

**AN ASSESSMENT INSTRUMENT FOR MEASURING BEHAVIOR CHANGE AMONG
LOW-INCOME YOUTH**

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(Abstract)

The Expanded Food and Nutrition Education Program (EFNEP) and its youth component, 4-H EFNEP, were established nationwide by the Cooperative Extension Service in 1969. 4-H EFNEP provides nutrition education to low-income youth, aged 5 to 19 years; however, there has been no standard instrument to evaluate behavior change among participants in Virginia or nationwide.

A 24-item Youth Food Behavior Checklist (YFBC) was developed based on 13 topics and food-related behaviors taught in 4-H EFNEP. Data were collected on 47 youth enrolled in 4-H EFNEP in the summer of 1998. The YFBC was tested for test-retest reliability and ability of each item and the total instrument to detect change from pre- to post-intervention.

The YFBC demonstrated good test-retest reliability with a Pearson Correlation of 0.81. Overall, the YFBC demonstrated sensitivity to detect change in nutrition behaviors, by showing positive change for some items and negative change for other items in all but nine of the participants. The YFBC also appeared to successfully measure behaviors taught in 4-H EFNEP lessons, as questions regarding only two topics did not demonstrate change from pre- to post-intervention. Since not all checklist items showed significant positive change from pre- to post-intervention, the YFBC should be tested again with a larger sample and in situations where the intervention and the administration of the instrument are better controlled. This would increase the power of the study and the credibility of the YFBC as an assessment instrument for wider use in 4-H EFNEP.

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CHAPTER 1

INTRODUCTION

The Expanded Food and Nutrition Education Program (EFNEP) was established nationwide in 1969 by the Cooperative Extension Service, as a result of the Federal Extension Service's effort to find more effective ways to reach low-income families. EFNEP's objective is to provide nutrition education to limited resource families.¹ The primary targets of EFNEP programs are families with young children, pregnant women, and youth 5-19 years, with the majority of children participating being between 8 and 12 years of age. The youth component of EFNEP is closely tied to the 4-H Program provided by the Cooperative Extension Services and is referred to as 4-H EFNEP. 4-H EFNEP is implemented at the local county level by paraprofessionals called 4-H EFNEP Program Assistants (PAs). The PAs are trained and supervised by Extension Family and Consumer Science agents and 4-H agents. The PAs may recruit and train volunteers to lead and teach the youth groups.² To be enrolled in 4-H EFNEP, a group must participate in a series of six or more lessons derived from a core curricula established by the state program coordinator of 4-H EFNEP. A minimum of six contact hours is required to complete the program. The setting for the lessons includes school classrooms, after-school programs, neighborhood groups, community recreation programs, day camps, and summer child feeding programs sponsored by USDA. Youth from preschool age to 19 years are recruited to participate in 4-H EFNEP by PAs and/or volunteer leaders.

Participants are recruited from the following sources:

- Children from Adult EFNEP families
- Youth from non-program families in predominantly limited resource communities
- Referrals of limited resource youth from school personnel, Head Start workers, and other agencies
- Youth participating in Summer Food Service Programs
- Summer recreation programs in which participants are predominantly limited resource³

Low-income families and those with less formal education are less likely to consume the suggested serving sizes in the USDA Food Guide Pyramid.⁴ Failure to conform to healthy nutrition practices increases this group's risk of more frequent illnesses in childhood. It also increases the chance of cardiovascular disease, certain forms of cancer, high blood pressure, and other chronic diseases in later life.⁴ Risk for infection and disease can be reduced by nutrition education which effectively brings about change in nutrition behaviors, especially if begun in childhood.² Thus, the objectives of 4-H EFNEP are to teach and encourage youth to increase the variety of food they eat; increase their intake of fruits, vegetables, and grains; reduce their intake of high fat, sugar, and salty foods; become familiar with safe food handling, storing practices, and economical purchasing skills.⁵

In Virginia, there are currently 17 geographic areas with 4-H EFNEP programs, including 15 counties and 2 cities where Extension is funded. In the 1997 reporting period, over 14,000 youth in Virginia participated in 4-H EFNEP. Of the 1997 participants, 51% were between the ages of 8 and 12 years.⁶

STATEMENT OF PROBLEM

Currently, there is no standard assessment instrument to evaluate behavior changes among 4-H EFNEP participants in Virginia or nationwide. The role of reducing health risks among limited resource children and teens is an important one. In 1998, Virginia 4-H EFNEP received over \$400,000 to fund its nutrition education program. This amount is 24% of the funds appropriated for both adult and youth EFNEP.⁶ As competition for federal funds increases, it becomes increasingly important to document the benefit of 4-H EFNEP to its participants.

In order to document behavior changes and benefits among program participants, it is necessary to conduct a pre- and post-lesson series assessment. The assessment should address topics that will be or have been covered in the lessons. Once both assessments have been completed, results can be compared to assess behavior and

knowledge change. This needs to be done in order to evaluate the impact and effectiveness of the program.

PURPOSE

The purposes of this study were to develop an instrument based on the primary principles taught in 4-H EFNEP, pilot test the instrument, and validate the instrument. The instrument was designed to measure behavior changes among 4-H EFNEP participants. The instrument was expected to be used in the future to document behavior changes among participants and, therefore, document the benefit of the program.

OBJECTIVES

1. To identify primary food and nutrition concepts and behaviors taught in the Virginia 4-H EFNEP.
2. To select for the assessment instrument, behaviors that are deemed most critical or representative of the program's impact.
3. To develop an assessment instrument in the form of a questionnaire that incorporates the critical behaviors, which is specifically designed for participants in the third, fourth, fifth, or sixth grade.
4. To pilot test the assessment instrument for validity and reliability.

