of the TTT in their classroom. Teachers suggested changes in wording and modifications to the TTT before proceeding to the second component of Phase One. The second component was a convergent validity assessment of the evaluation tool. This validation pilot study was conducted with 114 school-aged students aged 8 years or older participating in a University of California (UC) SNAP-Ed summer day camp. Counselors administered the TTT to campers after tasting a fruit or vegetable presented by UC SNAP-Ed staff. Simultaneously, campers rated their "liking" (preference) of the fruit or vegetable on a 3-point scale. The authors assessed whether or not there was agreement between the two tools by calculating from each tool the proportions of campers who would try the food again at camp, try the food again at home, and ask for the food at home.

Phase Two determined instrument reliability and compared student response by grade level and food category in a convenience sample of 514 UC SNAP-Ed classrooms in 2010 and 2011. Teachers administered classroom food-tasting activities during UC SNAP-Ed and recorded

classroom responses on a paper TTT. Teachers counted by a show of hands how many had eaten the food before, were willing to try it again, and were willing to ask for the food at home (Kaiser, et al., 2012).

Results indicated convergent validity in that a strong degree of liking a food, based on the logs, was positively correlated with willingness to try the food again at school ($r=0.52$; $p=0.004$) to try the food again at home ($r=0.37$; $p=0.05$) and to ask for the food at home ($r=0.36$; $p=0.06$). The TTT was therefore deemed "valid" as an evaluation tool. Compared with younger students (preschool through 6th grade), older students (seventh through 12th grade) were less likely to try the foods in class and less willing to try them again or ask for them at home ($p<0.05$).

Overall, this research study found that teachers can administer the TTT successfully to capture the students' previous exposure and response to foods presented. The authors concluded that a teacher-administered taste test tool is feasible to use in a group setting and capable of yielding valid, reliable information to evaluate student response and to guide SNAP-Ed program delivery (Kaiser, et al., 2012).

Difference in response by grade level implies that further research and testing of this method is needed to determine optimal methods for evaluation, particularly for older children (seventh through 12th grade). The nonrandom (convenience) sample limits generalization to other populations, and the feasibility sample and the validity pilot sample were small. The authors note that future longitudinal research should examine the relationship between willingness to try as measured by the TTT and subsequent food intakes. Strengths of the study include the development and testing of an evaluation tool in the target setting and the large, multi-county sample allowing for examination of student response across grade levels.

Overall, the TTT indicated that for fruits and vegetables, a strong degree of liking of the food was correlated with a willingness to try the food again at school and ask for it at home. Future research should assess whether this correlation holds true for other types of foods, namely, whole-grain foods. The authors noted that this type of assessment may be less appropriate for older children due to increased peer influence on responses. Exploring other methods of collecting data that assure anonymity (e.g. voting with clickers) was cited as a possibility for future evaluation tool development.

Measurement of Evaluation Tool Validity

Generally speaking, studies describing the development of SNAP-Ed and EFNEP evaluation tools emphasize the importance of conducting validity assessments on newly-constructed tools. Establishment of validity has great implications for the interpretation of data gathered when using the tool. When an evaluation tool relies on a mediating variable as an indicator of behavior, the establishment of validity shows that that the mediating variable is, at least in part, indicative of the behavior itself. Without a validity assessment, there is no proof that a variable measured in an evaluation tool (whether it be knowledge, self-efficacy, etc.) correlates to actual behavior. Establishment of validity is therefore key to the development of an effective and accurate tool.

According to the review study by Contento, et al., (2002), attention is increasingly being paid to the validity and reliability of instruments that measure psychosocial variables such as food preference, self-efficacy, and outcome expectancies as indicators of behavior. However, establishment of construct validity for these types of child evaluation tools is varied and

inconsistent. Generally, construct validity was either not established or infrequently reported for psychosocial mediating variables and behaviors in nutrition intervention studies.

Validity information from intervention studies in the Contento review found that a majority of the studies with children reported establishing content validity. For many of these studies, the process of determining content validity was to have a panel of experts review the instrument for appropriate content relative to the purposes of the study, establishing face validity. More specifically, in studies with preschool children, about 85% of the studies specifically reported establishing content validity and for school-aged children, 90% established content validity. It is clear that content validity was very likely to be assessed in studies conducted in connection with the school setting.

Contento, et al. also examined studies for the establishment of construct validity. Construct validity is a measure of how well a measured variable predicts the desired outcome or behavior in question. A common way to determine construct validity is to correlate data from one assessment tool with data from an established tool designed to measure the same behavior or characteristic (conducting a convergent validity assessment). Establishing construct validity of psychosocial variables is difficult and was generally not reported in child nutrition intervention studies (Contento, et al., 2002).

Some studies that test new evaluation instruments describe methodologies for establishing validity and reliability. Gower, Moyer-Mileur, Wilkinson, Slater, & Jordan (2010) described their processes for testing the validity and reliability of a computer nutrition knowledge survey for elementary school students as well as measuring the effectiveness of a four-part classroom nutrition intervention, “Fit Kids ‘r’ Healthy Kids.” The intended audience

for the survey consisted of first- through fourth-grade students from Salt Lake City, UT, metropolitan area schools.

First, the authors established content validity of the survey. During survey development, a sample of twelve health educators, elementary school teachers, and registered dietitians assessed the survey by rating each survey item on relevance to content area, level of difficulty, and appropriateness for the study population. The review ultimately resulted in the deletion of five survey items, and content validity was established as indicated by expert ratings >80% for each category.

The authors then took steps to establish both reliability and effectiveness of the nutrition intervention. Participants were divided into reliability (n=68) intervention (n=74), and control groups (n=59). The reliability group took the survey twice (2 weeks apart); the intervention and control groups took the survey twice at pre- and post-intervention (4 weeks later). Reliability was assessed by Pearson's correlation coefficients for knowledge scores. Correlations of 0.50 to 0.69 were considered moderate and 0.70 to 1.00 were considered high. Results indicated that test–retest reliability correlations were moderate and significant for the overall survey (r=0.54; P<0.001) and for the survey's subscales: food groups, healthful foods, and food functions (r=0.51, 0.65, and 0.49, respectively; P<0.001). Nutrition knowledge gains were measured using paired samples t tests upon program completion (Gower et al., 2010).

Overall, this study presents feasible methods for determination of validity and reliability for an evaluation tool designed for a nutrition intervention in an elementary school. Content validity was established using ratings from experts who were familiar with the topic taught (registered dietitians, health educators) and the audience (elementary school teachers). Determining content validity will be essential to the development of a useful tool that is

appropriate for the target audience and accurately addresses the nutrition topic at hand. Test-retest reliability was necessary in this case to determine the reliability of the survey when administered at two different points in time. While important for the development of many tools, test-retest reliability assessment will not be practical for a WNEP evaluation tool if it is likely that significant behavior change would take place between the two time points.

Internal consistency is frequently another important determination for a survey, questionnaire, or evaluation tool with multiple items. Internal consistency indicates that several items within the evaluation tool will produce the same scores when they aim to measure the same construct. A study by Branscum, Sharma, Kaye, & Succop (2010) provides a good example of this type of measure. One of the purposes of the study was to establish internal consistency for three subscales (fruit and vegetable intake, milk consumption, healthy eating behaviors) of a Food Behavior Checklist modified for children (FBC-MC) with low-income, Youth Expanded Food and Nutrition Education Program (EFNEP)-eligible children. To conduct the study, ninety-seven children from low-income families filled out the survey while participating in a nutrition afterschool program. The study utilized Cronbach alpha for internal consistency measures, with a resulting value of α=0.67 for fruit and vegetable consumption, indicating acceptable internal consistency for that subscale. The other two subscales did not demonstrate internal consistency (milk consumption α=0.43; healthful eating behaviors α=0.56).

A particular limitation in this study was that Cronbach alpha is sometimes underestimated in short surveys with few response categories. Since most questions in this instance were given a "yes/no" response format, the nature of the survey may have impacted the internal consistency results. On the other hand, it is difficult to administer to children a lengthy survey with many

response categories; a complex survey could introduce difficulties with item comprehension and yield inaccurate results.

Another possible quantitative assessment for a new tool is the establishment of convergent validity. As previously noted, Kaiser, et al. (2012) conducted a convergent validity assessment, correlating two similar tools (a taste test tool and a food preference log). Children rated their "liking" of a fruit or vegetable on a 3-point scale while completing the taste test tool. The assessment results suggested that strong degree of liking a food, based on the logs, was positively correlated with willingness to try the food again at school, try the food again at home, and to ask for the food at home. While these results demonstrated convergent validity between the two related scales, convergent validity assessments have stronger implications when a new evaluation tool is correlated to an established, previously validated tool.

