RELIABILITY AND VALIDITY OF

YOUTH EFNEP CHECKLIST

By

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CHAPTER I

INTRODUCTION

Dietary habits start early in life and unhealthy eating behaviors can carry over into adulthood (Corwin et al. 1999). The dietary habits children establish during childhood and adolescence may significantly influence the likelihood of the child developing particular chronic diseases later in life (Variyam et al. 1999). Half of the leading causes of death in the United States are related to dietary factors (Corwin et al. 1999).

The *Third Report on Nutrition Monitoring in the United States* (FASEB 1995) showed that many children one to eleven years old consumed diets that provided inadequate amounts of vitamin E, zinc, vitamin A, vitamin B6, calcium, iron, and copper. Sodium intake was above the recommended intake. Total fat was also greater than the recommended 30% of calories. Children who lived in households with incomes less than 130% of the federal poverty level had lower intakes of vitamin A, vitamin C, and vitamin B6, calcium, iron, and zinc than children in higher income households, however, low-income children had a higher intake of folate than children from higher income households. Therefore, children, especially low-income children, may be at risk for developing nutrition-related diseases such as osteoporosis later in life, or have developmental

problems because of inadequate nutrient intake. With an increased intake of fat and sodium, children may be a greater risk for developing diseases such as atherosclerosis and diabetes later in life.

The National School Lunch Program is a good way for children and adolescents to consume a healthy diet. The program is available nationally to 92% of all students, but only a little more than 50% of students actually eat USDA school lunches (Gleason 1995). Under the National School Lunch Program, school lunches must meet the Dietary Guidelines for Americans which recommend less than 30% of calories from fat, and less than 10% from saturated fat. School lunches must also provide one-third of the RDA for protein, vitamin A, Vitamin C, iron, calcium, and calories (USDA 2002), the nutrients that were low in the diets of low-income children.

Many factors can affect a child's eating behaviors, but parents exert a large influence. Parents can be a positive or negative influence on their children's diets. In a recent study, it was shown that children who eat the majority of their meals with their family had a healthier diet. The researcher said the results might have shown that parents are serving more healthy meals, but it may have also shown that children are getting the idea about healthy eating from observing their parents during family meals (Epstein 2000). Children learn how to choose a healthy diet from experience, they are not born with the ability to do so. Parents have the ability to decide for the child what types of food to give or have available, healthy or not healthy. Parents are usually responsible for a

child's nutrition education from age 5 to 10 years old. Parental influence usually weakens as the child gets older (Rasanen et al. 2001)

Corwin and coworkers (1999) stated that "behavior is learned through an individual's social experiences with his or her *environment*" and "the environment provides examples, or *models*, for learning behaviors" (pg. 183). Parents provide behavioral examples to their children everyday. Parachin (2001) stated there are five behaviors parents should establish in their children to promote good health: regular hand washing, use of safety belts, daily exercise, eating a healthy diet, and use of proper safety equipment. He states if parents teach their children these good habits early in life, the children will grow up to be fit and healthy adults.

Youth EFNEP

The Cooperative Extension Service Expanded Food and Nutrition Education Program (EFNEP) has been helping low-income families for over 30 years (Leidenfrost 2000). EFNEP is a federally funded nutrition education program geared towards the low-income population. The program teaches basic nutrition skills and food safety. EFNEP has now become "the largest federally funded program exclusively offering nutrition education" (Arnold and Sobal 2000 p. 130).

A youth program was implemented from the beginning. In the youth EFNEP program, nutrition education assistants (NEAs) teach third and fourth grade children important lessons about food and food behaviors in the

classroom. These lessons include information and activities about basic nutrition, specific nutrients, and food safety. In order for a child to be eligible for the youth program they must be of 4-H age (9 years old), living in "low-income" geographic areas, receiving free or reduced price lunch, or enrolled in other low-income programs (USDA). Third and fourth grade children were chosen because at that age children have the ability to start making some of their own decisions. They also like making decisions for themselves at this age (Parker, personal communication, Feb. 2001). Ilg and Ames (1955) state that a typical child at eight years old is very willing to try new things, and has a lot of energy and enthusiasm. A child at nine or ten years of age is becoming very independent and self-sufficient. As children get older their ability to use strategies to organize and store information into significant categories increases (Gauvain 2001). They are becoming more able to use reasoning and integration of thought to make their own decisions, because they are becoming more involved in "complex tasks".

Schools with 50% or more of the school population receiving free or reduced price lunches are eligible to participate in the EFNEP youth program (Adair, personal communication, Feb. 2001). This qualifies them as a low-income school. Children may qualify for free lunch if their family's income is at or below 130% of the poverty level. If the family's income is between 130% and 185% of the poverty level, the children are eligible for reduced price lunches (USDA 2002). The nutrition education assistants teach the children four to six lessons, depending on time and availability. The teacher usually decides the number of

lessons. Although four to six lessons may not be enough to change children's food choices, it can lead the children in the right direction (Brug et al. 1997).

The youth EFNEP program in Oklahoma evaluates the children with a pretest/posttest format, to demonstrate changes in the children's food behavior after the lessons. The behaviors listed on the checklist used for youth EFNEP program promote good health and encourage preventative nutrition (Parker, personal communication, Feb. 2001). These behaviors are taught in different lessons throughout the program. The purpose of the evaluation is to measure behavior change, rather than knowledge gain (Adair, personal communication, Feb. 2001).

The purpose of this study was to test the validity and reliability of a new checklist used in the Oklahoma youth EFNEP program since the Fall of 2000. The program needs the information from this study to determine if the checklist is an effective way to measure eating behaviors of children. Some youth educators (NEAs) do not think the checklist is an effective tool because some children either check the boxes randomly or copy from their friends. The youth educators need the information to be motivated to use the checklist with every class they teach.

The following research questions will be addressed in this study: What is the relationship between children's responses to the checklist and observations made of actual eating behaviors in the lunchroom? What is the relationship between children's responses to the checklist and responses made by parents to a similar checklist about their child? How similar are children's

responses to the checklist given twice before they participate in the youth EFNEP lessons? What is the difference between children's responses to the checklist before the nutrition lessons are given and the children's responses to the checklist after the nutrition lessons are given?

CHAPTER II

REVIEW OF LITERATURE

Studies have tested the validity and/or reliability of different dietary assessment methods for children. Several methods have been shown to be valid and reliable measures of food behaviors or choices of children. Many factors can influence children's food behavior and food choices. For example, EFNEP and other nutrition education programs have been shown to have positive effects on changing food behaviors and food choices.

Food Choices of Children

A child's food choices are important to their health now and later in life. Melnick et al. (1998) conducted a study to look at schoolchildren's food consumption patterns. The subjects were 693 second graders and 704 fifth graders from New York City who completed a 24-hour recall and a household questionnaire. Dietary indexes were created by calculating the average number of servings each child ate for each group in the Food Guide Pyramid. The children, both second and fifth graders, met the recommendations for meat and milk, but their number of servings in the bread, vegetable, and fruit group were below the recommendations. Seventy-five percent of the second graders and

72.3% of the fifth graders fell below the 5 A Day recommendations. The authors concluded that children in New York City were not meeting the recommendations to prevent disease and promote optimal health.

Ward et al. (2002) conducted a study to determine food choices of children by analyzing 24-hour recalls for "marker" foods high in fat, saturated fat, and sodium. Subjects were 513 randomly selected third-graders from 24 elementary schools who were already participating in the CATCH program. The children completed a food record for the day before their 24-hour food recall interview. Foods were separated into food groups and then separated again into categories based on content of fat, saturated fat, and sodium. A representative food from each category was analyzed for fat, saturated fat, and sodium content. Foods were considered high fat if 30% or more of the energy came from fat, and high saturated fat if 10% or more of the energy came from fat. The food was considered high sodium if the percent daily value was 10% or greater. The 5 most frequently consumed foods were refined wheat bread, rolls, or tortillas; fresh, frozen, or canned fruit' fresh or frozen vegetables; whole milk; and fruit juice. High fat foods consumed included crackers, cornbread, and French fries. All food choices from the meat group were high-fat and high saturated fat, and also had the most high-sodium foods. Snack foods consumed were mostly high in fat such as potato chips and candy. The foods that were high in fat usually were high in saturated fat also. This study was helpful in identifying food choices of children using foods, instead of nutrients. The results of this study show that nutrition interventions should promote low-fat meat, dairy products, and snacks.