DEFINITION OF TERMS

Expanded Food and Nutrition Education Program (EFNEP)- *EFNEP is a nutrition education program for persons with limited resources and is funded by the United States Department of Agriculture. The component directly involved with limited resource youth education is referred to as 4-H EFNEP.*

Program Assistant (PA)- *Program assistants are paraprofessionals trained and supervised by Extension agents to implement the 4-H EFNEP program. The PAs are indigenous to the population they serve. In this study, the PAs in each area recruited youth groups and administered the instrument in a pilot test.*

Limited Resource- *In the Virginia EFNEP, limited resource is defined as 150% of the Federal Poverty Income Guidelines or below. For a family of four, an annual gross income of \$16,050 is at the poverty line. This same family, at 150% poverty, would have an annual gross income of \$24, 075.*⁶

Validity (Internal Validity)- *Validity is a term that refers to the integrity of an experiment. The presence of validity ensures that the results mean what we think they mean. In this project, the instrument was developed in a manner to insure internal validity. External validity means that the results can be generalized to a larger population due to the random selection of subjects. Since this study is based only on results in Virginia, we will strive for internal validity.*⁷

Reliability- *Reliability is a term that refers to the degree of consistency with which a measuring instrument measures what it is supposed to measure. It can also be said that reliability is the extent to which a test yields the same results with repeated trials.*⁸ *In this project, we tested reliability by administering the instrument to participants twice, with no intervention, or lesson, being given between administrations.*

LIMITATIONS

1. It was assumed that all PAs followed the instructions for the administration of the assessment instrument. The principle investigator personally observed the administration of the instrument in one situation only. It was assumed that the procedures followed at that site were followed at all sites, based on the instructions and training provided to the PAs. However, there was some evidence that the involvement of large unorganized summer groups led to difficulties in use of the instrument.

2. It was hoped that the instrument developed for Virginia 4-H EFNEP would also be applicable to 4-H EFNEP youth in other states, but it was only tested with Virginia youth participants.

3. PAs were instructed to encourage youth to ask questions if they did not understand an item on the instrument. If youth did not ask questions when they did not understand, it may have affected the responses given on the instrument. However, it was not known whether the youth did comprehend the meaning of all questions.

4. The number of youth that actually completed the youth pilot instrument at pre- and post-intervention was lower than desirable. Originally, it was planned that the pilot-test of the instrument would be done with school groups of 4-H EFNEP participants. Due to insurmountable barriers, the pilot-test was delayed until the summer of 1998. Thus, there were fewer youth groups available who met the criteria and with whom the instrument could be administered. Also, two PAs resigned and left the program without turning in completed instruments.

Chapter 2

Review of Literature

History and purpose of EFNEP. In 1914, Congress passed the Smith-Lever Act, which established the Cooperative Extension Service as part of the Land-Grant College system. The act made provision for cooperation between federal, state and county governments, and individuals at the local level in planning, financing, and conducting a system of education in agriculture and home economics.⁹

In the early 1960's, America was suddenly presented with evidence that many families in this country were affected by poor health, poverty, and inability to properly feed their children.¹⁰ Poverty and malnutrition crossed geographic and racial lines, and affected both rural and urban areas.¹¹ A task force was established by the Federal Extension Service to determine more effective ways for poor families to be reached by educational programs sponsored by Extension. This issue was of particular interest due to Extension's tradition of working with poor farm families. Five pilot nutrition education programs were funded by the United States Department of Agriculture (USDA) in response to the task force's report. Based on the pilot projects, which showed the feasibility of such a program, the Expanded Food and Nutrition Education Program (EFNEP) was founded in 1968 by the Cooperative Extension Service. A \$10 million grant was used to establish EFNEP nationwide and in 1969 Congress legislatively established a budget. In 1989 the EFNEP remained the single largest federally funded nutrition education program in the United States.¹⁰ The Extension service was chosen as the best agency for delivering EFNEP due to the fact that it was already in place and worked as a partnership between federal, state and local governments. Efficient delivery of information was insured because the agency had been in existence for some time and had shown they could deliver education programs. Experienced home economists also were available throughout Extension, with experience in teaching methods and development of materials.¹¹

The EFNEP was founded specifically to reduce hunger and malnutrition among the estimated 5.5 million American families living in poverty.¹² The mission of Extension's home economics programs, including EFNEP, is to help improve family and community life through educational processes focused on issues and problems that uses research-based knowledge.⁹ The primary objective of the EFNEP is to promote "sound nutritional principles among low-income families."¹¹ Other objectives include graduating homemakers after completion of the EFNEP course, and to deliver food and nutrition education directly to the low-income population by employing, training and supervising nutrition paraprofessionals. EFNEP focuses on providing nutrition and nutrition-related knowledge and skills. It does not include any type of food supplementation, as do some other federally funded programs. Low-income families were found to be not only malnourished due to a lack of sufficient food, but many families were also malnourished due to lack of knowledge regarding the importance of nutrition and its relationship to health.

The primary targets of the EFNEP are homemakers with young children and youth 5 to 19 years of age. EFNEP now exists in selected counties of all fifty states, and in American Samoa, Guam, Micronesia, Northern Marianas, Puerto Rico, and the Virgin Islands.¹³ The theoretical model of EFNEP was that indigenous paraprofessionals, when carefully trained and appropriately supervised by home economists, would work effectively to improve the diets of low-income families through individualized teaching. Thus, existing Extension home economics programs were expanded to more effectively reach low-income families.⁹ The EFNEP model has proven to work well and through EFNEP's history, the teaching of adults and youth has been conducted by indigenous paraprofessionals.¹¹ Prior to beginning their work with participants, the paraprofessionals, called program assistants (PAs) in Virginia, are trained on basic food and nutrition information, teaching strategies, and program methods. Frequent in-service training is also provided to the PAs on pertinent topics, such as marketing EFNEP, effective presentation techniques, and in-depth information on food and nutrition issues.¹⁴

History of 4-H EFNEP. In 1971, Congress set aside some of the EFNEP funds for establishment of an EFNEP youth component.¹¹ The youth component focuses on providing food and nutrition education and the personal development of youth from low-income families. One of the long-range goals is to encourage EFNEP youth to pursue other opportunities in 4-H. The mission of 4-H EFNEP is to teach youth (ages 5-19) to improve their dietary practices and become more effective managers of their available resources. 4-H EFNEP audiences may be comprised of youth of 4-H age from EFNEP families, youth living in low-income geographic areas, youth receiving free or reduced price school lunches, and youth from families enrolled in other low-income programs such as WIC or Headstart.