Overall, research describing child evaluation tool development underscores the importance of conducting validity assessments to ensure accuracy of collected data and meaningful results reflective of behavior change. Due to the age of the study population, classroom environment, and transient nature of WNEP youth lessons, a lengthy, multi-component evaluation tool such as a survey is often not practical. Therefore, an assessment of internal consistency was considered unnecessary. Also, given the expectation that our nutrition education may incite behavior change, an assessment of test-retest reliability would also not provide valuable information. The absence of established, validated youth whole grain evaluation tools in the literature presented an insurmountable obstacle to the completion of a meaningful convergent validity assessment. The establishment of content validity was a very realistic and important goal for this study made possible by access to WNEP state specialists, county coordinators, and youth nutrition educators as expert reviewers, who are proficient in the

specifics of nutrition education programming, content, and evaluation. Completing a feasibility assessment by conducting interviews with those administering the evaluation tool as modeled by Kaiser, et al. was another practical measure for this study.

Summary

This literature review explored possibilities for the development of a new evaluation tool for WNEP youth surrounding the topic of whole grains. Wyker et al. (2012) clarified the role of evaluation in SNAP-Ed education and justified the use of theory in child nutrition intervention and evaluation. Since it is difficult to construct a universally-appropriate evaluation tool for use in SNAP-Ed programs nationwide due to variability in program delivery, the use of credible behavior theories, pilot testing, and validation of new tools while maintaining the curriculum- or program-specific approach to evaluation is warranted. The application of established theories and tool validation can improve the evaluation processes for SNAP-Ed projects.

Contento, et al. (2002) explored specific theories behind nutrition intervention and evaluation by dissecting the methodologies of previous studies that describe child evaluation endeavors. Although measurement of knowledge was found to be frequently used and convenient, the correlation between knowledge and behavior was low for all age groups. More recent studies utilized behavioral theories in intervention and evaluation due to research that nutrition education is more likely to be effective when it is behaviorally focused. The most frequently-cited behavioral theory, the Social Cognitive Theory, provides researchers with well-studied psychosocial mediators of behavior (self-efficacy, outcome expectancies, intention, social support, modeling) which have all been increasingly utilized as indicators of dietary behavior.

An analysis of a variety of psychosocial factors identified by the Social Cognitive Theory revealed details about each factor's relationship to food choice. Parcel, et al. demonstrated that measurement of self-efficacy may be one important contributor in the overall assessment of nutrition-related behavior in children. Burgess-Champoux et al. (2008) and Rosen et al. (2011) demonstrate the significant role of the parent in child whole grain intake, both in home availability of whole grains and in parental modeling. The latter study even suggests that home environment may play a greater role in child behavior than any other psychosocial factor, even though Kaiser, et al. (2012) showed that a strong liking or preference of a fruit or vegetable was correlated with a willingness to try the food again at school and ask for it at home.

The Burgess-Champoux et al. research from 2006 and 2008 found that adults and children lacked knowledge to identify whole grain foods. Rosen et al. (2011) noted a correlation ($p<.07$) between higher intake of whole grains and outcome expectations. Improving whole grain knowledge both in the identification of whole-grain foods and in health outcomes of whole grain consumption may be integral parts of future interventions for parents and children. Young children are an exception; the focus groups conducted in 2006 demonstrated that emphasis on taste rather than health attributes may be best for this audience.

Past research shows that children found less-familiar foods to be less acceptable (Rosen, Burgess-Champoux, Marquart, & Reicks, 2011). Look and taste of whole-grain foods were also found to be a strong influence on selection (Burgess-Champoux, Marquart, Vickers, & Reicks, 2006). Future intervention strategies may do well to focus on increasing children's familiarity with lesser-consumed whole-grain foods such as whole wheat pasta and whole-grain tortillas. Increasing familiarity may be completed via a variety of routes, including increasing school

offerings, educating parents to increase home availability, or offering child taste-testing activities.

Finally, research indicates that the development of a useful evaluation tool takes considerable effort and a series of qualitative and quantitative measures to ensure that it is well-understood, feasible to conduct, and accurately collects data related to program objectives. This type of approach can help to maximize an evaluation's effectiveness at capturing program impact.

Conclusion

This literature review critically analyzed research on factors that influence whole grain intake in elementary-aged children and explored the development and use of youth evaluation tools to measure behavior change. Literature review findings inspired the content of the new evaluation tool by taking steps to improve child and adult familiarity with whole grain foods, improving caregiver knowledge in identifying whole grain foods, and evaluating caregiver intent to increase whole grain availability at home. Quantitative and qualitative measures included establishment of content validity using expert reviewers, cognitive testing with the target audience (as described by Dickin, et al. 2012) and a feasibility assessment using nutrition educator interviews (as described by Kaiser, et al., 2012). In this way, literature guided this research's methodology in the development and testing of the new evaluation tool.

CHAPTER 3: METHODS

The purpose of this study was to develop and pilot test a whole-grain evaluation tool that measures behavior change in 2nd-5th grade children participating in the Wisconsin Nutrition Education Program (WNEP). This study was conducted in two parts. The first part consisted of the development of a youth whole grain evaluation tool based on critical analysis of existing literature and the input of expert reviewers. The second part of the study focused on assessment for target audience understanding and feasibility of implementing the tool. The goal was that the resulting evaluation tool components would be useful for assessing change in elementary-aged youth following WNEP whole grain nutrition intervention.

Development of Evaluation Tool Based on Literature Review

Although there were only a few studies that specifically reported on whole-grain-related youth evaluation, the literature review did reveal several themes characterizing successful youth evaluation methods. Namely, youth evaluation tools should: (1) have a solid basis in theory, (2) be behaviorally-focused as opposed to knowledge-focused, (3) utilize a SCT indicator that research shows is highly predictive of the behavior of interest, and (4) be pilot tested and validated as is possible within the confines of the study. Each of these principles was addressed in the whole grain evaluation procedure as follows: First, the evaluation tool was based on theory. The Social Cognitive Theory was the most frequently cited theory for assessment of child behavior, and it was utilized by the Rosen, et al. (2011) and Burgess-Champoux, et al. (2006, 2008) studies, the only studies that evaluated whole-grain-related measures in children. It was therefore prudent to consider SCT principles when creating the whole grain evaluation components. Secondly, this study sought to measure indicators of behavior change in children.

The literature suggests that improvement of nutrition knowledge does not ultimately transfer to behavior change in children, so the whole grain evaluation did not include knowledge questions (e.g. asking children to identify whole grain foods, knowing that half of grains eaten in a day should be whole). Instead, the evaluation sought to measure SCT indicators hypothesized to reflect whole grain consumption behavior: familiarity (preference), intention, parental modeling, and home availability. Finally, the evaluation tool components were validated. As was done in the majority of research in child evaluation (Contento, et al. 2002), this study established content validity via expert analysis utilizing an Expert Review Tool (Appendix F).

Evaluation Components

The whole grain evaluation tool consisted of three main components: the Whole Grain Taste Test Tool (conducted with youth in a classroom), Parent Education (*Nutrition Tidbits* newsletter sent home to parents), and Parent Evaluation (completed at home by parents and returned). The Whole Grain Taste Test Tool (Appendix A) sought to increase whole grain familiarity and measure intention to choose whole grains. The Parent Education newsletter (Appendix B) was designed to increase parent knowledge of whole grain foods, particularly how to find whole grain foods by reading labels. The Parent Evaluation (Appendix C) intended to measure improvement in the family's familiarity with a whole grain food and measured a parent/caregiver's intention to choose a whole grain food in the future.

The Whole Grain Taste Test Tool (WGTTT, Appendix A) was developed based on the WNEP Fruit and Vegetable Sampling tool (UW-Extension Cooperative Extension, Wisconsin Nutrition Education Program, 2011) and the Taste Test Tool (TTT) utilized in the Kaiser et al. (2012) study. Both the WNEP and Kaiser tasting tools assess the improvement of children's

familiarity with fruits and vegetables after exposure to new foods, and both measure intention to improve of fruit and vegetable consumption at home. The WNEP Fruit and Vegetable Sampling tool's objective is to "increase vegetable and fruit variety eaten at home," with the desired long-term outcome of increasing overall vegetable and/or fruit intake. Likewise, the purpose of the Kaiser TTT was to assess "willingness to try new foods and ask for them at home" by asking about children's previous exposure to the food, willingness to eat the food at school and home, and willingness to ask for the food at home. The WGTTT aimed to ascertain similar information about familiarity and intention to choose whole grains, so it asked three questions that closely mirrored questions in the WNEP and Kaiser tools. The questions were: (1) Is this the first time you have ever tried (*sampled food*)? (2) Will you eat it again? (3) Will you ask to eat it at home? The person administering the tool would also count the number of children who tried the food by observation.