A study was conducted by Rasanen et al. (2002) to assess the dietary patterns of 7-year-old children and determine the relationship of those patterns to nutrient intakes and cholesterol levels. Subjects were 690 children randomized into an intervention group or a control group. The children were selected from a well-baby clinic at the age of 5 months. The families in the intervention group were seen by a pediatrician, a nutritionist, and a nurse at 1-3 month intervals until the child was 2 and then twice a year after that until they were 7 years old. The doctor examined the child and made sure they were developing normally. The nutritionist went over a 4-day food record the parents provided regarding the child's intake. The nutritionist also counseled the families regarding risk factors for atherosclerosis and targeted lowering the fat and cholesterol intake of the children. The control families were given basic health education and provided the nutritionist with a 4-day food record twice a year throughout the study. They did not receive any counseling from the nutritionist. The 4-day foods records measured food consumption of the children. They were analyzed for energy and nutrient intake. Serum total cholesterol, HDL, and triglycerides were measured also. The counseling in the intervention group showed positive changes in their nutrient intakes and serum cholesterol levels. The control children had a higher fat and cholesterol intake than the intervention group. The study concluded that the counseling was effective in changing the dietary habits of children.

A study by Cullen et al. (2002) looked at the intake of sweetened beverages, fruits, vegetables, and calories by fourth- through sixth-graders. Five hundred four children in grades 4 through 6 completed 3 to 7-day food records.

Daily fruit, vegetable, soft drink, fruit-flavored drink, and total sweetened beverage consumption were measured. Students consumed an average of 20 ounces a day of total beverages. Over half of beverages consumed were sweetened beverages. Children who consumed more sweetened beverages also consumed more total calories. Children who consumed more sweetened beverages also consumed less fruits. The researchers concluded that sweetened beverage consumption might be a marker for poor dietary habits. Children should be encouraged to drink healthier beverages at home and at meals away from home.

Influences on Children's Diets

Many things can influence a child's diet including participation in the National School Lunch Program and the School Breakfast Program. Cullen et al. (2000 A) wanted to know the effect of an a la carte snack bar on children's consumption of fruits and vegetables during lunch at school. The study consisted of 312 fourth and 282 fifth grade students from one school district. All the fourth graders went to one school where only the National School Lunch Program (NSLP) meal was served. All the fifth graders went to another school where, in addition to the NSLP meal, a snack bar was also available. The students completed food records in their classrooms immediately after lunch. They were trained ahead of time on how to complete the food record. They were asked to identify what they ate and how many servings they ate. The fifth graders also identified where they got the food, such as the snack bar or home.

All the students also completed a questionnaire about fruit and vegetable preferences. Mean fruit and vegetable servings were calculated for each child for the 5 days. For the fifth graders, each lunch source was categorized and then mean fruit and vegetable servings were calculated for each lunch source. Pearson correlation coefficients were calculated for the number of servings of fruits and vegetables consumed, and fruit and vegetable preferences. The results showed that fourth grade students (NSLP only) consumed significantly more fruits and vegetables than fifth graders. Students whose parents had a high school education or less consumed more fruits and vegetables than those students whose parents had a higher education. Fifth graders who ate school meals consumed more fruits and vegetables than those who only ate the snack bar food. There was a significant correlation between vegetable preference and consumption with fourth graders only. There was a significant correlation between fruit preference and fruit consumption with both fourth and fifth graders.

Gordon and McKinney (1995) examined the differences in nutrient intake between students who participated in the National School Lunch Program (NSLP) and the School Breakfast Program (SBP), and the students who did not participate in the programs. The sample was 3350 students from grades 1-12. They each completed a 24-hour dietary recall interview. Participants in NSLP were over 50% more likely to consume milk or milk products during lunch. The participants ate meat, poultry, or fish 40% more than nonparticipants. Legumes were more likely to be consumed by nonparticipants. Nonparticipants were more likely to consume grains in the form of sweets and snacks. Participants in SBP

were more likely to consume milk or milk products, meat, poultry, fish, or meat mixtures, and grain products; and twice as likely to consume fruit or fruit juice at breakfast.

Social and environmental factors also influence children. Cullen et al. (2000 B) used focus groups of parents and children to determine how those factors influenced children's diets. The focus groups consisted of African-, Euro-, and Mexican-

The schools used in the study all received Chapter 1 funding indicating they were classified as low-income schools. Questions were asked about availability and accessibility of fruits and vegetables and low-fat foods, foods that compete with fruits and vegetables, and social aspects of eating fruits and vegetables. The transcripts of the focus groups were analyzed and coded, and then themes were identified. All the children said a variety of fruits and vegetables were available in their homes and the parents agreed. The parents thought it was important to have those foods available to the children to give them healthy food choices. All the children and parents also said low-fat foods were available in the home. All of the parents said parental example was important and lack of that example was a reason children did not eat fruits and vegetables. The children said they only saw parents eating fruits and vegetables occasionally. The children said peer influence was a reason they did not eat fruits and vegetables or low-fat foods. The parents said the main competition for fruits and vegetables was from sweets and junk food. They also stated they were worried about these foods being advertised on television. The children stated they ate out at least 2 times per

week and could order whatever they wanted. Parents said they monitor their children's growth and health, and worried about weight and obesity. Parents also said they know they play a large role in helping their children consume a healthy diet. The researchers concluded that knowing what factors affect a child's diet could help other researchers design programs with interventions that can be directed at these factors.

Parents can influence a child's nutritional habits that will continue into adulthood. Fisher et al. (2001) wanted to determine if a mother's beverage choices were a factor in their daughter's milk and soft drink intake. The subjects were 197 5-year-old girls and their mothers. The mothers filled out a quantitative food frequency questionnaire for themselves that included the past 3 months. The daughters completed three 24-hour food recalls with the mothers' help. Mothers who drank more soft drinks had daughters who drank more soft drinks and the same pattern was observed for milk intake. The mothers had a positive influence on their daughters' consumption of milk. The researchers concluded that mothers directly influenced their daughters' intake of milk and soft drinks.

Preferences of children can also affect how they eat. Baxter and Thompson (2002) wanted to know how children's preference and consumption of fruits compared to vegetables and the availability of these things in school lunch. The subjects were fourth graders from four different schools in the same school district who were observed eating lunch in the school cafeteria. The students who had been observed were then either asked to give a same day recall or a next day recall of what they ate. After the recall, the children were then asked

about preferences for foods the school had offered for lunch on the day they were observed. Overall, preference appears to be a sound determining factor for consumption of fruits and vegetables.

Food neophobia, or unwillingness to try new foods, may also influence what a child eats. Falciglia et al. (2000) conducted a study to determine if children with food neophobia had more restrictive diets, less variety in their diet, and lower nutrient intakes when compared to children who did not have food neophobia. The researchers first screened 651 fourth and fifth grade students using the Food Neophobia Scale. The researchers divided the students into 3 groups based on their scores: neophobic, average, and neophilic, which indicates the student is very willing to try new foods. Diet records were collected from 70 students. The researchers also collected three 24-hour recalls from the children. Parents were present during all 3 interviews, but only helped the student during the last 2 interviews. The neophilic group had a trend towards a higher energy intake than the other groups. The groups were alike in the number of children who were meeting two-thirds of the RDAs or DRIs for most nutrients. For vitamin E, the neophobic group had fewer students meeting two-thirds of the recommendation. There were no differences between the 3 groups in the number of servings of grain, vegetable, fruit, or meat consumed. The average group had a lower intake from the dairy group than the other groups. The neophobic group had a significantly lower Healthy Eating Index score than the other groups. Saturated fat and variety were significant contributors to differences between the groups in overall score. The neophobic group had

higher intake of saturated fat and less variety in the foods the ate than the other groups. The researchers concluded that food neophobia affects overall diet quality.

Effects of EFNEP and Other Nutrition Programs

EFNEP and other nutrition programs aim to teach individuals the importance of nutrition. Many different programs have been shown to be effective. In 2002 the Oklahoma adult EFNEP program had 43% of their participants graduate from their program (USDA EFNEP Unit Summary Report 2002). Ninety-three percent of the participants enrolled in one or more food assistance programs as a result of the recommendation of the EFNEP program. Ninety-two percent of the participants had a positive change in number of servings of any food group from entry into the program to exit of the program. At least a quarter of the participants had improvement in other food related practices such as resource management, nutrition practices, and food safety practices. In 2002 the Oklahoma youth EFNEP program enrolled 13,821 participants, and evaluated 29% of those children enrolled. Eighteen percent of the participants increased their ability to select low-cost nutritious foods. Twelve percent improved their practices in food preparation and safety.