Status of 4-H EFNEP in Virginia and Participant Description. In 1997, thirteen Virginia extension units had 4-H EFNEP, with 15 PAs delivering the program. 4-H EFNEP reached 14,122 youth through six or more lessons presented to 379 groups.⁶ These groups were held in a variety of settings, such as in school, summer feeding programs, camps, and small neighborhood groups. Nationally, 392,474 youth were reached by 4-H EFNEP in 1997.¹³ Of these participants, 48% were white, 34% were black, 14% were Hispanic, 2% were Asian, and 1% was American Indian/Alaskan.

During 1997 in Virginia, there were fifteen extension units with 4-H EFNEP, located in 6 cities and 8 counties across the state.⁶ These locations include the counties of Scott, Washington, Tazewell, Roanoke, Campbell, Appomattox, Amelia, King William, King and Queen, and Lancaster. It also includes the cities of Alexandria, Richmond, Newport News, Norfolk, Chesapeake, and Virginia Beach. There were sixteen program assistants (PAs) with five area coordinators providing supervision to the PAs.

In 1998 in Virginia, 12,582 youth participated in 4-H EFNEP, which was 1,540 fewer than were reached in 1997.¹⁵ This was due to a lower caseload of youth enrolled by new PAs, and the resignation of two PAs who had been highly productive. The largest group of youth reached (44%) was between the ages of nine and twelve with the next largest age group being six to eight year olds (28% of participants). Nine year olds made up the largest portion of participants at 16%, ten year olds composed 14% of participants

and eight year olds made up 10%. Black youth made up 54% of participants, while white youth comprised 43% of participants. Hispanic youth made up 2% of participants, and Asian or Pacific Islander youth made up 1%. On gender, 51% of the youth were female and 49% were male. The largest portion of participants (46%) lived in central cities with populations over 50,000. Youth living in towns with less than 10,000 people and rural areas made up 31% of participants.

The total number of groups participating in 4-H EFNEP was 429.¹⁵ Of these groups, 172 were described as special interest, short-term programs and Day Camps. These groups had a total of 1,266 contact hours, with an average of 7.4 contact hours per group. Groups categorized as school enrichment programs totaled 164 and had a total of 925 contact hours, with an average of 5.6 contact hours per group. Other group categories were organized clubs, overnight camps, individual learning, school age child care, and instructional tv/video. There were no participants in the instructional tv/video group in Virginia in 1998. The other groups listed had an average of 5.9 contact hours per group.

National objectives of 4-H EFNEP. The objectives of 4-H EFNEP are to help children and families to do the following: expand variety of food in diet; add more fruits, vegetables, and grains to the foods they already eat; construct a diet lower in fat; and learn food purchasing, handling and storage skills. Another objective is to provide opportunities for personal development of low-income youth.⁵

Curricula and Methods. In Virginia, limited resource youth can be enrolled in 4-H EFNEP for a maximum of one year. Participants receive a minimum of six hours of nutrition education instruction provided by 4-H EFNEP PAs and/or trained volunteers.⁵ In 1986, the Virginia 4-H EFNEP began using the *Eating Right is Basic 2* for 4-H curriculum.¹⁶ This series included twelve lessons, but only eight were used extensively in Virginia (Variety Counts, Start Your Engines, Winning Food Ideas, Play it Safe, Picking the Winners, Food Choices, Fast Food Choices, and Choose Fitness). As this series became outdated, lessons from several youth curricula were pulled together to form a

series based on 13 core topics.⁵ The lesson information has been gathered from several resources and to address specific lesson objectives. Many activities may be used to support the lesson objectives, including videos, games, songs, and food tasting. The thirteen main topics covered by the Core Curriculum are as follows:

- The Food Guide Pyramid
- Variety in Foods
- Breakfast
- Grains
- Vegetables
- Fruits
- Fitness, Physical Activity and Appearance
- The Other Group
- Fiber
- Label Reading and Advertising
- Snacks and Eating Out
- Food preparation and food safety
- Milk and Meat

Lessons are available on each topic that are geared towards particular age groups. Age groups are generally classified as Grades 1-9, Grades K-5, Lower Elementary, Upper Elementary, Intermediate, and Secondary.

Impact Assessment Methods Used in 4-H EFNEP

From 1990-1992, Virginia 4-H EFNEP used the computer program *The Enhanced EFNEP Record and Reporting System*. (Personal communication with State EFNEP Coordinator, 1999) The system was developed by Extension professionals at Cornell University, and was used by several states, but was never adopted for nationwide use.¹⁷ The system required information from “4-H Enrollment” forms and “4-H What’s Happening.” The 4-H Enrollment form is used to record information on time period of a group’s enrollment and number of lessons taught in the series. Information recorded on individual members included age, gender, race, place of residence, whether or not the individual was new to the program and the total number of lessons in which the individual participated. Data from the “4-H What’s Happening” form was used to determine program impact. This form recorded the number of youth in the group as a whole that gained knowledge or adopted behaviors in certain categories. The knowledge and behaviors were categorized into the following areas: Knowledge of Nutrition, Fitness, Food Purchase, Food and Meal Planning, and Food Preparation and Safety. The

system recorded the information entered by 4-H EFNEP PAs, and reports could be generated.

In 1992, the *EFNEP Evaluation/Reporting System* Version 3.0 (ERS-3) computer program was implemented in the Virginia EFNEP.¹⁸ In this system, demographic information is recorded for youth groups. The demographic information includes group name, and youth name, address, telephone, sex, race, residence, date of birth, entry and exit date, and whether or not the youth participates in other 4-H activities. ERS-3 did not make provision for collecting dietary or food behavior assessment data on youth.

During 1996-1997, the ERS was updated to a Windows based version, ERS 4.0 (ERS-4).¹⁹ The computerized component allowed for the collection and entry of data on impact of the educational program. The impact indicators for youth are in four categories, or domains. The first category is “Eat Variety,” and indicates whether program youth eat a variety of foods. The second domain is “Knowledge,” and indicates if program youth increased knowledge of the essentials of human nutrition. The third domain is “Select Food,” and indicates if program youth select low-cost, nutritious foods. The fourth domain is “Practices,” and indicates if program youth improved practices in food preparation and safety. In order to arrive at summary data for entry into the four domains listed in ERS, an instrument must be available at the state level for collecting data on the knowledge, skills and practices of youth at both the entry and exit from 4-H EFNEP participation. When ERS-4 was implemented in Virginia in 1997, there was no assessment instrument available for use in Virginia’s 4-H EFNEP program.