The Parent Education component was a single-page *Nutrition Tidbits* newsletter (Appendix B). This document educated parents about whole grains with a particular focus on how to find them when shopping, as adults frequently report lack of confidence in their ability to identify whole grains (Burgess-Champoux, Marquart, Vickers, & Reicks, 2006). The Parent Education document also served as advertisement for the completion of the Parent Evaluation.

The Parent Evaluation (Appendix C) was a single-page survey attached to the Parent Education document. The Parent Evaluation asked parents and caregivers to try a new whole grain food with their child at home, then detach and return the survey to show that they and their child tried a whole grain together. It also asked the parent or caregiver about their intent to have that food in their household in the future by asking, "Will you buy this food again?" with response options "yes," "no," and "maybe." The incentive for completion of the survey (the

child's receipt of a nutrition sticker) was highlighted both on the Parent Evaluation and Parent Education documents.

To educate nutrition educators about the purpose of the evaluation tool and ensure consistency in evaluation delivery, a Whole Grain Tasting Guidelines document (Appendix D) was drafted to explain each of the three evaluation components. This document was based on the WNEP Fruit and Vegetable Tasting guidelines and was revised to suit whole grain taste testing. The Tasting Guidelines provided nutrition educators with the details of the evaluation procedure, which included explicit instructions on choosing a grain to sample, conducting the evaluation, completing the evaluation form, and administering the parent education and evaluation components. The Tasting Guidelines also included the Whole Grain Sample List (Appendix E)—a list of allowable foods for the taste test.

Expert Review Procedure and Content Validity Assessment

Content validity of the evaluation tool was determined using an expert peer review and rating scale. All evaluation tool components (WGTTT, Parent Education, Parent Evaluation, and Tasting Guidelines) were subject to three rounds of critiques by expert reviewers. Expert reviewers included nutrition educators, county WNEP coordinators, and WNEP state specialists who are familiar with WNEP lesson content. Rounds 1 and 2 were formal reviews in which the reviewers utilized the Expert Review Tool (Appendix F) for the purpose of establishing content validity. Round 3 was informal and was based on state specialists' observations and suggested revisions prior to Spanish translation.

For Round 1, all documents (WGTTT, Parent Education, Parent Evaluation, and Tasting Guidelines) plus the Expert Review Tool were distributed by email to fifteen state specialists,

coordinators, and educators who are members of the Youth Curriculum Workgroup team, whose focus is on WNEP youth curriculum and evaluation. Round 2 was similarly distributed to eight members of the Hispanic/Latino Audiences and African Diaspora workgroups for a better gauge of cultural appropriateness and relevance. Following Round 1 and 2 reviews, Expert Review Tool ratings were tallied and comments were compiled. Ratings on each item were checked for minimum average rating of 4/5. Items marked below this threshold were addressed by examining suggestions for improvement given by expert reviewers and making appropriate revisions. Documents were revised as needed to ensure relevance to content area, appropriateness for the target audience, and suitability for WNEP.

Round 3 revisions improved clarity of wording and succinctness of Parent Education and Parent Evaluation components in preparation for translation of both documents into Spanish by a state-sanctioned translator. These informal revisions were based on input from WNEP state specialists and did not utilize the Expert Review tool. Translation was warranted because it was necessary that the Parent Education and Parent Evaluation components be available for children with Spanish-speaking parents; this was a particular need for Banting, Blair, and Heyer elementary schools.

Cognitive Test for Understanding

As a result of a majority vote by expert reviewers, it was determined that the WGTTT questions should be tested on the target audience for understanding. The cognitive test was completed with a convenience sample of 14 second and third grade students from Blair Elementary's afterschool program in Waukesha, WI, in October of 2013. The children were asked to demonstrate their understanding of each question with the following instructions from

the researcher: *"I am going to ask you a couple of questions that will help us see what you have learned today. First, I want to make sure you understand all of my questions before I ask them. Let's see if you can explain to me what I'm asking."* Each of three WGTTT questions (e.g. "Is this the first time you have ever tried barley?) were then posed to the group. After each question, volunteers from the student group were selected to explain what was being asked. Children demonstrated understanding of the questions based on their ability to restate the question in their own words with accurate meaning. The WGTTT then proceeded as detailed in the Tasting Guidelines (Appendix D).

Pilot Test and Feasibility Assessment

The Whole Grain Youth Evaluation components underwent pilot testing in WNEP-participating schools in the Waukesha School District in Waukesha, WI, from November-February during the 2013-2014 school year. This pilot test was conducted in conjunction with Waukesha County WNEP's routine elementary nutrition education, which customarily utilizes existing WNEP-approved youth evaluation tools to measure impact.

Subjects

The pilot test utilized a convenience sample, namely, 1,043 children in 53 second, third, fourth, and fifth grade classrooms in each of six schools: Blair, Banting, Hadfield, Hawthorne, Heyer, and Whittier Elementary schools. Second through fifth grade students regularly participate in Waukesha County WNEP evaluation endeavors. Passive consent forms were distributed to parents of all children participating in the evaluation. The study protocol and

consent procedure was approved by the University of Wisconsin-Extension and Mount Mary University Institutional Review Boards.

Data Collection

The Whole Grain Youth Evaluation components were administered by a total of seven nutrition educators in each of 53 classrooms following nutrition education intervention.The nutrition intervention consisted of a 45-minute whole grain lesson adapted from University of Missouri Extension's Show Me Nutrition, a WNEP-workgroup-recommended curriculum. The first grade *Great Grains* lesson was adapted to suit second grade and included a discussion of grain food pictures, an interactive story of making whole grain bread, and a "poppin popcorn" hopping activity. The fifth grade *Make Half Your Grains Whole* lesson was adapted for use with third, fourth, and fifth grades and contained an introduction to four common whole grains (wheat, oats, rice, corn) and foods made from these grains using photos on a SMART Board as well as discussion about what it means when a grain is "whole". These lessons served the important purpose of familiarizing children with whole grain foods, which helped to "set the stage" for the whole grain taste test.

After the lesson, educators offered each child a sample of whole grain bread with a small amount of butter-olive oil spread and posed the three WGTTT questions to the class. Educators followed the procedure detailed in the Whole Grain Youth Evaluation Guidelines (Appendix D) to collect taste test data and distribute the Parent Education (*Nutrition Tidbits*) and Parent Evaluation to classroom teachers. Nutrition Educators also supplied classroom teachers with nutrition stickers to serve as youth incentives for returned Parent Evaluations. Teachers collected completed Parent Evaluations and returned them to nutrition educators at or before the next

lesson, allowing approximately one month between Parent Evaluation distribution and final collection. The completion of whole grain nutrition lessons, collection of youth evaluation data, and the distribution of the Parent Education and Parent Evaluation was completed in all classrooms between November 2013 and February 2014. Returned parent surveys were collected by the end of March 2014.

The purpose of the pilot test was to determine feasibility of administering each of the evaluation tool components and the feasibility of collecting youth and parent evaluation data. After the administration of the tool in all 2nd-5th grade classrooms, each Waukesha County Nutrition Educator was interviewed regarding feasibility of conducting the evaluation in Waukesha elementary school classrooms. This study's feasibility assessment was modeled after the Kaiser, et al. (2012) study, which conducted in-depth interviews with nine teachers who administered a newly-developed taste-test evaluation tool. Kaiser's interview format consisted of open-ended questions such as, "tell us how well students in this grade understood this question," and "describe any challenges with this question for you or your students." The interview questions used with Waukesha County Nutrition Educators were similarly constructed and are listed in Appendix G.

Data Analysis

Qualitative data from the expert review/content validity assessment, cognitive test for understanding, and feasibility assessment were compiled and summarized for the purpose of revising the tool components. Items on the Expert Review Tool were checked for a minimum average rating of 4/5. Additional data included tallied responses to the youth WGTTT questions by grade level, total number of returned Parent Evaluations, and Parent Evaluation responses.

CHAPTER 4: RESULTS

Results reported here include data from the expert review and content validity assessment, cognitive test for understanding, Whole Grain Taste Test Tool, Parent Evaluation, and educator interview and feasibility assessment.