Arnold and Sobal (2000) conducted a study to look at the benefits gained during EFNEP as well as the maintenance of the benefits. The researchers hypothesized that food and nutrition knowledge and other healthy behaviors would increase from entry into the program through graduation into a year after

the program was completed. Fifty-nine participants from two counties in New York were measured at baseline as they entered the program, when they completed the program, and 1 year after they completed the program. The researchers used self-reported data as well as interview data collected by the same nutrition teaching assistant at each measurement. Quantitative data was compared using Chi-square tests and t-tests. For qualitative data, descriptive summaries of themes and topics were developed. Participants improved between entry and completion of the program for the 12 food practices such as food budgeting and preparation, and there were no significant changes between completion and follow-up showing maintenance of the practices from completion to follow-up. Nutrition knowledge increased between entry and completion, and participants' knowledge either improved or stayed the same between completion and follow-up. Intake increased between entry and completion for vitamin C, folate, and fiber, but calcium and folate decreased between completion and follow-up. Intake of fiber stayed elevated between entry and follow-up. The majority of the participants reported becoming more interested in nutrition and health, especially their children's nutrition after the program. They report healthier habits being used by their families, with their families having improved health. They also report trying to include new foods in their diets, especially fruits and vegetables, but also grains and beans. The participants stated the most important thing they learned from the program was the importance of eating a balanced diet, learning to read labels, and balancing their food budget. The

results of this study support the hypothesis that participants' food practices would improve upon completion of the EFNEP program and be maintained afterwards.

A study was conducted by Brink and Sobal (1994) to examine the long-term effects of the Expanded Food and Nutrition Education Program on food and nutrition behaviors and other benefits of participants who completed the program. The subjects were 50 women with an average age of 35. Food behaviors, nutrient intakes, nutrition knowledge, and other benefits of EFNEP were measured before the program, at graduation of the program, and at follow-up 9 to 16 months after the program. Food behaviors were reported using a 12-item questionnaire. Participants improved significantly between entry and graduation for 10 out of 12 of the behaviors. They had continued improvement at follow-up for 2 of the behaviors. Nutrient intakes were measured using a 24-hour recall. There was a significant decrease in the amount and percentage of calories from fat from entry to graduation. Mean vitamin A, protein, and calcium were significantly lower at follow-up than graduation. Four multiple-choice questions were used to assess nutrition knowledge. There were significant increases in responses to the questions between entry and graduation, with marked improvements between graduation and follow-up. Other improvements mentioned about EFNEP included better employment rate, enrollment in school, more involvement in community activities, and better health for their families. The researchers determined that EFNEP participants in an area of New York City retained positive food-related behaviors and nutrition knowledge.

A study was conducted by Torisky et al. (1989) to determine the long-term impact of the Virginia EFNEP program on graduates of the program. Behavior change towards a healthier diet was the desired goal of EFNEP. A healthy diet was defined as consumption of two servings of milk, two servings of meat, four servings of fruits and vegetables, and four servings of grains (the 2-2-4-4 diet pattern). One hundred eighty homemakers participated in the study. Twenty-four hour food recalls and family record data were collected from each of the participants at the beginning of the EFNEP program, at graduation of the program, and at follow-up 6 to 36 months after graduation from the program. Scores were assigned to the 24-hour recall using the 2-2-4-4 diet pattern. The family record data was used to assess family composition, family support, and homemaker control over family diet. The family data was scored based on intercorrelations between items. Values of highly intercorrelated items were summed to create scores. Paired t-tests were used to test the difference between entry and graduation scores, graduation and follow-up scores, and entry and follow-up scores. Paired t-tests were also used to compare average number of servings consumed from each food group at entry, graduation, and follow-up. ANOVA was used to determine which food group had the most changes occur. Pearson's correlation was used to compare dietary improvement between entry and graduation, and graduation and follow-up. That test was also used to measure relationships between family measure and dietary variables. The number of participants who ate a healthy diet increased from entry to graduation, and those that increased, about 40% of them continued the healthy diet at follow-

up. Meat intake increased significantly from graduation to follow-up. Grain intake increased significantly from entry to graduation. The study's results showed that the Virginia EFNEP seems to be very successful in improving dietary behaviors of participants.

Cox et al. (1995) conducted a study to find out if cancer prevention would be appropriate to include in the EFNEP program to reduce the risk of cancer in low-income women. Three hundred thirty-nine women aged 20-45 years with low-incomes and low education levels from 3 counties and 1 city participated. The participants completed a 3 random-repeat 24-hour recalls before and after the intervention. Chi-square tests and analysis of variance were conducted on the data. The participants were divided into 3 groups. One group received only EFNEP lessons, another group received EFNEP lessons plus cancer-prevention lessons, and a control group received lessons on money-management. Before the intervention, a majority of the participants reported low intakes of energy, fiber, calcium, and vitamin A. The group that received the cancer-prevention lessons had a decrease in fat intake and an increase in fiber and vitamin C. The group that received EFNEP lessons only decreased their fat intake and increased their fiber intake. Both groups experienced an increase in intake, although not significant, in calcium, folate, vitamin A, and vitamin E. The participants in the cancer-prevention group made more changes to their diet than the participants in the EFNEP only group. The researchers concluded that incorporating cancer-prevention into the EFNEP program could be effective in changing food behaviors of low-income women.

Dollahite et al. (1998) conducted a study to see if nutrition education provided to elementary school children had an effect on the children's nutrition knowledge and food choices. The intervention group included 548 elementary school children in a rural school and their parents. The control group included 383 children in a rural school in a neighboring community and their parents. Nutrition education was incorporated into the school's curriculum for one school year. The program was taught one day a week in every classroom. The parents were mailed nutrition messages throughout the intervention. The main outcome measures in the children were change in nutrition knowledge and food choice behaviors when given a questionnaire before and after the intervention. The questionnaire included multiple choice knowledge questions and "pictorial, forced-choice items regarding knowledge, behavior, and food-choice behavior." The study also measured change in parents' nutrition knowledge and food choice behavior before and after the intervention. Paired t-tests and Chi-square tests were used to analyze the data. In the intervention group, with second and third graders there was a significant gain in knowledge, but no significant difference in any of the pictorial, forced-choice items. For fourth and fifth graders in the intervention group there was a significant knowledge gain as well as a significant difference in the pictorial, forced-choice items. There was no significant change in knowledge in the control school. There was a significant improvement in behavior intent and behavior with fourth and fifth graders in the intervention group. Second and third graders in the intervention group showed no change in behavior intent or behavior. There was no significant positive change in the

control school. The parents in the control school showed no significant difference between their pre- and posttest scores. The parents in the intervention school showed a significant difference between pre- and posttest scores for food choices section. For both the intervention and control groups, there was no significant difference between pre- and posttest for parent knowledge and diet-related beliefs. The researchers concluded that the intervention impacted the children in the intervention group the most, which was expected. The nutrition education program was effective for children.

Marcus et al. (1987) conducted a study to determine the effects of the Know Your Body program on knowledge, beliefs, and health behaviors in fourth and fifth grade students, and also to measure the 2 components of the program (curriculum and clinical screening) separately. Eighteen schools from California were selected to participate. Each school was assigned one of four quasi-experimental conditions: KYB curriculum and clinical screening, clinical screening only, KYB curriculum only, or the control group. Three different pretests addressing health knowledge, health beliefs/attitudes, and self-reported health behaviors were given before the intervention and three different posttests on the same topics were given after the intervention. There were significant differences between the control and intervention groups for each of the 6 knowledge tests. There were no differences between the control and intervention groups for self-reported behaviors of consumption of dairy products, high-cholesterol foods, or smoking, but there were modest differences between control and intervention groups for self-reported exercise. The analysis was repeated for children who

presented one or more risk factors at the clinical screening. There were significant differences between the group receiving clinical screening only and the group receiving clinical screening and curriculum. The students in the curriculum intervention had more knowledge of health and more positive self-reported behaviors. The researchers concluded that the KYB program appears to have a positive effect on health knowledge, and somewhat of a positive effect on beliefs and behavior.