4-H Evaluation in Other States. In 1976 an instrument to evaluate 4-H EFNEP was developed and tested in four states, including Minnesota, North Carolina, Vermont and Oklahoma. The instrument measured participant behavior change and was tested for reliability and validity.²⁰ The lesson series used at the time of this study is no longer in use. In California, an assessment instrument is currently being tested on 9-12 year olds. The instrument focused on knowledge and has been tested for reliability, and face and content validity. After testing is completed, there are no plans to use this instrument on the state or national level. (Personal communication with Marilyn Townsend, 1999)

The EFNEP education and instruction has been guided by two principles. The first principle is that information provided must be based on the latest available research and that nutrition knowledge, instruction, technology and methodology for reaching low-income groups would be taken into account. The second principle is that the teaching must be focused to produce measurable behavior change in the target population, and measurement of that behavior change must be an integral part of program activity.¹¹ This principle is the key to why the development of a youth assessment instrument is very important.

Important Issues in Development of Assessment Instruments for Nutrition Education Interventions/Programs.

Objectives of the Educational Program. In developing an assessment instrument for nutrition education interventions/programs, the objectives of the program must be clearly defined and considered. The program's purpose and objectives may be to change knowledge, behaviors, attitudes, skills, nutrition or health status, or a combination of these. The EFNEP program is aimed at producing "measurable food-related behavior change" among participants. A program's objectives are important to know because the goals will determine what an instrument should measure. For example, some previous youth nutrition education programs that focused on knowledge gain are not successful in achieving behavior changes.²¹ Therefore, in the development of an instrument to assess a knowledge-based program, the focus of the instrument design would not be on behavior changes. However, if the objectives of the program are to bring about behavior changes, then the instrument should assess behavior changes.

Validity. Validity refers to the meaningfulness and appropriateness of the interpretations to be made from test scores and other evaluation results.²² In other words, validity refers to an instrument's ability to measure what it is supposed to measure. Its presence insures that the results mean what we think they mean.⁷ There are several types of validity including internal, external, and content validity. Internal validity ensures that results mean what we think they mean, which is done by random assignment of subjects to

treatment groups. It would not be present if a researcher knowingly put all of one type of subject in one group, and all of another type subject in the other group.⁷ External validity refers to how well the results of a study may accurately reflect an entire population. Studies using samples that are not randomly selected may lack external validity.

Content validity refers to the adequacy with which important content has been sampled and represented in the form of instrument items.²³ Content validity can be shown by evidence in the data. If content validity is present, one would expect the internal consistency between the instrument items to be at a moderate level. Another way to show content validity is to compare results from an instrument given before and after a treatment period. Improvement on individual items after the period of intervention can be evidence of content validity. Evidence can also be obtained by correlating scores from different tests who claim to measure the same thing, though this will not guarantee content validity if both tests measure the same wrong things.²³ Content validity may also be ensured by having experts in the pertinent field to give their careful and critical opinion on the relationship between the test and the domain of content.²⁴ Content validity is usually not reported in numerical form. There are several factors that influence validity, and can cause test results to be invalid for their intended use. These factors include unclear directions, reading vocabulary and sentence structure too difficult, inappropriate level of difficulty of the test items, poorly constructed test items, ambiguity, items inappropriate for outcomes being measured, inadequate time limits, test too short, improper arrangement of items, and identifiable pattern of answers.²²

Reliability. Reliability refers to the degree of consistency with which a measuring instrument measures what it is supposed to measure. Reliability is the extent to which a test yields the same results with repeated trials.⁸ More specifically, reliability refers to whether the instrument yields similar results when administered on several occasions to stable subjects.²⁵ Evidence of reliability should be shown when new instruments are developed because measurement error is an important issue in the use of any measurement instrument.²³ Internal consistency concerns the estimates of reliability based on the average correlation among items within a test. Cronbach alpha, or

coefficient alpha, is the measure most often used to show internal consistency. Internal consistency measures of reliability are designed to determine whether all the items in an instrument are measuring the same thing. Cronbach alpha sets the upper limit to the reliability of an instrument, and the higher the number the better. If the coefficient alpha is very low, the instrument may be too short or the items on the instrument may have very little in common. Coefficient alpha is a good estimate of reliability in most cases because the primary source of measurement error is due to the content sampling.²³ This method has practical advantages because it requires the development of only one form of the test or instrument, and the cooperation of participants is required for only one administration of the instrument. The formula for Cronbach alpha is $\alpha = \frac{n}{n-1} (1 - \frac{\sum s_i^2}{s^2})$.

Another measure of reliability is reliability indexes. This measure requires two administrations of the same test, and can be shown by test-retest reliability or equivalent-forms reliability. In test-retest reliability, a coefficient is obtained by administering the same test to a group of individuals on two occasions. Equivalent-forms reliability is a coefficient of equivalence, when comparing the coefficient obtained from two administrations of alternative forms, with two weeks between administrations to allow for variations in ability and attitude to occur.²³ The resulting test scores are correlated and the correlation coefficient indicates how stable the instrument results are over the given amount of time. If the time interval is short, the results will be influenced because participants will remember some of the answers from the first test to the second test. If the time interval is long, the results will be influenced by actual changes in the participant over that period of time. The longer the time between test and retest, the more the results are influenced by changes in the aspect being measured, and the smaller the reliability coefficient will be.²² A test is reliable to the extent that the scores for an individual remain almost the same in repeated administrations of the instrument when there has been no intervention. There are two ways to evaluate this; the amount of variation within a set of repeated instruments of an individual and the extent to which an individual maintains nearly the same position in the group.