Expert Review and Content Validity Assessment

Expert Review Tools were completed by seven reviewers from the Youth Curriculum Workgroup in Round 1 and five reviewers from the African Diaspora and Hispanic/Latino workgroups in Round 2 (Tables 1 and 2). Ratings on each item met the required minimum average rating of 4/5 for both rounds of review. Based on reviewer comments, documents were revised as needed to ensure relevance to content area, appropriateness for the target audience, and suitability for WNEP. Some suggested revisions, such as changing wording on the Tasting Guidelines to reflect terminology from the literature, adding the choice "maybe" to the Parent Evaluation, and tweaking some wording in the Parent-Education document, were made between Rounds 1 and 2.

Informal revisions during Round 3 and prior to translation of the Parent Education and Parent Evaluation documents into Spanish included improving clarity of wording, reducing the Parent Education document to one page, changing wording from "parent" to "parents and caregivers," and adding required UW-Extension and WNEP logos to the documents.

Table 1. Expert Rating Round 1—Youth Curriculum Workgroup (Number of Responses Per Category).

Whole Grain Taste Test Tool						
	1-Poor	**2-Fair**	**3-Good**	**4-Very Good**	**5-Excellent**	**Average Rating**
Clarity: Are the questions clearly stated and easily understood?	0	0	0	4	3	4.43

Suitability: Are the questions appropriate for the target audience?	0	0	1	2	4	4.43
Relevance: Does the content of this evaluation tool fit WNEP's purpose and educational goals for the target audience?	0	0	0	3	4	4.57
Relevance: Is it culturally relevant (suitable for racially and ethnically diverse audiences in WNEP)?	0	0	0	4	3	4.43
Whole Grain Tasting Guidelines						
Clarity: Are the Whole Grain Sampling Guidelines clearly worded?	0	0	1	3	3	4.29
Relevance: Do the guidelines and foods on the Whole Grain Sample List fit with the goal of increasing youth familiarity with whole grain foods?	0	0	1	3	3	4.29
Parent Education and Parent Evaluation						
Clarity: Is the whole grain education portion of the parent tool clearly worded and easily understood?	0	0	2	1	4	4.29
Clarity: Are survey instructions and questions clear and simple?	0	0	1	2	4	4.43
Suitability: Is the educational information appropriate for the target audience?	0	0	0	4	3	4.43
Suitability: Is the survey appropriate for the target audience?	0	0	0	4	3	4.43
Relevance: Does the content of the parent whole grain education and parent survey fit with WNEP's purpose and educational goals for parents?	0	0	0	2	5	4.71
Relevance: Are the parent materials culturally relevant (suitable for racially and ethnically diverse audiences in WNEP)?	0	0	1	2	4	4.43

General Comments:

- Run the tools by the Latino and African diaspora groups for cultural competence and diversity relevance.
- *"I think this is very doable in the classroom setting and the take-home parent survey is simple and clear. I like using the vegetable and fruit eval that this reminds me of. It is an evaluation that doesn't use up a lot of my teaching time and I love that. I think it would give good information to the coordinators for their reporting as well. I honestly cannot see anything that needs to be changed! You did a wonderful job and I hope that this tool is added to the database for all of us to use."*

Comments on Tasting Guidelines:

- Alter some of the language to match current literature on taste testing materials—use "knowledge and attitudes" instead of "familiarity and acceptance."

Comments on Sample List:

- *"I think Fiber One contains artificial sweetener, which is why it is lower in sugar. I'm not opposed to using it but prefer the other whole grain cereals that are not artificially sweetened."*
- Perhaps allow the kids to eat crackers with something else (e.g. cheese).
- *"Popcorn should be included in the taste sampling list. It IS a whole grain and a sample of **air-popped** popcorn is a great example of an inexpensive whole grain for families to consume."*

Comments on Parent Education:

- Change sentence to, "Refined grains foods include white bread, white rice, or non-whole grain pasta. They are made from only part of the grain and have fewer nutrients." Include it under "Why should my family eat whole grains?" as the second bullet.
- Get rid of some of the clip art on the front (popcorn and bread basket) to make more room for the whole grain kernel picture.
- *"I like the example ingredient list and 'how to shop' language."*
- Fit all information on one page.

Comments on Parent Evaluation:

- Might want to add a third choice 'maybe'.
- Consider using other language besides "parent".
- If the parent evaluation is separate from the fact sheet, then the UWEX logo, civil rights statement and WNEP credit statement need to be added.
- "Want to be a healthy role model?" could be misinterpreted- consider changing wording.

*Comments not in quotations are paraphrased.

Table 2. Expert Rating Round 2—African Diaspora and Hispanic/Latino Audiences Workgroups (Number of Responses Per Category).

Whole Grain Taste Test Tool						
	1-Poor	**2-Fair**	**3-Good**	**4-Very Good**	**5-Excellent**	**Average Rating**
Clarity: Are the questions clearly stated and easily understood?	0	0	1	1	3	4.40
Suitability: Are the questions appropriate for the target audience?	0	0	0	1	4	4.80
Relevance: Does the content of this evaluation tool fit WNEP's purpose and educational goals for the target audience?	0	0	0	2	3	4.60
Relevance: Is it culturally relevant (suitable for racially and	0	1	0	2	2	4.00

ethnically diverse audiences in WNEP)?						
Whole Grain Tasting Guidelines						
Clarity: Are the Whole Grain Sampling Guidelines clearly worded?	0	0	0	2	3	4.60
Relevance: Do the guidelines and foods on the Whole Grain Sample List fit with the goal of increasing youth familiarity with whole grain foods?	0	0	0	2	3	4.60
Parent Education and Parent Evaluation						
Clarity: Is the whole grain education portion of the parent tool clearly worded and easily understood?	0	1	0	2	2	4.00
Clarity: Are survey instructions and questions clear and simple?	0	1	0	2	2	4.00
Suitability: Is the educational information appropriate for the target audience?	0	0	1	1	3	4.40
Suitability: Is the survey appropriate for the target audience?	0	0	1	1	3	4.40
Relevance: Does the content of the parent whole grain education and parent survey fit with WNEP's purpose and educational goals for parents?	0	0	0	2	3	4.60
Relevance: Are the parent materials culturally relevant (suitable for racially and ethnically diverse audiences in WNEP)?	0	0	0	2	3	4.60

General Comments:

- Provide in Spanish and Hmong.
- *"I love the evaluation content."*

Comments on WGTTT:

- Be specific as you refer to the sample (e.g. "Is this the first time you have tried whole grain pasta?")

Comments on Parent Education:

- Arrange boxes to provide more white space.
- Offer suggestions or recipes on ways various cultures use different whole grain foods. Like whole grain corn bread, whole wheat tortillas, brown rice with red beans, cous cous in soup instead of white rice.
- The parent tool could have been spread out to a double sided form. Some of the information is really condensed and hard to sink in at once.

- Provide in color if possible.

*Comments not in quotations are paraphrased.

Cognitive Test for Understanding

The cognitive test for understanding was completed with 14 (five males, and nine females) second and third graders in Blair Elementary's afterschool program (Table 3). Demographic data collected at the beginning of the lesson series showed that of the 14 participants, ethnicity/races included one Asian/Asian American, two white, and 11 Hispanic/Latino participants. Two children volunteered to explain each of three WGTTT questions (a total of six volunteers). Children demonstrated understanding of the questions based on their ability to restate the question in their own words with accurate meaning. Before answering WGTTT questions, children were informed that they did not have to answer questions if they didn't want to and that their responses would be confidential.

Table 3. Cognitive Test for Understanding.

Cognitive Test Script with Youth Responses
"I am going to ask you a couple of questions that will help us see what you have learned today. First, I want to make sure you understand all of my questions before I ask them. Let's see if you can explain to me what I'm asking." 1. *The first question will be:* ***Is this the first time you have ever tried barley?*** *Before we answer that question, can someone raise their hand and explain to me what I'm asking?* a. **Child 1: "Is it the first time you've had barley."** b. **Child 2: "If it's the first time you've tried it."** 2. *The next question will be:* ***Will you eat barley again?*** *Who can raise their hand and explain to me what I'm asking?* a. **Child 3: "Will I eat it again? And the answer is yes."** b. **Child 4: "If you'll eat it again."** 3. *The last question will be:* ***Will you ask to eat barley at home?*** *Who can raise their hand and explain to me what I'm asking?* a. **Child 5: "Will I ask to eat it at my house."** b. **Child 6: "If I'll have it at home."** *Ok, Great job! Now that I know you understand the questions, it's time for the taste test! Raise your hand if you answer is "yes."* Is this the first time you have ever tried barley? **12 raised hands**

Will you eat barley again? **12 raised hands**
Will you ask to eat this food at home? **8 raised hands**

Whole Grain Taste Test (WGTTT)

Results from the Whole Grain Taste Test Tool (WGTTT) are presented in Table 4. Approximately 98% of youth participating in Waukesha County WNEP's whole grain lessons tasted the whole grain bread sample. About 36% of those who tasted the bread reported trying whole grain bread for the first time; 80% reported intention to eat whole grain bread again, and 71% reported intention to eat whole grain bread at home. Second graders more frequently reported trying whole grain bread for the first time (52.5%), while only a minority of polled 5th graders tried it for the first time (19%). Demographics of all youth in Waukesha County WNEP-participating schools are listed in Table 5.