In a study conducted by MacPherson et al. (2000), the development and pilot of interactive homework lessons for first to fourth grade students and their parents/guardians was described. Parents/guardians and teachers from predominantly low-income schools were asked about the content and format of the homework lessons. The lessons focused on food groups, planning, selection, and preparation skills. The major outcome measured was behavior change. Extension nutrition staff reviewed the lessons and suggested ways to improve the lessons to better suit low-income audiences. The classes chosen to participate in the pilot testing had the highest percentage of free and reduced price lunches. Weekly pre- and posttests were given to both children and guardians to measure changes in knowledge, behavior, and food intake. T-tests were used to compare pre- and posttest scores. Internal consistency was measure using Cronbach's alpha coefficient. Two-thirds of the lessons were returned the first 2 weeks of the study, but only about half were returned for the last 3 lessons. Results of the pilot study showed significant positive changes for parents/guardians and children in behavior. The other questions showed no

significant differences. The Cronbach's alpha coefficient of internal consistency was fairly low. The content and format of the lessons were improved based on the pilot study. The researchers concluded that the homework lessons were a great way to change behavior because it is so interactive with the family and child in the home.

Validity and Reliability of Other Dietary Assessment Methods

Several studies have tested the validity and/or reliability of measures used to assess children's diets. For example, Domel et al. (1994) tested the validity and reliability of fruit and vegetable food frequency questionnaires in fourth and fifth grade children by comparing the questionnaires to food records already validated by school lunch observations. Ten classes from one elementary school were selected to test the food frequency questionnaires. Seventy-three percent of the 246 students participated. Spearman's correlations and paired t-tests were used to test the validity and reliability. Results showed significant correlations between the number of servings of fruits and vegetables measured by a food frequency questionnaire and food record. Correlations between FFQ and corresponding food records were significant, but low. There were significant differences between FFQ and food records. Therefore, the authors concluded that the food frequency questionnaires were somewhat reliable, but not a valid method of assessing children's fruit and vegetable consumption. They felt that the food record was a more valid way of assessing children's fruit and vegetable consumption.

Kris-Etherton et al. (2001) conducted a study to validate the use of MEDFICTS. MEDFICTS is a dietary assessment tool that shows whether or not a patient is following the low fat and low saturated fat Step 1 or Step 2 diet. In a pilot study, the validity was tested using 16 randomly chosen four-day food records to see if the program could accurately detect which subjects were following each diet. Two other studies were conducted to validate the MEDFICTS questionnaire. In the first study, a registered dietitian administered the MEDFICTS questions to 22 subjects over the phone; these responses were compared to their 3-day food records. The second study compared 26 questionnaires completed by subjects with their 3-day food records. In the pilot study, the MEDFICTS questionnaire accurately detected which subjects were following a Step 1, Step 2, or regular diet. In both of the other two studies there were significant correlations between the questionnaires and the food records. The authors concluded that the MEDFICTS questionnaire was a valid dietary assessment tool.

Another way to assess children's diets is to ask parents for their observations of the child's diet. Treiber et al. (1990) conducted a study to test the reliability of parental responses to a 24-hour recall and a food frequency questionnaire for their pre-school children. Parents of 55 preschoolers completed a food recall and a 3-month food frequency questionnaire concerning their child's diet intake. The authors used the test-retest method, so the parents completed the food recall and the food frequency questionnaire two times, 1 week apart. There was a positive correlation for carbohydrate, cholesterol, and

calcium with time. There was significant correlation for protein, calcium, cholesterol, and potassium. For the 24-hour recall, there was a significant correlation for polyunsaturated fat. The authors concluded that the parental responses to both the 24-hour recall and the food frequency questionnaire were a reliable dietary assessment method for pre-school children.

Golan and Weizman (1998) developed and tested a questionnaire that looked at parents' and child's eating behaviors and the "house rules for eating behaviors." The authors wanted to see what influenced childhood obesity in the home and the child's environment. The questionnaire was tested to determine the reliability and predictive validity. The questionnaire was given to 60 parents of obese children age 6-11 years who were enrolled in a treatment program for obese children. The reliability was tested by comparing a parent's responses to the questionnaire to the spouse's response to the questionnaire. Pearson's correlation showed a significant correlation between the parent and spouse responses to the questionnaires. An "expert panel" tested the validity by comparing the obese children's scores of the questionnaire and the nonobese children's scores to the same questionnaire. Independent t-tests showed the obese children's scores were higher than the nonobese children's scores. The results indicated that the questionnaire was both valid and reliable. The authors concluded the questionnaire was a useful dietary assessment tool.

Simons-Morton et al. (1992) conducted a study to test the reliability of direct observation of bag lunches brought by children in third through fifth grade. Randomly selected children in third through fifth grades from 4 elementary

schools in Texas were observed over 2 months on randomly selected days. The observers were trained before observing the children. They observed two children at a time and recorded the type of food and estimated the amount of food in the lunch bag, as well as any food received or given away. Then, the food that was uneaten was subtracted from the food originally taken to determine food that was eaten. The researchers took 45 pairs of observations from 3 sets of observations, coded the foods, and calculated the nutrients. Each pair was compared for agreement between observers. The results indicated the overall agreement was high. The authors concluded that observation of bag lunches by trained observers was a reliable dietary assessment tool for measuring energy and nutrient intake in children.

Baxter et al. (1997) conducted a study to validate self-reports of dietary behavior by comparing the self-reports to observations made in the lunchroom. Subjects were low-income fourth-grade students from 4 elementary schools. Recalls of the students' lunch were obtained at three different intervals: same day, next day, and Monday. All recalls were for the lunch that was observed by the researchers. Observations and interviews were only done for students who purchased school lunch. The observers grouped the food observed into nine categories by meal component, not food groups. The students were then interviewed at the different time intervals by the researchers asking what they ate for lunch on the observation day. Arithmetic differences measured how agreeable the observed and reported amounts were eaten, but under- and overreporting were factored in and could cancel each other out. Absolute

differences measured how agreeable the observed and reported amounts were eaten despite under- or overreporting. Analysis of variance was used to determine the accuracy of the students' reporting food items. This also analyzed the effect of the time interval between eating and reporting. Students seemed to leave out food or make up food eaten on the Monday recall more often than the other 2 recalls. Eighty-four percent of students' reports of food eaten agreed with observations. There were no significant effects of time intervals on the accuracy of amount reported eaten. The researchers concluded that children might have trouble correctly reporting what they have eaten, even with a small amount of time between eating and being interviewed.

A study was conducted by Gray et al. (2002) to test the validity of using food taken as a proxy measure of food consumed at lunch. Participants were 350 randomly selected fifth graders from 20 low-income schools in Minnesota. Observers recorded the entrée on the tray and the number of fruit and vegetable items taken on the tray. Portion size was not estimated, and fruits and vegetables in mixed dishes were not counted as taken. Another set of observers recorded what the student consumed from his/her tray. Fruits and vegetables in mixed dishes were counted as eaten. Observations of number of servings of fruits and vegetables taken onto the tray were compared with observations of the quantity of fruits and vegetables eaten, and correlations were determined. The predictive validity of "taken for eaten" was analyzed using analysis of covariance. The results showed that students took about 1.5 servings of fruits and vegetables onto their tray and ate about 86% of those servings. When fruits and vegetables

were analyzed separately the ratio of eaten to taken was less than when they were analyzed together, most likely due to the fact that mixed dishes were counted as eaten, but not taken. The proportion of variance in fruits and vegetables eaten ranged from 25% to 37%. The correlations between eaten and taken were 0.51 to 0.59. The researchers determined, based on the data, that food taken as a proxy was a valid method of estimating dietary intake and food choices.

Johnson et al. (2002) developed and tested the reliability and validity of a checklist used to assess healthy eating behavior among adolescents. Subjects for the study included 1822 adolescents age 13 to 16, with 68% being female. A pilot study with 178 adolescent girls was conducted to choose items for the checklist. Participants were asked to respond "true" or "false" or "not applicable to me" to several questions regarding food behaviors and habits. The results of the pilot study showed a weak factor structure, so the items for the checklist were chosen based on content. Questions used pertained to fruit, vegetable, and energy-dense food intake. Using Cronbach's alpha, the internal reliability was shown to be good. The researchers came up with a 23-item checklist with a true/false format to make it easier to complete. Reliability of the 23-item checklist was tested using the test-retest method with 24 adolescents. They were given the checklist twice two weeks apart. The correlation between the two times the checklist was given was high, showing the checklist to be reliable. The validity of the 23-item checklist was tested by comparing the adolescents' responses to various other instruments. Dietary fat and fiber scores on the checklist were

compared to a version of the Dietary Instrument for Nutrition Education (DINE) food frequency questionnaire, which the adolescents completed. Daily intake of fruits and vegetables scores on the checklist were compared to the minimum five portions recommended each day by the WHO. Nutrition knowledge scores on the checklist were compared to a version of the Nutrition Knowledge Questionnaire. Data were analyzed separately for boys and girls. There was a negative correlation between checklist score and dietary fat levels for both boys and girls. There was a significant correlation between dietary fiber and checklist score for both boys and girls. There was a strong association between fruit and vegetable intake and checklist scores for both boys and girls. Dietary restraint and a high level of nutrition knowledge were both positively associated with healthy habits for boys and girls. The checklist was deemed both reliable and valid based on the results.