A correlation between the two administrations can be computed to determine the extent to which an individual's position remained the same and this is called a reliability

coefficient. When interpreting reliability coefficients, several things must be considered. First, the reliability of a test is in part a function of the length of the test. The longer the test, the greater its reliability and the longer the test the more representative it is. Second, the more heterogeneous a group the easier it is to rank individuals regarding the other members of the group. Third, the reliability of a test is in part a function of the ability of the individuals who take the test. Fourth, reliability is partly a function of the specific technique used to estimate it, and some methods are more respected than others. Last, reliability is partly a function of the nature of the variable being measured.²⁶ It is generally accepted that once reliability and validity have been established, an appropriate instrument is ready for use as an outcome assessment tool.²⁵

Cultural and Age Sensitivity, and Responsiveness. Within society, sex, social class, language, ethnicity, age, income, education and personal history affect how a person perceives reality and what meanings are attached to words. These differing values and meanings also affect how a person views food and health related behaviors, which can subsequently affect responses on nutrition or food related instruments. Culturally sensitive research recognizes the differing values and assumptions and terminology are adjusted in order to conduct research that considers cultural differences. Culturally sensitive instruments generally contain few words spoken by the researcher with most being the words of the respondent, and the information requested will be applicable in almost any setting. A culturally sensitive instrument will also be flexible and easily modified in settings when it is necessary and will obtain data that can be analyzed.²⁷

In order for nutrition education for children to be effective, it must be developmentally appropriate, use social learning strategies, and focus on behavior change instead of knowledge gain.²⁸ Children's ability to reason and think abstractly are directly correlated to their chronological age. From ages 2-7 years, children are developing language, reasoning is circular, and deductive reasoning is not well developed. Children aged 7-11 years think in terms of concrete objects and specific experiences. Children are not able to think abstractly until 11 years of age. A child's ability to translate nutrition terms and information into behavior is very important. Depending on the age of the

children targeted by the instrument or program, wording choices will be affected as will ideas and whether or not they are concrete or abstract. Lytle et al. (1997) found that terms such as “low fat” and “low sugar” were recognized and frequently used by children as young as kindergarten age.²⁸ When asked what low fat meant, however, most were unable to verbalize an understanding of the term. Similar questions on the meaning of healthy weight, a diet low in cholesterol, using only a little sugar or salt, and eating a variety of foods showed that most young children were not able to translate the nutrition information into appropriate behaviors. Differences were seen between age groups, especially in regard to the children’s understanding of abstract concepts, such as nutrients or vitamins.

For a nutrition education program to be effective for children, the message must be kept simple and behaviorally oriented.²⁸ It seems reasonable that, if a nutrition education program must be developmentally appropriate in order to be effective, an instrument evaluating that program must also be developmentally appropriate.

Instruments measuring changes in dietary behavior or food intake must be sensitive to change. Responsiveness describes how sensitive an instrument is to change. Nutrition education programs that are very intensive require an instrument that will not only measure nutrition practices at baseline, but will all be sensitive to changes after the intervention is completed and new practices and foods have been introduced. Low intensity nutrition education programs that expect only moderate behavior changes require a measurement instrument that will detect these slight changes. Responsiveness was defined by Kristal et al.²⁹ (1994) as the observed intervention effect divided by its standard deviation. This definition of responsiveness is a modification of that by Guyatt et al.²⁵ (1987), which is the ratio of the clinically important difference to the variability in stable subject, or the square root of two multiplied by the mean square error. An instrument’s ability to detect minimal differences is vital to the instrument’s usefulness. Responsiveness does not ensure the usefulness of an instrument, as it must also be shown to be valid.

Reading/Literacy Level. Nutrition education materials that use high-level vocabulary and information that is complex run the risk of excluding low-literacy readers. This is the same portion of the population that has the greatest need for the information.³⁰ People with limited education tend to have poor diets and also tend to be at higher risk for diet related chronic diseases such as certain forms of cancer and cardiovascular disease.³¹ Literacy not only involves the ability to read and write, it also involves the processing of information. Literacy is defined by the National Assessment of Education Progress as “using printed and written information to function in society, to achieve one’s goals, and to develop one’s knowledge and potential.”³²

When working with children, age and literacy level must be taken into consideration when developing educational materials or assessment instruments. Children ages nine to twelve tend to understand information better if it is presented in both written and oral form.³³ Children of younger ages may understand information presented in pictures or read aloud to them. According to Nitzke and Voichick³⁰, the following factors improve the readability of written materials:

- High motivation (reader interest, perceived need for information)
- Close match between text and reader’s schema (knowledge/background)
- Appropriate terminology (simple, concrete, imageable, and familiar words)
- Low concept density
- Organization (cohesive composition)
- Reinforcement of major points (examples, illustrations, headings, highlighting, summaries)
- Clear syntax (use of active verbs, short but not overly compressed sentences with few clauses, direct sentence structure)
- Appearance (white space, font size and style, contrast between letters and background, etc.)

There are several methods to determine the reading level of written material. Some methods use formulas, based on type and length of sentences and vocabulary as

determined by word length.³⁰ Formulas can be used to prepare nutrition material with simple language, but used alone, they do not address issues such as organization of information and familiarity with the topic.³⁴ Most formulas were validated against McCall-Crabbs Standard Test Lessons that were standardized with New York City public school students. For this reason, formulas may not reflect the reading ease of people from other areas or adults.³⁰ Formulas are used frequently as screening tools because they are easy to use, aid writers in using more simple words and sentences, and give a numerical rating. The formulas used most often in nutrition education include the SMOG Index, also called McLaughlin's SMOG formula, and the Fry Readability graph. Readability is calculated using the SMOG Index by counting the number of words with three or more syllables in a group of thirty sentences. To derive the estimated grade level readability, one uses the nearest perfect square root of that number and adds three. The SMOG Index assesses reading comprehension at 90%. The Fry Readability graph was published by Edward B. Fry. This formula uses the average number of sentences and syllables in three 100-word sections to determine the readability using a specific graph. The Fry Readability graph assesses reading comprehension at 50%.

Computer programs are also available that will determine the reading level of written material. One such program is RightWriter (Que software, 1992) computer program. Some programs may overestimate the number of sentences in a section, however, by counting all periods, even those included in abbreviations.³⁰

Other measures may help determine readability and comprehension for specific populations. One such measure is the Cloze procedure. In this procedure, every fifth or seventh word in a passage of text is blanked out and readers are asked to fill in the missing word. The ease of comprehension of the material is assessed by how many words are correctly filled in. This procedure assesses readability by showing how much information is gleaned from the surrounding text and how well the information is applied in figuring out the missing word. Signaled stopping assesses readers from a target population by having the readers state their thoughts when they pause during reading a passage of text. The issues that cause interruption in the reading process are tallied to examine how the information fits in with the reader's experience and knowledge.³⁰ Both

the Cloze procedure and the signaled stopping technique have been shown to verify that target populations can comprehend and come to anticipated conclusions from materials.