Table 4. Whole Grain Taste Test Tool (WGTTT) Responses.

		Youth Responses To WGTTT		
	Tasted the WG Bread Sample	**Tried WG Bread for First Time**	**Would Eat WG Bread Again**	**Would Eat WG Bread at Home**
2nd grade (n=220)	99.0% (n=200)	52.5% (n=105)	84.5% (n=169)	75.0% (n=150)
2nd/3rd grade (n=112)	99.1% (n=111)	47.8% (n=53)	74.8% (n=83)	69.4% (n=77)
3rd grade (n=207)	98.6% (n=204)	37.3% (n=76)	81.4% (n=166)	75.0% (n=153)
4th grade (n=150)	97.3% (n=146)	39.0% (n=57)	84.3% (n=123)	78.8% (n=115)
4th/5th grade (n=128)	95.3% (n=122)	26.2% (n=32)	79.5% (n=97)	69.7% (n=85)
5th grade (n=226)	98.2% (n=222)	18.9% (n=42)	71.6% (n=159)	58.1% (n=129)
Totals (n=1,043)	98.1% (n=1,023)	36.3% (n=371)	79.5% (n=813)	70.8% (n=724)

Table 5. Youth Demographics in WNEP-participating schools

Total Number of Learners		100% (n=2,116)
Male, %		51% (n=1,084)
Female, %		49% (n=1,032)
Race, %	White	60% (n=1,271)
	Black/African American	9% (n=190)

	Asian/Asian American	4% (n=92)
	Other races or combinations	13% (n=261)
	Not reported	14% (n=302)
Ethnicity, %	Hispanic or Latino	40% (n=843)
	Not Hispanic or Latino	56% (n=1,186)
	Not reported	4% (n=87)

Parent Evaluation

All children were sent home with a Parent Evaluation Tool (Appendix C). Results from the Parent Evaluation are presented in Table 6. In all, 141 (13.5%) parents returned surveys. Most parents that completed the evaluation reported trying more than one whole grain food with their child and often several whole grain foods. Parents who reported "other" whole grain foods tried commercially-prepared or homemade whole grain bars, popcorn, whole wheat chapatis (Indian flatbread), ready-to-eat breakfast cereals, quinoa, a rice blend (freekeh/brown rice) and whole grain bagels. When asked if they would buy the whole grain food again, 123 answered "yes," three answered "no," nine answered "maybe," five did not respond, and one circled all three responses. Comments included: "we/our family eat these items daily," "we eat oatmeal most mornings," and "didn't like whole grain tortilla but like the others." Thirty-three percent of all returned Parent Evaluations were from Spanish-speaking parents. Percentages of parents who reported that they would buy the sampled whole grain again was similar for both Spanish-speaking (91%, n=43) and English-speaking (85%, n=80) parents.

Table 6. Parent Evaluation Responses.

	Responses to Parent Evaluation							
	Tried WG Bread	**Tried Brown Rice**	**Tried Whole Wheat Pasta**	**Tried WG Tortilla**	**Tried WG Corn Tortilla**	**Tried Oatmeal**	**Tried Other**	**Would Buy WG Again**
English (n=94)	68	37	40	19	16	61	9	80
Spanish (n=47)	36	10	10	18	16	28	8	43

Total (n=141)	104	47	50	37	32	89	7	123

Educator Interview and Feasibility Assessment

The six nutrition educators who conducted the whole grain lesson and evaluation were asked to respond orally to seven questions about the feasibility of administering the evaluation. Educators answered each question based on their experiences with the tool. Responses to Nutrition Educator Interview Questions are summarized in Table 7. Generally, educators were unanimous that the children understood the WGTTT questions and that the questions generated appropriate responses; they also reported few difficulties with WGTTT and Parent Evaluation tool administration and collection. Interviewees offered recommendations on how to make the delivery of the WGTTT questions successful.

Table 7. Responses to Educator Interview Questions.

Question 1: Describe any changes you would make to the Whole Grain Sampling Guidelines or the Whole Grain Sample List based on your experience with the evaluation tool.
Educators reported that the Sample List and Tasting Guidelines were complete. Sample List Observations: • It can be difficult to find cereals with 5g or less sugar—10 g may be a better guideline. • Allowing a small amount of sauce or spread is a good idea because grains are not often eaten "dry." • The whole grain label will be helpful for new educators. • Whole corn tortillas have to be served hot; they are not meant to be eaten cold. • Brown rice is a good option, but anything that needs to be hot is difficult to do in a classroom. • Cheerios are too common to include on the list since the goal is to increase children's exposure to unfamiliar whole grains. Tasting Guideline Observations: • "Question 1: Observe" should be bulleted or bolded so educators do not forget this step.
Question 2: Tell me how well students understood each [WGTTT] question.
Educators were unanimous that children understood the questions. Observations: • Children understood the questions. o *"No kids said that they didn't understand. I didn't hear any 'what?' or 'I don't know what you mean' All was well understood."*

- *"I didn't find any challenges. It was pretty straightforward. Kids were not like, 'I don't know' they pretty much knew. Sometimes when you ask questions, kids look around to see what other kids are answering, but not for these; kids were very confident answering for themselves. Questions were easy to participate in, because I saw them participating."*

Question 3: Describe any challenges with the [WGTTT] questions for you or the students.

Educators reported that the questions generated appropriate responses from the students and were not challenging to understand.

Question 4: Describe any changes you would make in wording or delivery of the [WGTTT] questions.

Educators asked about the importance of reading items word-for-word, suggested changes in wording, and made a few recommendations on how to make delivery of the questions successful.

Observations:

- Educators made several observations about question wording.
  - *"To be honest, I probably said, 'would you eat it again' instead of 'will you.' I'd be interested to know how important it is for us to read it exactly. Will children respond the same way whether or not you use the word 'would' or 'will?'"*
  - *"'Raise your hand if…' is the way most of us would ask the question in the classroom."*
  - *"'Is this the first time you have ever tried whole wheat bread?' was well-understood. By comparison, the WNEP Fruit and Veggie Taste Test, asks, "Did you try this food for the first time today?" Some kids interpret that question and think only about what they had eaten today".*
- Educators made several observations about question delivery.
  - *"Teachers like that we tell children to wait until everyone is served before tasting because it does teach them manners, but it is helpful for us because then they are all focused on the taste test at the same time."*
  - *"Instruct children to put their hands down in between each question. It helps them to refocus, listen in to the next question, and decide on their answer."*
  - *"Engage children in the taste test to make things run smoothly. In my classrooms, I said, 'Remember the three parts of the grain? The bread that you're eating has all three parts!' Kids would say, 'I think I see a piece of bran!'"*

Question 5: Describe any challenges you experienced with the administration of the WGTTT and/or data collection in the classrooms.

Educators had few challenges with WGTTT administration. Some challenges arose that were unique to particular classrooms.

Observations:

- One double class ($1^{st}/2^{nd}$ combo) needed to be divided to ensure that only 2^{nd} graders were answering the questions. Classroom teachers were able to assist.
- One educator reported interference of another classroom adult; an aide said during the taste test, "if you don't think you're going to like it, you don't have to eat it."
- Educators reported some difficulty in getting a particularly excited classroom's full attention, and ensuring that those children raise their hands long enough to count.

Question 6: Tell me about any difficulties with distribution and/or collection of the Parent Evaluation forms.

Educators reported few difficulties with distribution and that classroom teachers were positive and receptive to the process. **Some interviewees offered tips for working with the classroom teacher to collect the Parent Evaluations.**

Observations:

- One educator thought that it might be helpful to have language in the guidelines about how to talk to the classroom teacher about the Parent Evaluation.
  - *"I talked to the teacher and made sure she understands it very well. I was counting on her and wanted her buy-in."*
- Educators suggested leaving incentive distribution up to the teacher.
  - *"I made sure the teacher knew that I had given her stickers for everyone. I wanted the teacher to have control over who gets stickers."*
- One educator thought that a better incentive could help to motivate the kids more, but noted that any incentive is helpful.
  - *"Telling the parent that the child will receive an incentive is great, because oftentimes parents want their child to participate in whatever's going on in their classroom. Parents know, "they really want this [survey] back. They've put money into this."*

Question 7: Do you have any other concerns, comments, or suggestions regarding this evaluation tool?