In another study conducted by Domel et al. (1996), a stages of change questionnaire was developed and tested concerning the fruit and vegetable consumption of 386 fourth and fifth graders. The authors used the test-retest method to evaluate the reliability of the questionnaire. Construct validity was tested by comparing the students' responses to the questionnaire to observed consumption of fruit and vegetables. Students' responses to the questionnaire given on two occasions were similar, therefore the reliability of the questionnaire was judged to be satisfactory. The observed fruit and vegetable consumption did not correlate with the students' responses to the questionnaire, so the authors concluded that the validity was not satisfactory.

Summary

Adult EFNEP programs have been shown to be effective in changing the behaviors of the participants towards a healthier lifestyle even several months after graduation. However, it is not clear if the youth EFNEP program is also effective in changing reported behaviors of children.

The literature tells us that many methods of dietary assessment such as food frequency questionnaires, checklists for health eating behaviors, parental responses about child's food behavior, and direct observations have been shown to be reliable and valid. What we don't know is if the checklist used by the youth EFNEP program in Oklahoma is reliable and valid. The next chapter will describe the methods used in this study to determine if the youth EFNEP checklist is a reliable and valid method of assessing behavior change.

CHAPTER III

METHODS

Validity of an instrument is whether or not the instrument measures what it is supposed to measure (Gersovitz et al. 1978). Dietary assessment tools are usually validated by using a comparison to a quantitative assessment instrument like a 24-hour food recall, or qualitative assessment instruments like a food frequency questionnaire (Kris-Etherton et al. 2001). To test the validity of the youth checklist, the responses of children to the checklist (reported behaviors) were compared to one observation of their food choices in the lunchroom and to the responses of a parent of guardian to a similar checklist about the child's usual food choices.

The Area Coordinators from Oklahoma Cooperative Extension Service that offer the youth EFNEP program in their area were asked to participate in the study (Appendix A). Six areas in the state have the youth program, and all but one area coordinator agreed to participate in the study.

Each area coordinator received pretests, post-tests, child assent forms, and parent consent forms and parent checklists for the parents to complete regarding their child's behavior (Appendices B, C, D, E). The materials also included instructions for the area coordinators on how to distribute the materials

and what the Nutrition Education Assistants (NEAs) were to do with the materials once they received them from the area coordinator. The pretests, posttests, and parent checklists were copied in different colors to easily identify them when they were returned to the researcher. The NEAs distributed the checklists in classes in Oklahoma that received the youth EFNEP nutrition education lessons in the summer or fall of 2001. The children took home the following materials for parents or guardians: a letter explaining the study (Appendix F), a consent form to sign, and a checklist for the parent or guardian to fill out about their child's food choices. The child also signed an assent form agreeing to participate in the study. The children returned their assent form and the parent/guardian assent form to the NEA.

When all the checklists were returned to the researcher, each student's papers were matched by name. Then the names were cut off and each student was assigned an identification number.

Sample

The sample included 297 third and fourth grade students from Oklahoma elementary schools located in counties served by the youth EFNEP program, who completed a pretest, and 288 parents/guardians as surrogate reporters. Two hundred thirty-seven of the subjects completed a posttest. The observed subjects were 18 fourth graders from 2 of the schools receiving the youth EFNEP lessons who were participating in the study. Every child who participated in the nutrition education lessons during the summer or fall of 2001 who had a signed

parental consent form and child assent form was included in the study. Any child who did not have a signed consent form from their parent or guardian or assent form was not able to participate in the study, but was allowed to participate in the nutrition lessons.

Youth checklist

When a class received nutrition education lessons from the NEAs, all children in the classroom completed a checklist as a pretest and a posttest (Appendix B). The pretest assessed current eating behaviors and the posttest assessed any changes that have occurred in eating behaviors as a result of the lessons. The pretest was completed immediately before the educator started the first lesson. The posttest was completed about one week after the lessons were completed.

The checklist listed six food behaviors: "I wash my hands before I eat, I drink water everyday, I eat something before I start class, I drink milk everyday, I eat fruit or drink fruit juice everyday, and I eat green or orange vegetables everyday." The children checked the box next to each behavior indicating how often they perform the behavior: "not very often, sometimes, most of the time." There are also four boxes for them to provide demographic information.

The layout of the checklist was slightly modified for the study. The demographic boxes were rearranged so the name boxes were on the bottom of the form.

Observations

The food consumed by 3 to 5 children per class from 5 classes in Tulsa County was observed in the lunchroom by the researcher and assistants who were graduate students in Nutritional Sciences. The observations (n=18) were completed about two weeks prior to the classes receiving the nutrition lessons. Tulsa County was the only area where observations were completed due to time constraints and availability of the researcher. The researcher distributed parent consent forms to classes where nutrition lessons were to be given later that semester, and then returned to that classroom a few days later to collect them. The students who were observed were chosen from the students who had signed consent and assent forms.

Each observer observed 2 to 3 randomly chosen children from a class. Three behaviors were chosen from the checklist that could be easily observed in the lunchroom. The researcher observed children's consumption of milk, fruit or fruit juice, and a green or orange vegetable. The observers recorded whether or not the child drank milk, ate fruit or drank fruit juice, or ate a green or orange vegetable (Appendix G). The observer did not estimate how much was eaten. If children who were being observed brought sack lunches, the observer noted if milk, fruit or fruit juice, or a green or orange vegetable was in the lunches, if the students added anything in the lunch line, and what the students ate from the lunch. Knowledge of the content of the sack lunch was never known ahead of time. The observer was inconspicuous and did not converse with the students when possible. The children were only observed once at lunchtime.

In order for the lunch to be reimbursable by USDA, a student must take a vegetable or fruit. Each student is required to take an entrée and 2 other items onto their plate. The other items they can choose from include milk, fruit, vegetable, and sometimes bread. There were only 10% of the days in Tulsa County where a green or orange vegetable was not served, but on those days other fruits such as apricots or peaches are available, along with juice (Griffin personal communication Oct. 2002).

Surrogate Reporters

A checklist was sent home with the children with an explanation of the study and a consent form. The checklist provided to parents/guardians was almost identical to the youth checklist in format. It contained the same behaviors, with slightly modified wording and different instructions on completing the form. The surrogate reporters completed the checklist and sent it back to school with the child. The adult checklist was only given once, before the child participated in the EFNEP lessons.

Each child's responses to the checklist were compared to their parent/guardian's responses to the same checklist and to the researcher's observation of the child's food choices at one lunch using assigned code numbers.

Test-retest reliability

"Reliability is consistency of measurement" (Lemke and Wiersma 1976). When testing the reliability of an instrument, the researcher must decide what results are expected. Test-retest method is used when the researcher does not expect/want a change in answers between the two times the measurement is given. The measurement instrument would be unreliable if the answers vary between the times the measurement is given (Babbie 1998).

To test the reliability of the youth checklist, the test-retest procedure was used. This was conducted in one of the areas that has a summer youth EFNEP program (n=62). The reliability of the checklist was tested by distributing the checklist to the children about a week before the nutrition education lessons started and again just before the first lesson. Some students actually received four tests: a test, retest about 1 to 2 weeks before the lessons, a pretest before the first lessons, and a posttest after the lessons. When analyzing the data, it was decided that the retest and pretest provided the same type of data, so the retest was not used in the data, only the pretest.

Data Analyses

All statistical analyses were done on SPSS program version 11. Each response to the checklist was assigned a score. "Most of the time" had a score of 3, "sometimes" had a score of 2, and "not very often" had a score of 1. Summed scores were computed for each checklist: child pretest, child posttest,

child test, and parent checklist. The maximum score was 18 for the child pretest, posttest, and parent checklist.

In order to compare the child's responses to observed behaviors, the data had to be recoded. The child had 3 options to check off on the checklist, "most of the time," "sometimes," "not very often." The observer only had 2 options to check off, "yes" or "no." Therefore, the child's responses "most of the time" and "sometimes" were recoded to match the "yes" response of the observer. The response "not very often" was recoded to match the "no" response of the observer.