Another technique that may be used to develop materials for low-literate populations is the Language Experience Approach (LEA). This technique is especially useful when the language and expressions of the target population varies substantially with that of those developing the material.³⁵ LEA has been used mainly for reading instruction, but can also be applied to material development. To use this technique, a sample of the target audience meets to learn and talk about information on a given topic. The LEA leader asks each individual to prepare oral statements about the subject, after an open discussion has been held where personal experiences and opinions are shared. The statement of each individual is transcribed, and the statements are placed to form the text of materials being developed for that particular population. This technique is especially useful in developing materials for specific populations because it examines the thinking processes, associations and language patterns that are presented in the oral statements of the learners.³⁶ LEA can be used to reduce the gap between the language of the written text and that of the reader's language.

Response Format of the Instrument. There are many different ways that an instrument may be formatted. Among the choices available are open ended, response category, true-false, and discussion. Each style has pros and cons and pertinent issues that must be addressed. Questions using the same method of response should be grouped together on a survey to make it easier for the respondent to answer.²⁴

Open-ended questions give the respondent the freedom to answer the given questions as they choose, both in length and detail of answer. This approach can be used to obtain information that is unexpected. The researcher is then responsible for grouping similar answers together after all data has been collected. While this style seems easier to write than other styles, there are drawbacks. One major obstacle with this style of question is the respondent's willingness and ability to give an answer in written form. Less literate populations will be less likely to respond to open-ended questions for this reason. When using this style with large populations, the categorization of responses can

introduce error and be very time consuming.³⁷ It can be very difficult to take a written answer and summarize it into a category.³⁸ Open-ended instruments can be used with a small sample to determine the most prevalent categories that may later be used as choices in a response category survey. For this reason, open-ended questions play an important role in pilot surveys.³⁸ Open-ended questions may be the best choice if the response possibilities are fairly limited and specific and if responses will be entered into computer data sets. If answers can be anticipated by the researcher, response categories should be used.

Response category questions, also called pre-coded, objective or multiple-choice, are probably the most common form of questions on surveys. This style question involves the respondent choosing their answer from a limited number of choices given, or in the case of an oral interview, the interviewer assigns the answer to an appropriate category. Response category questions combine the steps of recording and coding a respondent's answers, which simplifies the procedure. If the range of answers is expected to be limited and well established, this style of question is preferred.³⁸ One risk with response category questions is that respondents will be forced to choose an inappropriate category. This can be caused by options that are too extreme and do not allow for other variations. There are also problems with presenting more options. The more options given, the more margins between them and the greater the chance that marginal answers will be coded inappropriately. Additionally, if respondents are given the choice of answers where some are extreme and some are moderate, many will choose the moderate and avoid an extreme opinion.³⁸ There are also other issues to be considered with response category questions. The use of the option 'other' as a choice should be avoided in most situations.³⁷ Some respondents will carelessly mark other instead of the answer they should give. The use of the category 'other' should be used only after it has been determined that nearly all applicable categories have been included as options and when the researcher has been unable to determine with certainty the most common categories of response.

The number of responses should be considered and limited to four or five. Psychometric research has shown that most scales cannot distinguish more than six or

seven levels of response.³⁷ Giving several options such as never, rarely, occasionally, fairly often, often, very often, almost always and always, may annoy respondents due to small differences between responses. The order of response categories should be listed from a lower level of response to a higher level of response, from left to right.³⁷ An example of this would be to list the following options as: a) Never, b) Seldom, c) Occasionally, d) Frequently. Combining the categories of never and seldom may also be appropriate if a respondent would be unlikely to choose 'never' and if 'seldom' connotes almost the same level of frequency.

When using a scale as a response type, neutral response positions can pose a problem in interpretation of data. A question may be posed where the choices given are 1) Agree, 2) Tend to agree, 3) Undecided, 4) Tend to disagree, 5) Disagree. A respondent may choose the midpoint of the scale out of ignorance of the subject, uncooperativeness, reading difficulty, reluctance to give true opinion, or when the question does not apply to the respondent. When a number of respondents choose the midpoint of the scale for invalid reasons, the results are inaccurate because the average response level is raised or lowered due to the midpoint responses. Sometimes respondents will avoid making a choice in one direction or the other. If a neutral option is deleted, the researcher should encourage leaving a question blank if a decision cannot be made. The responses may also be worded so that a firm stand does not have to be taken on an issue, by using phrases such as "tend to agree." These options are also useful when many respondents do not have strong or well-formed opinions. These options allow the expression of a respondent's uncertainty. Options may also be included to allow for those respondents to whom the question does not apply, such as "not applicable," "no basis for judgment" or "prefer not to answer."³⁷ Also when using a scale to measure response, avoid using a qualifier in both the item and the response. For example, it would be inappropriate to ask if someone thought that politicians usually lie, and measure that person's response on a scale that goes from 'strongly agree' to 'strongly disagree' because the words 'usually' and 'strongly' are both qualifiers. It would be better to ask if that person thought politicians lie, and use the same scale as above. The reason for the use of only one

qualifier is that strongly agreeing that politicians usually lie, is not a very meaningful response.²⁴

Length of Instrument. When designing a survey, it is important to first define the problem to be addressed and then decide what questions to ask. Survey length can have a great effect on the willingness of respondents to answer questions. A survey should be “no longer than is absolutely necessary for the purpose.”³⁸ Long surveys will frustrate many responders, causing them not to return mailed surveys or give incomplete and inaccurate information on those directly administered, both of which affect the quality of data obtained.^{37,38} Long surveys often have many items that are not relative to the majority of anticipated respondents. The researcher must thoroughly examine each question, and exclude any that are not relevant to the objectives of the survey. In addition, questions should only be included that are practicable. Asking a person about things he or she does not understand, or things he or she does not have accurate information on, will not give valid answers.³⁸ According to Cox, when determining the length of a survey, the researcher should think of as many questions as possible, then edit and cut until there are enough questions to provide all of the necessary data but will only take 10-12 minutes to complete.²⁴ When dealing with surveys and children, the same theories apply. Children, like adults, tend to get restless after answering many questions. The minimum number of questions that will give the maximum amount of information should be used. Children in public school settings are familiar with test taking and answering questions, which should assist in collecting data from a younger age group.