Educators gave positive feedback.

- *"No. I think it works, I don't see how you could improve on it."*
- *"The fact that it [the Parent Evaluation] is attached to the newsletter is new and different, something we haven't tried."*

CHAPTER 5: DISCUSSION

This study explored the use of a new whole grain evaluation method for WNEP youth education. The development of the evaluation method used in this study was influenced by several factors and circumstances encompassing WNEP youth education. The evaluation tool needed to be simple, easily understood, and concise due to the time frame of the youth lessons and the age of the target audience. Secondly, since there are several curricula recommended for use with WNEP youth, the evaluation tool had to be suitable for more than one whole grain lesson or curriculum. Finally, the evaluation tool was developed based on research to demonstrate impact as accurately and comprehensively as possible. The evaluation was based on theoretical constructs linking familiarity and intention to changes in whole grain consumption behavior in youth, and was extended to parents based on findings that home availability is a significant contributing factor to whole grain intake in children.

Familiarity and intention are just two potential indicators of behavior. As evidenced by the complex interrelationship of factors that influence behavior (Contento, 2008), there may be many determinants of behavior that can be successfully measured in an evaluation tool. For example, self-efficacy has been cited by some research as a psychosocial indicator that has good potential for assessing dietary behavior in children (Parcel, et al. 1995). Given the complex system of behavioral influences and the current lack of research on the strength of these influences on youth dietary behavior, future research endeavors should continue to explore which factors are the most significant predictors of behavior.

Familiarity has been identified in social cognitive models of behavior change as an influential factor in dietary behavior change in youth. In this study, providing a first exposure to a whole grain food during a taste test was considered to be a measurement of a child's increased

familiarity with the food. While the majority of second graders (52.5%) reported experiencing the whole grain bread for the first time, most fifth graders reported that it was *not* their first time trying whole grain bread. This may be due to older children's greater opportunity for exposure to the food at some point in time. This observation led to a reconsideration of how best to measure changes in familiarity. Exposing children to a new whole grain certainly improves familiarity, but providing children who eat whole grains infrequently with an additional exposure also improves familiarity. For instance, only 19% of fifth grade children reported during the taste test that they had never tried whole grain bread before. However, it was hypothesized that the majority still did not *regularly* eat whole grain bread. Therefore, partway through the pilot test, youth in ten classrooms (n=248) were also asked, "Do you *normally* eat white bread at home?" More than half of students (n= 165 or 66.5%) raised their hand responding "yes" to this question. It may be worthwhile to consider including this type of question as part of the evaluation, particularly in older grades where children have had more opportunity for prior exposure to whole grains.

Intention was also assumed to be an indicator of behavior. Based on theoretical models of behavior change (Contento, 2008), intention is a precursor to behavior, although there are certainly other environmental factors that may impede good intentions. Unfortunately, the measurement of behavioral intention in children and the relationship between intention and whole grain intake behavior in youth has not been well-studied. While one study (Burgess-Champoux, et al., 2008) found that a child's intention was not easily discernible from food preference, intention was assessed using a forced-choice question format which may have pressured children to choose between two disliked foods. It also did not necessarily reflect a child's response in a free-choice situation or in a more tangible situation (not a survey). The

Whole Grain Taste Test Tool measured intention in a more direct and concrete fashion, which was an advantage when working with children between the ages of seven and eleven; this span of ages represents the same "concrete operational" stage of development. The object of the evaluation questions was tangible; the children could see, touch, smell, and taste the bread and then report on their intent to eat it. In spite of this advantage, it is clear that the use of intention as an indicator of youth behavior requires further exploration and validation.

Taking a step beyond the youth evaluation process, this research project also considered parental influence on youth whole grain intake. A newsletter (Appendix B) was developed as a means to communicate with parents and caregivers about the selection and use of whole grain foods, and an at-home tasting activity (Appendix C) encouraged parents to familiarize their families with whole grain foods. The newsletter-activity combination was successful in reaching 13.5% of parents. While a newsletter is a convenient and frequently-used avenue for teachers and other parties to communicate with parents, the consideration of other methods of communication will be important for the future. As technology changes, increasing numbers of parents are relying on digital information as their primary resource for the happenings at their child's school. Exploring the school district's digital communications such as electronic newsletters, school websites, and classroom websites could reveal other routes for parent education and evaluation. Greater parent involvement may also be achieved with other approaches; for instance, one research effort offered family grocery store tours, which combined youth and parent whole grain education into one event (Burgess-Champoux, et al., 2006). However, since recruitment of parent learners often takes considerable effort, these approaches would need to be carefully planned and adequately promoted to maximize parent participation.

Results of the Parent Evaluation (Appendix C) suggest that parent interpretation of the evaluation activity should be analyzed. Many parents reported completing the tasting activity with several whole grain foods and sometimes all of the foods listed. It seems unlikely in these cases that the Parent Evaluation was a true report of completion of the whole grain tasting activity. Instead, some parents may have interpreted the question as a report of home availability, leading them to check off foods regularly available at home. Others may have interpreted the Parent Evaluation as a measure of previous exposure, resulting in a report of whole grain foods they had tried with their child *before*. Based on these types of responses, it may be beneficial to present the Parent Evaluation form to a focus group of parents to gain a clear picture of parent interpretation of the activity. The focus group may help to provide additional insights regarding the practicality of the tool and highlight any revisions that would ensure clarity and parent understanding.

Regardless of the variations in interpretation of the Parent Evaluation, the evaluation process successfully engaged 141 parents in considering and potentially improving their family's whole grain consumption. The return rate of the Parent Evaluations was lower than expected (13.5% compared to Waukesha County WNEP's average ~30% return rate for fruit and vegetable parent evaluations). One possible explanation for the lower return rate is that the whole grain Parent Evaluation was more involved than the fruit and vegetable evaluation in that it asked parents to complete an activity with their child. The number of evaluation questions and the time required to complete an evaluation will ultimately impact return rate. On the other hand, one may argue that a multifaceted, more complex evaluation engages parents on a deeper level and provokes more of an impact. Engaging parents in the nutrition education process while

keeping the evaluation succinct and reasonable to complete will be an important consideration for future parent evaluation endeavors.

Another possible approach to improve the return of the Parent Evaluation is to provide an incentive to the parties involved. During this study, Nutrition Educators provided classroom teachers with stickers to encourage children's return of the Parent Evaluation. While the sticker incentive has been utilized by Waukesha County WNEP in the past, Waukesha County Nutrition Educators have noted that a sticker is not always a strong motivator, particularly for older children. Unfortunately, budget limitations and WNEP policies regulating the provision of incentives decrease the likelihood that additional resources could be allocated for this purpose. No-cost rewards such as engaging children in a fun nutrition game or activity during a return visit to their classroom may be another approach. Generally, providing attractive incentives and doing so under budget constraints will require creativity and continued exploration.

Overall, this research study exhibited several strengths including the assessment of the evaluation components by expert reviewers, the utilization of a large sample size in the pilot test, and the use of in-person interviews to assess for feasibility. First of all, the expert peer review process was an advantage to this study as it provided the opportunity for evaluation tool assessment from a variety of programmatic and cultural perspectives. State-level WNEP specialists, county-level WNEP coordinators, and county-level educators were all included in the pool of expert reviewers. Assessments of cultural relevance by colleagues from the African Diaspora and Hispanic/Latino Audiences workgroups were crucial to the testing of the evaluation components for fit with WNEP's diverse audience. Secondly, the large, diverse sample of youth in the pilot test (n=1,043) allowed for a broad test of the evaluation in a variety of classroom environments. Finally, the in-person feasibility interview format gleaned in-depth

information about conducting the evaluation and afforded opportunities to probe for additional details from interviewees when necessary.

One weakness of this research was the scope of the pilot test, which was limited to Waukesha County WNEP. Prior to the possible adoption of the evaluation for use in the statewide program, it would be beneficial to pilot it in additional counties, especially those counties that are geographically and demographically distinct from Waukesha County. In particular, rural Wisconsin counties with large Hmong or Native American populations would be ideal candidates for an additional pilot test. While there are fewer Hmong and Native American learners in Waukesha County, these populations represent large percentages of learners in other WNEP counties and will therefore be essential groups with which to conduct a pilot test.

The WGTTT was designed to ideally be compatible with a variety of whole-grain education intervention strategies. This adaptability makes it difficult to link impact (as measured by the WGTTT) to the particular whole grain nutrition curriculum used in this study (Show Me Nutrition). Traditionally, since it has been considered useful to link specific educational interventions to specific evaluations, there is some danger that the tool may not be considered a true measure of the educational intervention.