Paired t-tests were done to compare scores of checklists between child pretest and parent checklist responses, child pretest responses and observed behavior, child test and retest responses, and child pretest and child posttest responses. Chi-square analyses were done to compare the responses to individual questions between child pretest and parent checklist responses, child pretest responses and observed behavior, test and retest responses, and child pretest and child posttest responses.

Hypotheses

There will be a positive correlation and no significant differences in scores between the parent responses and the child responses to the checklist. There will be no differences in scores for each individual question on the checklist between the child and parent responses. These findings will show that the

parent and child report similar food choices by the child, which helps demonstrate validity of the checklist.

There will be a positive correlation and no significant differences in scores between the child's responses to the 3 items on the checklist and observed choice of foods by the child at one lunch. There will be no differences in scores for each individual question on the checklist between the child responses and observations. This will help determine if child performs the behaviors they say they are doing on the checklist. This will again show validity of the checklist.

There will be a positive correlation and no significant differences in scores between the test and the retest responses, to determine if the child answers similarly on the checklist when given twice. This will show reliability of the checklist.

There will be a significant difference in scores between the pretest and posttest responses. There will also be a significant difference in scores for each individual question between the pretest and posttest responses. This will determine if the children reported a behavior change after receiving the EFNEP lessons.

CHAPTER IV

RESULTS

Background information

A total of 297 students participated in this study. Six percent of them were in third grade and 94% of them were in the fourth grade. One percent of the children were 7 years old, 19% were 8 years old, 56% were 9 years old, 24% were 10 years old, and 1% were 11 years old. Only four of 6 areas in Oklahoma provided data for the study. One area could not get any schools to participate. Thirteen percent of the participants were from the Pontotoc area, 23% were from the Tulsa area, 23% were from the Okmulgee area, and 41% were from the Comanche area.

Child vs. Parent

There was a significant positive correlation ($r = .390$, $p < .001$) between the child's responses to the checklist and the parent's responses to a similar checklist about their child's food behavior. There was also a significant difference between the average scores with $p < .001$. The maximum score was 18. The average score for the child's responses was higher (9.3 ± 2.4) than the average score for the parent's responses (8.7 ± 2.1). The children reported

performing the behaviors more often than the parents reported the child performed the behaviors.

There was a significant difference between child and parent responses for reported frequency of washing hands, eating before class, drinking milk, eating fruit or fruit juice, and eating green or orange vegetables (Table I). The majority of children and parents (≥50%) agreed on their responses on all the questions except eating green or orange vegetables. Sixty-nine percent of parents and children agreed about washing hands. That is, 138 parent and child pairs agreed that the child washes their hands "most of the time," 38 pairs agreed the child washes their hands "sometimes," and 8 pairs agreed that the child washes their hands "not very often." Sixty-six percent of parents and children agreed on their answers about drinking water, 65% agreed about eating something before class, 59% agreed about drinking milk, 50% agreed about eating fruit or drinking fruit juice, and 48% agreed on eating green or orange vegetables.

The parents had a better response than the children (for example, the parents said "most of the time" or "sometimes" when their child said "not very often") to the questions about eating something before class, drinking milk everyday, eating fruit or fruit juice, and eating green or orange vegetables. Seventy-eight parents had a better response to the question regarding eating something before class compared to 15 children who had a better response than the parents. Sixty-seven parents had a better response to the question regarding drinking milk compared to 41 children who had a better response than the parents. Seventy-four parents had a better response to the question regarding

eating fruit or drinking fruit juice compared to 59 children who had a better response than the parents. Eighty-nine parents had a better response to the question regarding eating green or orange vegetables compared to 48 children who had a better response than the parents did.

The children had a better response than the parents to the questions regarding hand washing and drinking water. Forty-five children had better responses to the question regarding washing hands compared to 39 parents who had a better response than the children. Fifty-five children had a better response to the question regarding drinking water compared to 37 parents who had a better response than the children.

Child vs. Observation

There was no significant correlation ($r = -.126$, $p = .618$) between the child's responses to the checklist and observations made of the child once in the lunchroom. There was no significant difference between the average number of behaviors observed (1.28 ± 0.6) and reported (1.28 ± 1.1) by children. The maximum score was 3.

There was no significant difference between child's responses and observed behavior in regards to drinking milk, eating fruit or fruit juice, or eating green or orange vegetables (Table II). However, all analyses had 50% of cells with expected frequencies of less than 5. Of the 13 children who reported drinking milk "most of the time" or "sometimes," only 5 were observed drinking milk. Ten children reported eating fruit or drinking fruit juice "most of the time"

and "sometimes," but only 5 of the children were observed eating fruit or drinking fruit juice. The children were observed eating green or orange vegetables more often than they reported eating green or orange vegetables. Eight students reported eating green or orange vegetables, while 15 were observed actually eating them.

Test vs. Retest

There was a significant positive correlation ($r = .790$, $p < .001$) between the child's responses to the checklist and their responses to the same checklist given a week later. There was no significant difference between the average responses to the checklist ($p = .518$). The maximum score was 18. The average score for the test was 9.7 ± 2.5, and the average score for the retest was 9.6 ± 2.4.

There was a significant difference between reported frequencies of all the behaviors on the checklist when the checklist was given twice, one week apart (Table III). However, all the questions had greater than 50% of cells with an expected frequency of less than 5. The majority of the children had the same answers to all the questions on both the checklists. The responses of 64% of the children agreed on the question regarding washing hands, 82% agreed about drinking water, 68% agreed about eating something before class, 77% agreed about drinking milk, 68% agreed about eating fruit or drinking fruit juice, and 71% agreed about eating green or orange vegetables.

Pretest vs. Posttest

There was a significant positive correlation ($r = .593$, $p < .001$) between the child's responses to the pretest and their responses to the posttest. There was also a significant difference in the average scores on the checklist ($p < .001$). The average score for the pretest (9.3 ± 2.4) was higher than the average score for the posttest (8.6 ± 2.2).

There was a significant difference between the pretest and the posttest responses in regards to all the questions on the checklist. The majority of the children (>50%) were in agreement on all the questions between the pretest and the posttest. Seventy-three percent of children's responses were the same regarding washing hands, 76% of children's responses were the same regarding drinking water, 71% of children's responses were the same regarding eating something before class, 70% of children's responses were the same regarding drinking milk, 58% of children's responses were the same regarding eating fruit or drinking fruit juice, and 61% of children's responses were the same regarding eating green or orange vegetables. The majority of the children also either kept their response at "most of the time" or improved their response between pretest and posttest (See Table IV). Seventy-five percent of children's responses either stayed "most of the time" or improved regarding washing hands, 81% regarding drinking water, 80% regarding eating something before class, 72% regarding drinking milk, 61% regarding eating fruit or drinking fruit juice, and 57% regarding eating green or orange vegetables.

CHAPTER V

DISCUSSION

This study was conducted to test the reliability and validity of a checklist used as an evaluation method for the youth EFNEP program in Oklahoma. The checklist measures behavior change after a series of nutrition lessons are given to the students. The checklist measures behavior change, so we compared the students' pretest responses to the students' posttest responses to see if there was a reported behavior change. Data collected in this study compared students' responses to the checklist to actual behaviors observed in the lunchroom. The study also compared students' responses to parents'/guardians' responses to a similar checklist about their child's behaviors. Data tested the reliability of the checklist by comparing the responses of the checklist when given to the students twice, at least a week apart.

A significant positive correlation was found between children's responses and the responses of the surrogate reporters (parents/guardians). Most of the children and surrogate reporters agreed on the same answers for most of the questions on the checklist. However, there was a significant difference in average scores on the checklist between parents and children, with children reporting more frequent behaviors than parents. Cullen et al. (2000) found that

many social and environmental factors affect a child's diet, especially parents. In separate focus group interviews, parents stated they thought of themselves as important influences on children's diets, but children reported only seeing parents eat fruits and vegetables occasionally. Parents stated they worried about advertised foods and sweets, but children stated they ate out at least 2 times per week and were allowed to order whatever they wanted. Fisher et al. (2001) found mothers' food frequency questionnaires and daughters' 24-hour food recalls were similar, showing that mothers who drank more soft drinks had daughters who drank more soft drinks as well as mothers who drank more milk had daughters who drank more milk. However, Frank et al. (1991) found that parents were not a reliable method of recall for their children's food intake. These studies showed some significant results when using parents and children to determine children's food intakes. There is not a lot of research comparing children's reported behaviors to parents reported behaviors of their children.