Data Collection Methods. There are several methods available for collecting data with youth. These may include observations of behavior by a researcher, mailed surveys, face-to-face interviews, and telephone interviews. Each method has advantages and drawbacks, and issues that must be addressed when deciding which method is best to implement.

Observation by a researcher is one of the methods that can be used in data collection. For observation to be a systematic form of data collection, several things must

be in place. First, the subject has to be available to be observed. Then the method of observation itself must be suited for investigating the problem at hand. Observation should also be appropriate to the population one wishes to study and should be reasonable reliable and objective.³⁸ Observation presents problems with each of these requisites. Observation is only suitable for a small number of the subjects that an investigator may want to study. Observation is not easily combined with random sampling and the subjective influence of the researcher can cause bias. For these reasons, researchers have come to rely more heavily on other methods of data collection. Observation is unsuitable in some situations because detailed information is required over time, such as in nutrition surveys. Observation can only be done for a small interval of time, if at all. For the same reasons, data on frequency of behavior can rarely be obtained by observation. The researcher must rely on the subject's report on frequency of a given behavior.³⁸

Observation also is not suitable for studying events of the past, as records or a subject's account must be relied upon. The study of opinions and attitudes is also difficult to study by observation. Observation is useful when studying small populations, and for seeing how people act in certain situations. Instead of relying on a subject's report of what they did and risk the bias of exaggeration or memory errors, the researcher can actually observe what the subject does. There is the risk that the researcher's interactions with the subjects to be observed can cause the observations to be different than they would be if an observer were not present.

It is up to the researcher to determine the extent he or she chooses to get involved in the group being studied, though becoming a part of the group and taking genuine interest in their activities may improve the collection of data. It is ideal for the sample population to be randomly selected, though this can be difficult. Difficulties can also arise with the objectivity of observations, as researchers are usually close to the behavior that they are observing and the out-of-ordinary behavior may catch attention before the usual behavior, although both are important. A researcher may also report on what he or she thinks is seen, rather than what is actually observed, due to stereotypes or preconceptions. These problems can usually be overcome with experience and training.³⁸

Mail surveys may be dismissed due to lack of adequate response rates; however, the merits can sometimes outweigh the drawbacks of this method if the effect of non-response can be estimated. Mail surveys are cheaper to distribute than the use of interviewers, but can cover less information than interviews. Generally, mail surveys are a quicker and less expensive method than others. Sometimes the population a researcher would like to study is so spread out, and time and funds so limited that mail surveys are the only realistic choice of data collection.³⁸ Mail surveys can also be useful when information from more than one group or family member is required. If questions are of a personal or sensitive nature, a subject may be more inclined to answer a mail survey as opposed to a personal interview. Mail surveys avoid the potential problems that come with using interviewers that can have a negative effect on the reliability and validity of the results. Mail surveys also avoid the risk of subjects not being at home, as may occur if a door to door personal interview is used. There are some limitations to this form of data collection, however. Though it does not take much time to mail the surveys out, it does take time to receive responses, and follow up with non-respondents. The cost may also be higher than desired, if the response is so low that the cost per completed survey is higher than other means of data collection might have been.

According to Moser³⁸, there are five main disadvantages to a mail survey. The first is that mail surveys can only be considered if the questions are simple and straightforward enough to be understood solely by reading the printed instructions. Mail surveys are suitable when the survey is kept relatively short and when the format of questions is kept simple. It is unsuitable when the subject is being asked difficult questions, when the purpose of the survey requires a lengthy explanation, or when answers beyond those gleaned in one question are wanted. The second disadvantage of mail surveys is that the answers received must be taken at face value, unless re-checking or verifying the answers with interviewers can be done. Because the survey is self-administered, it is impossible to probe the subject for clearer answers or to persuade the subject to answer a question that they may be unwilling to answer. The third main disadvantage is that mail surveys are not desirable when spontaneous answers are sought, when answers are sought that are not influenced by discussion with others, or when it is

important for one particular person in the group or household to answer the questions and no one else. Fourthly, the subject will be able to read the entire survey before answering any of the questions, so that the answers cannot be treated as independent. Lastly, there is no way to supplement the mail surveys data with observation. Some of the disadvantages to mail surveys can be taken care of by mailing the survey, and then having an interviewer collect the survey and clarify any answers that are unclear.

Non-response to mail surveys is a very real limitation with this form of data collection. The response rate is much lower with mail surveys than with face to face interviews.³⁸ The problem that non-response presents is the likelihood that those who do not respond to a survey have differing views from those who do respond. According to Moser, there are three main influences on the response rate of mail surveys: a) the surveys sponsorship, b) its subject matter, and c) its population. The survey with official sponsorship, such as an organization surveying its members, will receive higher response than the survey from a university or research group. The subject matter must relate to the population being surveyed, and the population must feel that the surveying group is interested in their opinions.

Researchers can encourage response to surveys by offering a gift or payment for completion of the survey. Including a self-addressed envelope with postage already affixed is a must if a researcher is interested in receiving responses. The assurance of anonymity and confidentiality, as well as a good cover letter and a short and simple survey also help to increase response rates.³⁸ The cover letter should clarify who is sponsoring the survey and why, how the potential respondent was selected for participation, and why the survey should be completed. Even with such precautions taken, there have been surveys with response rates as low as 10%, and surveys of the general population require much effort to receive a response rate over 30-40%. Follow-up requests can be sent out to remind non-respondents about the survey, and should include another copy of the original survey. This step will likely increase the response rate. The follow-up does not necessarily need to include the entire original survey, it can be shortened to the key items the researcher is interested in.³⁸

Interviewing is a method used when an interviewer is simply seeking information from a respondent. Generally the respondent is one of many people being asked the same questions and the purpose of the questions is not to educate the respondent or help him. Interviews can be very formal, where a designated list of questions is asked and the answers recorded in a standardized way. Interviews may also be very informal, where the interviewer can explain the meaning of questions, change the wording, or even come to an interview with only key points to address and no set questions to ask.³⁸

There are many variations of this form of data collection. In the case of educational programs, interviews with a population may be less difficult to obtain if they can be conducted before or after a program. The population is defined as participants in the program, and the location of this population can be derived from records or by attending a group meeting. To assist with recording the data in a standard way and to track participants responses from pre- to post-intervention, the interview style is best to use with the 4-H EFNEP population.