On the other hand, the flexibility of the WGTTT may be considered an advantage. Since the desired behavioral outcomes measured by the WGTTT were (1) improved familiarity with a whole grain food and (2) reported intention to eat a whole grain food, the design of the accompanying educational intervention should simply support the outcomes measured by the tool. Therefore, the WGTTT could work successfully with any accompanying intervention strategy that supports children's familiarization with whole grains and encourages whole grain consumption. In this study, the taste testing activity and the preceding nutrition lesson both

functioned as part of the intervention. The lesson activities helped to familiarize children with whole grain foods and "set the stage" for the taste test by introducing whole grain foods in an age-appropriate way. Presenting whole grains in an exciting way via an interactive and fun nutrition lesson arguably provoked more interest in the whole grain bread sample than if the taste test were conducted without a nutrition lesson. To support this assumption, future work may warrant a trial of the WGTTT without a prior nutrition education and a comparison of the evaluation results.

This research focused primarily on qualitative data gathered via surveys and interviews. While there are advantages to qualitative data such as the formation of in-depth and comprehensive assessments, quantitative data is also desirable to contribute objectivity to research. One example of how such subjectivity can be problematic was brought to light by the cognitive test. While the cognitive test was an important step in ascertaining child understanding of the questions, cognitive testing with a young audience introduces potential inaccuracies due to uncertain verbal skills of second and third grade children. The possibility that a child may have simply restated the posed questions rather than internalizing and understanding them is a valid concern. Research is lacking in the area of developmental verbal capabilities of children older than five years of age; however, some experts have established developmental "goals" for oral language development of elementary-aged youth based on observation. Fisher & Frey (2007) cite "goals for speaking and listening by grade level" for elementary-aged children, which expect that younger children (Kindergarten-2nd grade) can "paraphrase information that has been shared orally by others" and that 3rd-5th grade children should be able to "retell, rephrase, and explain what has been said by the speaker typically listened to for recreational, informational, and functional purposes." These developmental goals suggest that 2nd and 3rd graders participating in

the cognitive test were capable of restating questions in their own words. Child responses observed by Waukesha County nutrition educators during the pilot also suggested understanding. Educators reported that children raised hands "without hesitation" and some children even explained their response in greater detail (e.g. "I've had whole grain bread before, but not this kind of whole grain bread.") Future cognitive testing efforts may help to confirm these observations, perhaps by engaging children in conversation to understand the thought processes leading to their responses.

This study included a content validity assessment, a relatively weak form of validity. A more quantitative, objective assessment of validity could provide stronger support for the use of this evaluation method. The decision whether to do a convergent validity assessment, which would provide more concrete and objective data, was given careful consideration. Determining validity or accuracy of an evaluation tool is a daunting task for any study, especially with time constraints and limited resources. One potentially feasible assessment of validity was a convergent validity assessment of Kaiser, et al. (2012). Kaiser examined how well a group-administered taste test tool (TTT) for fruits and vegetables agreed with participant food preference logs. Children filled out the TTT and food preference log simultaneously, and Pearson correlation coefficients demonstrated correlations between degree of liking the food (as indicated on the log) and willingness to try the food again and ask for it at home (as indicated by the TTT). While this step did assess convergent validity, neither the TTT nor the food preference logs were "gold standards." Kaiser's results would have been more useful if a previously validated tool were available for comparison. A careful search has not yielded any validated taste test tools or youth whole grain evaluation tools by which to compare the Whole Grain Taste Test Tool. This type of validation is also difficult when attempting to limit time spent on evaluation

and the number of questions posed to the youth participants. The evaluation needed to be practical to administer in the time allotted by classroom teachers, and too many questions can cause respondent fatigue (particularly with younger children). While these factors made a convergent validity assessment impractical for this study, methods to more objectively validate the taste test questions could be explored in the future.

CONCLUSION AND RECOMMENDATIONS FOR FUTURE USE

This study's whole grain youth evaluation tool met content validity, cognitive understanding, and feasibility standards set in place by this research and is therefore recommended for use by WNEP. The development and pilot test of the Whole Grain Taste Test Tool and its Parent Education and Parent Evaluation components yielded an evaluation procedure that WNEP nutrition educators can feasibly use to measure behavior change in youth learners. Results from this evaluation will help to support and ensure quality of WNEP's whole grain education and demonstrate impact of WNEP education to agency partners and funders. The inclusion of both children and parents in the design of the evaluation tool is an attribute that could easily support WNEP's increasing focus on programmatic evaluation, which seeks to accomplish more comprehensive family nutrition education through various channels. Prior to adoption for statewide use, it is recommended that this evaluation procedure be subject to pilot testing in counties with demographic and geographic characteristics that are distinct from Waukesha County. It is also suggested that a focus group of parents be recruited to test for understanding and interpretation of the Parent Evaluation.

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Appendix A

Whole Grain Taste Test Tool (WGTTT)

WHOLE GRAIN TASTING Evaluation—**Youth** Learners

Instructions: Complete one column for each whole grain sample offered.

1. Write in the date and total number of students in the group
2. Write in the name of food and how presented (use Whole Grain Sample List)
3. Offer the food
4. Observe and record how many tasted the food
5. Ask the questions using the name of the food sampled (*example: Is this the first time you have ever tried **whole wheat pasta**?*) Record number who raised hands answering, "yes".

County: _____

Location: _____

WNEP Educator Name: _____

Agreement #: _____

EXAMPLE **Date:** _____ **Total Number of Students:** 22	**Date:** _____ **Total Number of students:** _____	**Date:** _____ **Total Number of students:** _____	**Date:** _____ **Total Number of students:** _____	**Date:** _____ **Total Number of students:** _____	**Date:** _____ **Total Number of students:** _____
Name of food sampled: Whole wheat pasta **How presented?** Tossed in small amt of marinara sauce	**Name of food sampled:** **How presented?**	**Name of food sampled:** **How presented?**	**Name of food sampled:** **How presented?**	**Name of food sampled:** **How presented?**	**Name of food sampled:** **How presented?**
OBSERVE: **How many tried it?** 20	**OBSERVE:** **How many tried it?** _____	**OBSERVE:** **How many tried it?** _____	**OBSERVE:** **How many tried it?** _____	**OBSERVE:** **How many tried it?** _____	**OBSERVE:** **How many tried it?** _____
SHOW OF HANDS: **Is this the first time you have ever tried** whole wheat pasta**?** 12 **said "yes"** **Will you eat it again?** 14 **said "yes"** **Will you ask to eat it at home?** 10 **said "yes"**	**SHOW OF HANDS:** **Is this the first time you have ever tried** _____**?** _____ **said "yes"** **Will you eat it again?** _____ **said "yes"** **Will you ask to eat it at home?** _____ **said "yes"**	**SHOW OF HANDS:** **Is this the first time you have ever tried** _____**?** _____**said "yes"** **Will you eat it again?** _____ **said "yes"** **Will you ask to eat it at home?** _____ **said "yes"**	**SHOW OF HANDS:** **Is this the first time you have ever tried** _____**?** _____ **said "yes"** **Will you eat it again?** _____ **said "yes"** **Will you ask to eat it at home?** _____ **said "yes"**	**SHOW OF HANDS:** **Is this the first time you have ever tried** _____**?** _____**said "yes"** **Will you eat it again?** _____ **said "yes"** **Will you ask to eat it at home?** _____ **said "yes"**	**SHOW OF HANDS:** **Is this the first time you have ever tried** _____**?** _____ **said "yes"** **Will you eat it again?** _____ **said "yes"** **Will you ask to eat it at home?** _____ **said "yes"**

Appendix B

Parent Education

NUTRITION TIDBITS

Information for you and your kids

Winter 2013-2014

Fun with Whole Grains

Today your children learned about whole grains! Eating more whole grains may reduce your risk for heart disease and other chronic diseases.

Use whole grain foods in your favorite recipes! Try:

- Beans and brown rice
- Barley or brown rice instead of white rice in soup
- Whole grain cornmeal in cornbread
- Whole wheat flour instead of white flour in recipes
- Whole wheat noodles in pasta dishes

Whole Grain Shopping Tips

⇨ Check the top of the ingredient list. The first ingredient should contain the word "whole," such as "whole barley" or "whole grain wheat."

⇨ Look for the whole grain stamp on your favorite foods.

⇨ Some foods such as brown rice, oatmeal, and popcorn are always whole grain.