Overall, no significant correlation was found between children's responses to 3 behaviors on the checklist and direct observations of these behaviors made one time in the lunchroom. However, there was also no significant difference between the average number of behaviors observed and reported by children. The sample size was not large enough to find significant results. The majority of the following studies showed significant results when dietary methods were compared with observations. Domel et al. (1994) found the food record method of assessment to be valid when compared to observations of food choices made in the lunchroom, but the food frequency questionnaire was not found to be valid.

Baxter et al. (1997) compared self-reports of intake to observations made of children in the lunchroom to validate self-reports. A high number (84%) of students' self-reports agreed with the observations made. Simons-Morton et al. (1992) found observations to be a reliable method of assessing energy and nutrient intake in children. However, another study by Domel et al. (1996) found no correlation between observations and the children's responses to the stages of change questionnaire regarding fruit and vegetable intake they developed.

A significant positive correlation was found between responses to the checklist given twice, at least a week apart. There was no significant difference between the average responses to the checklist. Domel et al. (1996) used the test-retest method to measure the reliability of their assessment method. They gave their questionnaire on two different occasions, and the students' responses were similar, which they concluded demonstrated the reliability of the questionnaire. Trieber et al. (1990) also used the test-retest method on a questionnaire that was given to parents. They found similar responses to a 24-hour recall and food frequency questionnaire when each was given twice to parents, a week apart. They found a significant correlation between responses, so they deemed the method to be reliable. Johnson et al. (2002) tested the reliability of a checklist used to assess healthy eating behaviors among adolescents using the test-retest method. The correlation between the 2 tests was high, showing the checklist was reliable.

There was a significant correlation between the child' responses to the pretest and their responses to the posttest. This indicates that children

performed well on the pretest and also performed well on the posttest. However, there was a significant difference in the average scores on the checklist. This could be due to the testing threat to validity. The children were given a test before and after the intervention. The intervention might have caused them to think more about the questions on the checklist and seriously consider how often they did the behaviors. Even though the average score for the pretest was higher than the posttest, when the individual questions were analyzed, most of the children either continued to report behaviors "most of the time" or improved their response. Arnold and Sobal (2000) found that nutrition knowledge increased after the adult EFNEP program, as well as intakes of vitamin C, folate, and fiber. The study also indicated the participants reported becoming more interested in health and nutrition and seeing healthier habits being performed by their families. Brink and Sobal (1994) and Torisky et al. (1989) found similar results when studying the long-term effects of the adult EFNEP program. Cox et al. (1995) found that cancer prevention lessons, when incorporated into the adult EFNEP program increased fiber and vitamin C intake, and decreased fat intake. Dollahite et al. (1998) found that nutrition education incorporated into a school's curriculum for one year significantly improved students' nutrition knowledge and food choice behaviors.

In conclusion, the statistical analyses show concurrent validity of the youth EFNEP checklist based on the correlation between child and parent responses. No conclusions about the validity of the questionnaire compared to one

observation of a lunch because few students were observed. The reliability of the checklist based on test-retest is strong.

Limitations

There were several limitations to this study. First, the observers were not adequately trained. Many articles using direct observations of children discuss their observers receiving training (Simons-Morton et al. 1992; Domel et al. 1994). The observers could have tested their consistency in observing by watching videotapes of children during lunch and recording the food eaten, then comparing their results to each other. Individually they should have compared their own results when watching the tape several different times to make sure they were consistent over time.

Also, it may have been more effective to observe the children on more than one occasion. The food intake observed at one meal on one day may not have been representative of their usual intake.

The letters sent to each area coordinator with instructions on how to distribute the checklists and send them back may not have been very clear. Many areas did not return data correctly.

Also, the parent letters needed to be customized to each area. Only one letter was constructed for the whole state. In the letter it mentioned that observations would be done in Tulsa County only, but there were still several inquiries about observations being conducted in other areas of the state.

Implications

This study was conducted to provide information to the youth EFNEP program in Oklahoma about their checklist used as an evaluation method. The NEAs were concerned that they were not getting the results that the evaluation method was supposed to be getting. This study was done, in part, to show the NEAs they need to keep giving the students the checklist as a pretest and posttest because it is correctly measuring their change in behavior. There may be some children who are not checking the boxes based on their own behavior, but it seems the majority of them are not providing random answers. The Oklahoma youth EFNEP program can take this data and report it nationally to other youth EFNEP programs in the country. They can also use the results of this study to improve their own program in Oklahoma. The behaviors on the checklist can be used to develop a core curriculum so that every NEA is teaching the same lessons throughout the state. This will also assure that the nutrition lessons in the classroom address the behaviors on the checklist. This may also improve the responses to the checklist because all the children in the program will be receiving the same information in the lessons.

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TABLE I Comparison of Child Pretest Checklist Responses to Parent Checklist Responses

Parent	Pretest						p	% agreement
	Most of the time		Sometimes		Not very often			
	n	%	n	%	n	%		
I wash my hands before I eat							.001	69
Most of the time	138	77.1	30	41.7	5	29.4		
Sometimes	36	20.1	38	52.8	4	23.5		
Not very often	5	2.8	4	5.6	8	47.1		
I drink water everyday							.006	66
Most of the time	154	75.5	24	51.1	9	56.3		
Sometimes	39	19.1	18	38.3	4	25.0		
Not very often	11	5.4	5	10.6	3	18.8		
I eat something before I start class							.001	65
Most of the time	157	92.9	46	73.0	25	71.4		
Sometimes	8	4.7	14	22.2	7	20.0		
Not very often	4	2.4	3	4.8	3	8.6		
I drink milk everyday							.001	59
Most of the time	120	76.4	36	53.7	16	41.0		
Sometimes	30	19.1	27	40.3	15	38.5		
Not very often	7	4.5	4	6.0	8	20.5		
I eat fruit or drink fruit juice everyday							.001	50
Most of the time	71	57.3	44	41.1	10	27.0		
Sometimes	49	39.5	57	53.3	20	54.1		
Not very often	4	3.2	6	5.6	7	18.9		
I eat green or orange vegetables everyday							.001	48
Most of the time	54	60.0	38	39.2	23	29.1		
Sometimes	32	35.6	47	48.5	28	35.4		
Not very often	4	4.4	12	12.4	28	35.4		

TABLE II Comparison Between the Child's Pretest Checklist Responses & Observed Behavior in the Lunchroom

Observations	Pretest				p	% agreement
	Yes		No			
	n	%	n	%		
Drank milk*					.410	39
Yes	5	38.5	3	60.0		
No	8	61.5	2	40.0		
Ate fruit or drank fruit juice					.596	56
Yes	5	50.0	3	37.5		
No	5	50.0	5	62.5		
Ate green or orange vegetable*					.396	39
Yes	6	75.0	9	90.0		
No	2	25.0	1	10.0		

*50% of cells with expected frequencies of less than 5

TABLE III Comparison Between Child's Checklist Given as a Test & Retest

Retest	Test						p	% agreement
	Most of the time		Sometimes		Not very often			
	n	%	n	%	n	%		
I wash my hands before I eat							.001	64
Most of the time	33	67.3	3	37.5	1	20.0		
Sometimes	15	30.6	5	62.5	2	40.0		
Not very often	1	2.0			2	40.0		
I drink water everyday							.001	82
Most of the time	46	90.2	2	28.6	2	50.0		
Sometimes	5	9.8	4	57.1	1	25.0		
Not very often	0	0	1	14.3	1	25.0		
I eat something before I start class*							.001	68
Most of the time	27	84.4	3	18.8	1	7.1		
Sometimes	3	9.4	9	56.3	7	50.0		
Not very often	2	6.3	4	25.0	6	42.9		
I drink milk everyday*							.001	77
Most of the time	27	93.1	7	35.0	1	8.3		
Sometimes	2	6.9	11	55.0	2	16.7		
Not very often	0	0	2	10.0	9	75.0		
I eat fruit or drink fruit juice everyday							.001	68
Most of the time	17	65.4	4	16.7	3	25.0		
Sometimes	8	30.8	17	70.8	1	8.3		
Not very often	1	3.8	3	12.5	8	66.7		
I eat green or orange vegetables everyday							.001	71
Most of the time	16	66.7	4	16.0	0	0		
Sometimes	4	16.7	17	68.0	2	15.4		
Not very often	4	16.7	4	16.0	11	84.6		

*50% of cells with expected frequency of less than 5

TABLE IV Comparison Between Child's Responses to Checklist Given Before and After Nutrition Education

Posttest	Pretest						p	% agreement
	Most of the time		Sometimes		Not very often			
	n	%	n	%	n	%		
I wash my hands before I eat							.001	73
Most of the time	142	85.0	26	44.8	5	31.3		
Sometimes	23	13.8	30	51.7	7	43.8		
Not very often	2	1.2	2	3.4	4	25.0		
I drink water everyday							.001	76
Most of the time	165	89.2	20	50.0	6	37.5		
Sometimes	16	8.6	15	37.5	6	37.5		
Not very often	4	2.2	5	12.5	4	25.0		
I eat something before I start class							.001	71
Most of the time	140	92.1	32	56.1	13	41.9		
Sometimes	9	5.9	21	36.8	8	25.8		
Not very often	3	2.0	4	7.0	10	32.3		
I drink milk everyday							.001	70
Most of the time	126	86.3	18	31.0	12	34.3		
Sometimes	16	11.0	33	56.9	15	42.9		
Not very often	4	2.7	7	12.1	8	22.9		
I eat fruit or drink fruit juice everyday							.001	58
Most of the time	85	75.2	39	41.1	5	15.2		
Sometimes	25	22.1	45	47.4	18	54.5		
Not very often	3	2.7	11	11.6	10	30.3		
I eat green or orange vegetables everyday							.001	61
Most of the time	68	80.0	26	31.0	9	12.7		
Sometimes	14	16.5	49	58.3	33	46.5		
Not very often	3	3.5	9	10.7	29	40.8		

APPENDIX A

March 5, 2001

Dear Area Coordinator,

My name is Jessica Hoff and I am a nutrition graduate student at Oklahoma State University. For my thesis I am testing the validity and reliability of the checklist used in the youth nutrition education program. I am comparing the students' actual responses to observations in the lunchroom and to parents' responses to a similar checklist. I was wondering if you could answer a few questions and e-mail them back to me by Monday March 19, 2001. If this is not enough time to answer, please e-mail me and let me know when to expect your response.

Would it be possible for you to distribute the parent checklist, along with a consent form, to the classes receiving the lessons?

Do you think there would be any response to the parent checklist?

Would it be possible for you to send me a copy of the students' checklists with the returned parent checklists?

To test the reliability, I am using the test-retest method. This requires the checklist to be given at another time before the lessons in addition to giving it as a pretest and a posttest. Do you think it would be possible to give the checklist to ONE class a week before the lessons start to test the reliability?

I plan to start collecting my data next fall when a new school year begins. I appreciate you taking the time to help.

Thank you-
Jessica Hoff
jhoff11@hotmail.com

APPENDIX B

What do you do?

1. Read each sentence.
2. Decide how often you do each activity and put an X in the box (☒).

Sentence	Most of the time	Sometimes	Not Very Often
I wash my hands before I eat.	☐	☐	☐
I drink water every day.	☐	☐	☐
I eat something before I start class.	☐	☐	☐
I drink milk every day.	☐	☐	☐
I eat fruit or drink fruit juice every day.	☐	☐	☐
I eat green or orange vegetables every day.	☐	☐	☐

Write your answer to these questions in the box.

Today's date is: ☐

My grade next year will be: ☐

My age is: ☐

First name: ☐ Last name: ☐

APPENDIX C

Assent Form

I agree to help in a project about my food choices.

The student and her helpers can watch me eat.

I can tell my teacher if I do not want to do this anymore.

☐ **YES, I want to help**

☐ **NO, I do not want to help**

Date: _____ Name: _____

APPENDIX D

Consent Form

I, _____ hereby agree to let my child participate in a study regarding eating behaviors.

I understand that my child's eating behaviors might be observed in the lunchroom. I understand the researchers will only be observing certain foods my child eats, and not how much food my child eats. I understand the observations will be done at random, so not everyone will be observed. The children will have little or no contact with the observers. There is no risk in participating in this study and these observations. My child will only be identified by an assigned code number. The information collected will be kept confidential.

I understand the checklist my child fills out in class will also be a part of the study. My child's name will never be associated with their answers.

The purpose of the study is to test the validity and reliability of a checklist used in nutrition lessons that assesses eating behaviors for 3rd and 4th grade students. This information will help in future nutrition education lessons, for children of this age group, done by Oklahoma Cooperative Extension Service.

I understand that participation in this study is voluntary and there is no penalty for my or my child's refusal to participate. I am free to withdraw my consent and either my or my child's participation in this study at any time by notifying my child's teacher.

I have read and fully understand the consent form. I sign it freely and voluntarily allow my child and myself to participate in this study. If I have any questions I may contact Jessica Hoff, primary researcher, at (405) 372-7509, Dr. Gail Gates at (405) 744-5032, or my local area EFNEP coordinator. Also, Sharon Bacher from the Institution Review Board at Oklahoma State University, (405) 744-5700, would be happy to answer any questions or concerns I might have.

Date: _____ Child's Name: _____

Signature: _____

APPENDIX E

What does my child do?

1. Read each sentence.
2. Please observe your child and decide how often your child does each activity and put an X in the box (☒).

Sentence	Most of the time	Sometimes	Not Very Often
My child washes his/her hands before they eat.	☐	☐	☐
My child drinks water every day.	☐	☐	☐
My child eats something before he/she starts class.	☐	☐	☐
My child drinks milk every day.	☐	☐	☐
My child eats fruit or drinks fruit juice every day.	☐	☐	☐
My child eats green or orange vegetables every day.	☐	☐	☐

Write your answer to these questions below.

My child's name is: _____

Today's date is: _____

My child's age is: _____ My child's grade is: _____

My child's teacher is:

_____

APPENDIX F

August 2001

Dear Parent/Guardian:

In the next few weeks your child will be learning about nutrition. Your child's teacher has asked Oklahoma Cooperative Extension Service to come to class and teach several nutrition lessons. They will be given a pretest and a posttest checklist that will assess their eating behaviors and see whether or not they have changed any behaviors due to the lessons. I am conducting a research study through Oklahoma State University to test how reliable and valid the checklist is in assessing these eating behaviors. The study will be conducted in elementary schools all over Oklahoma with the help of Oklahoma Cooperative Extension Service.

The study will consist of your child's checklists, observations made in the lunchroom, and observations made at home. Attached to this letter is a copy of a consent form that needs to be filled out in order for your child to be observed in the lunchroom. We will be observing whether or not your child eats certain foods like milk, fruit, or vegetables. We are not looking at how much your child eats, just if they eat any of those foods at all. We will choose the children at random to be observed. There will be little or no contact between the children and the observer. We would also like permission to use the information in the checklist your child fills out in class. Each child will only be identified by an assigned code number.

By returning the checklist you have given consent for the information to be included in the study. The checklist is very simple and very easy to fill out. It only takes a few minutes. The checklist you fill out is very similar to the one your child fills out at school. Attached is the checklist you will use to observe your child's eating behaviors. All you have to do is check the appropriate boxes and send the checklist back with your child to school by tomorrow. You fill out your child's name, but it will be cut off the bottom when it is returned to protect confidentiality.

Thank you for your time in reading this letter. Your and your child's participation is very important to this study. Please sign and return the consent form to your child's teacher no later than tomorrow. If you have any questions please feel free to contact myself, Jessica, at (405) 372-7509, Dr. Gail Gates at (405) 744-5032 or your local area EFNEP coordinator. You may also contact Sharon Bacher at the institutional Review Board at Oklahoma State University (405) 744-5700.

Sincerely,

Jessica Hoff
Graduate Student
Oklahoma State University

Gail Gates, PhD, RD/LD
Interim Associate Dean
Oklahoma State University

APPENDIX G

Name:
Code Number:

Observation Date: _____	YES	**NO**
Drinks milk		
Eats fruit or drinks fruit juice		
Eats green or orange vegetable		

Oklahoma State University
Institutional Review Board

Protocol Expires: 4/22/02

Date : Monday, April 23, 2001 IRB Application No HE0156

Proposal Title: VALIDITY AND RELIABILITY OF YOUTH EFNEP CHECKLIST

Principal
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425 HES
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Reviewed and
Processed as: Expedited (Spec Pop)

Approval Status Recommended by Reviewer(s) : Approved

Signature: Carol Olson

Carol Olson, Director of University Research Compliance

Monday, April 23, 2001
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modifications to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.