Parents and Caregivers:

Complete the activity with your child and return the attached form to your child's teacher for a nutrition sticker!

Complete the **Great Grain Challenge!**

UW Extension Waukesha County Nutrition Education Program
515 W. Moreland Blvd., Administration Center Rm G22
Waukesha WI 53188
Phone: 262-548-7877 Fax: 262-548-7787
Para mas información en español comuníquese con: 262-548-7789
http://waukesha.uwex.edu

Appendix C

Parent Evaluation

Attention Parents and Caregivers:

Children learn how to eat healthy foods from their role models—you! Try a new whole grain food from the list below at home. Return the survey to show that you and your child tried a whole grain together.

Detach the survey below and return it to your teacher.

Date:_____

My child and I tried a whole grain together! We tried:

- ☐ Whole grain bread
- ☐ Brown rice
- ☐ Whole Wheat Pasta
- ☐ Whole Wheat Tortilla
- ☐ Whole Grain Corn Tortilla
- ☐ Oatmeal
- ☐ Other: _____

Will you buy this food again? (Circle One)

Yes ☺ No ☹ Maybe 😐

Return this survey to your teacher—your child will receive a colorful nutrition sticker!

Appendix D

Whole Grain Tasting Guidelines

Whole Grain Tasting Guidelines – Youth Grades 2nd -5th

This evaluation tool can be used following either a single lesson or a series of lessons where whole grain food samples are provided. Remember that food samples are provided to learners to reinforce WNEP lessons. This whole grain sampling tool has the following short- and long-term objectives:

Short-term:

- Children will taste whole grain foods that are new to them
- Children will improve familiarity with whole grain foods
- Parents or caregivers will review educational materials describing how to shop for and use whole grain foods
- Parents or caregivers will taste a whole grain food with their child at home

Long-term:

- Parents or caregivers will increase whole grain availability at home
- Whole grain intake will increase

Instructions

Choosing a Grain:

1. Select the whole grain that you will offer from the Whole Grain Sample List. When choosing whole grains to include as samples, consider the following guidelines:
    a. Choose a food that is directly related to the lesson being taught.
    b. Plan and buy only enough of the whole grain to give each participant a sample or taste of the food.
    c. Follow the instructions on the attached Whole Grain Sample List. Avoid introducing grain foods with lots of "extras" like sugars, fats, salt, dressing, or spread. More specifically:
        i. The whole grain item should be the primary item in the food sample. It should not be an "afterthought" or part of a complex recipe where the flavor of the grain itself is difficult to identify (e.g. a casserole, parfait, or other mixed-food-group recipe).
        ii. A small amount of oil, sauce, or dressing may be used when serving brown rice or whole grain pasta.
        iii. Breads may be served with a small amount of spread
        iv. Hot whole grain cereal may have small amount of sugar added
        v. Ready-to eat items such as whole grain ready-to-eat cereal or whole grain crackers should be tasted without any addition of other foods

Appendix D

Whole Grain Tasting Guidelines (continued)

Completing the Form:

1. Write the name of the selected whole grain in the appropriate places on the WHOLE GRAIN TASTING EVALUATION form.
2. Note date(s) of the sampling activity and number of students participating on the correct sections of the form.
3. Complete the top portion of the form—Location, Agreement number, WNEP educator name.

Conducting the Evaluation:

Teach the lesson and offer the selected sample to the participants. As you offer the sample, encourage each participant to taste, but remind them that tasting is voluntary.

After each participant has had the opportunity to taste the offered whole grain sample, observe how many of the participants tried each food, count them, and mark that number on the evaluation form in the OBSERVE box.

Important: Before asking the following questions, inform learners that their participation is voluntary by saying, "I am going to ask you a couple of questions that will help us see what you have learned today. You do not have to answer the questions if you don't want to. All of your answers will be private."

Ask for a show of hands in response to the following questions, noting results on the evaluation form ("Raise your hand if you answer is "yes").

- Did you try this food for the first time today?
- Will you eat this food again?
- Will you ask to have it at home?

Instructions for Distributing/Collecting the Parent Education/Evaluation Component:

1. Praise students for trying a new whole grain food in class today. Encourage children to tell a parent, grandparent, or other family member about what they tried.
2. Show children the parent education/evaluation form. Encourage children to try a whole grain food at home with their families and to have a parent, grandparent, or other adult complete the activity.
3. Give parent education/evaluation forms to classroom teachers to distribute.
4. Instruct teachers to distribute forms to each student, encouraging the return of the form to receive a small prize (e.g. a sticker). Provide an envelope to each teacher for collecting forms.
5. Teachers may give the collected forms to the nutrition educator during their next classroom visit. Any late forms may be dropped off at the school office to be collected by the nutrition educator.

Appendix E

Whole Grain Sample List

Whole Grain Sample List

When conducting the Whole Grain Tasting Evaluation, please select foods from the following list. Remember that the purpose of the tasting activity is to increase youth audiences' knowledge of whole grains. Given this goal, keep the following guidelines in mind:

- Avoid or use only small amounts of "extras" (sugar, fat, salt, sauce, dressing, or spread) in whole grain samples. Avoid using "extras" that would mask the flavor of the whole grain food.
- Do not select brands or varieties of whole grains that would be cost-prohibitive for our audiences
- **Be sure to read the label and select only those items with a whole grain listed as a first ingredient:**

> INGREDIENTS: **WHOLE GRAIN OATS**, MODIFIED FOOD STARCH, FOOD STARCH, SUGAR, SALT, CALCIUM CARBONATE, OAT FIBER, TRIPOTASSIUM PHOSPHATE, WHEAT STARCH, VITAMIN E (MIXED TOCOPHEROLS) ADDED TO PRESERVE FRESHNESS

Breads:
- Whole grain breads
- Whole grain rolls
- Whole grain bagels
- Whole grain English Muffins

Crackers:
- 100% Whole grain crackers
  - ✓ Examples: Triscuits, Ry Crisps

Cereal:
- Oatmeal (steel cut, rolled, or instant oats—no sweetened instant oatmeal packets)
- Whole grain cereals low in added sugar (5 grams or less per serving)
  - ✓ Examples: Cheerios, Shredded Wheat, Unfrosted Mini Wheats, Wheat Chex

Rice:
- Brown rice, regular or instant
- Wild rice

Pasta:
- Whole wheat pasta

Tortillas:
- Whole wheat tortillas
- Whole corn tortillas

Other:
- Quinoa
- Whole grain couscous
- Whole Barley
- Bulgur

Not allowed:
Granola bars, cookies, muffins, pancake mixes, frozen waffles, instant rice mixes, instant pasta or macaroni and cheese mixes, popcorn*
Note: Popcorn is excluded due to children's familiarity with the item.

Appendix F

Expert Review Tool (Sample Page)

Expert Review Tool –For Youth Evaluation Component

Please rate the **youth component** of the Whole Grain Taste Test Tool on the following characteristics. Please note that this evaluation tool's target audience is 2nd-5th grade elementary-aged children. Goals for the youth tool include:

- Children will taste whole grain foods that are new to them
- Children will increase familiarity and acceptance whole grain foods
- Children's whole grain intake will increase

	1 Poor	2 Fair	3 Good	4 Very Good	5 Excellent
Clarity **Are the questions clearly stated and easily understood?**	☐	☐	☐	☐	☐
Please suggest any changes that would improve the clarity of the questions: (Click here to enter text) **In your opinion, would it be helpful to recruit a small panel of students to test for understanding/clarity of the questions? (Please check "yes" or "no")** ☐Yes ☐ No					
Suitability **Are the questions appropriate for the target audience?**	☐	☐	☐	☐	☐
Please suggest any changes that would improve the appropriateness for the target audience: (Click here to enter text)					
Relevance **Does the content of this evaluation tool fit WNEP's purpose and educational goals for the target audience?**	☐	☐	☐	☐	☐
Is it culturally relevant (suitable for racially and ethnically diverse audiences in WNEP)?	☐	☐	☐	☐	☐
Please suggest any changes that would better align this tool with WNEP's purpose and educational goals: Click here to enter text					

Appendix G

Feasibility Interview Questions

1. Describe any changes you would make to the Whole Grain Sampling Guidelines or the Whole Grain Sample List based on your experience with the evaluation tool.
2. Tell me how well students understood each question.
3. Describe any challenges with the questions for you or the students.
4. Describe any changes you would make in wording or delivery of the questions.
5. Describe any challenges you experienced with the administration of this evaluation tool and/or data collection in the classrooms.
6. Tell me about any difficulties with distribution and/or collection of the parent evaluation forms.
7. Do you have any other concerns, comments, or suggestions regarding this evaluation tool?