Pilot Testing Assessment Instruments.

A pilot test of assessment instruments can provide guidance on several issues. While a pilot test may not reveal all of the problems that may be encountered in collecting surveys, they nearly always result in major changes to the questionnaire and an increase in efficiency of the survey methods. The first topic a pilot test can clarify is whether the sampling frame proposed to select the sample is adequate. Pilot testing can clarify whether a proposed way of sampling is adequate, accurate, and convenient. The second topic a pilot test assists with is the variability within the population to be surveyed. This information can be used to determine the sample design and sample size. If everyone in a sample gives the same answer to a question, then a sample size of one (1) would suffice to give precision. But if every other person asked a question gives a new answer, the sample size would need to be greatly increased in order to achieve the desired level of precision.

Another topic pilot tests can be helpful with is the expected non-response rate. A pilot test can also be a useful way to compare the outcomes of various ways of combating non-response. From this information, one data collection method may be found to be

more useful than another. Non-response due to length of the survey may also help determine if some questions may be excluded from the survey. Pilot tests can also help determine the suitability of the data collection method. Various methods can be tested and compared based on relative cost, accuracy and expected response rates.

Another function of the pilot test, and possibly the most valuable, is to show the adequacy of the questionnaire.³⁸ The pilot test is a way to try out the survey on a population, as is proposed with the main study. It is also a way to try it out with interviewers like those who will be conducting the main study. The pilot test can show the ease of using the survey in the field, the efficiency of the format, the clarity of the directions, and whether the language is simple, clear, direct, and unambiguous. Pilot tests can help identify signs that subjects are misunderstanding the questions, or that they are not informed enough to give logical answers. The interviewers can give helpful information on how the survey administration went, if any difficulties were encountered, or what changes they believe should be made. When analyzing the questions for weaknesses, there are indicators that questions may be poorly worded or unclear. If many responses are at one extreme, this may indicate a leading question. A large number of “don’t know” answers may indicate a vague question or the use of uncommon words. If many people give qualifications for their response, this may indicate that the question could be improved.

Another topic the pilot test can address is the efficiency of the instructions and the common mistakes of interviewers.³⁸ The instructions may be inadequate if most interviewers fail to mark responses in the correct way, or fail to record information on all the topics covered. Pilot tests can also help determine the codes that will be chosen for pre-coded questions. This can be done by evaluating the number of different responses to an open-ended question, and incorporating the most frequently given responses in the pre-coded questions. The likely cost and duration of a survey can also be determined by a pilot test. If the results indicate that a main survey will last longer than expected or cost more than planned, the pilot survey can help identify areas where costs can be minimized. The final area where pilot tests can assist is showing the communication between the

principle investigator and those carrying out the surveys, if this is not the principle investigator themselves.

Conclusions. From this review of literature, the following conclusions may be made:

1. EFNEP is guided by the principle that the teaching must be focused to produce measurable behavior change in the target population and measurement of that behavior change must be an integral part of program activity.
2. An assessment instrument must be shown to be valid, reliable, culturally sensitive, age appropriate, responsive, and on an appropriate literacy level in order for results yielded from the instrument to be dependable and useful.
3. No reference was found in the literature describing an instrument specifically developed for use in 4-H EFNEP that has been shown to be reliable and valid.
4. There are various types of formats for measurement instruments, such as open-ended and response category questions, with response category being the preferable method for use in 4-H EFNEP. Response category is preferred due to its ability to measure varying degrees of behavior changes, and because the range of answers is expected to be limited and well-established.
5. There are various types of data collection methods, such as observation by a researcher, mail surveys, and face to face interviews. To assist with recording the data in a standard way and to track participants responses from pre- to post-intervention, the interview style is best to use with the 4-H EFNEP population. The pre-determined list of questions will be read aloud by a PA, while the participant reads along and marks the appropriate response.

Chapter 3

Methodology

The goal of this study was to develop a valid and reliable assessment instrument that can be used at entry and exit from the 4-H EFNEP Youth program. The instrument will be used to assess behavior and knowledge change of youth who are at approximately the third through fifth grade level of school. An instrument, called the Youth Food Behavior Checklist (YFBC), was designed to be administered easily to youth in a group setting. Instrument items incorporated culturally appropriate wording for limited resource African-American and Caucasian youth. Faculty who are Cooperative Extension Specialists, area program coordinators and program assistants (PAs) involved in the Virginia 4-H EFNEP provided expertise in the development of the instrument. Program assistants served as interviewers in the testing of the YFBC. The development and testing involved two phases, selection of the checklist items and development of the pilot instrument, and administration of the pilot instrument. These phases are described below.

Phase 1: Selection of Checklist Items and Development of the Pilot Instrument

Selection of Instrument Items

The selection of behavior and knowledge items for inclusion in the YFBC was conducted in a manner to insure content validity based on procedures described by Sapp and Jensen. Sapp and Jensen described content validity, or representative validity, as how closely test items represent the full domain of the concept being measured. The decision that content validity applies to a test is made by a group of scholars familiar with the topic.⁸ The contribution and consensus of area 4-H EFNEP program coordinators, 4-H EFNEP PAs, and four Extension food and nutrition specialists assisted in achieving content validity on the YFBC.

The current curricula used in the Virginia 4-H EFNEP were reviewed on two separate occasions and behaviors were selected to represent the most important concepts taught in the program. Feedback was also solicited from the 4-H EFNEP PAs and agents

who work in the program regarding their views of the most important behaviors and knowledge concepts to be assessed.

Prior to the beginning of this study, two of the investigators (Bruce and Elledge) had conducted preliminary activities to identify checklist items and their results were considered in the final selection of checklist items. In their work, Bruce and Elledge had identified 20 possible checklist items from an initial list of over 100 behaviors and knowledge concepts that they had identified from the curricula. Sixteen 4-H EFNEP PAs and Extension agents, who work in the program, had provided input into that process during a group meeting held in January, 1998.

To assure content validity, the principle investigator (PI) of the current study repeated the process of reviewing the curricula and a new list of 23 possible items were identified. This list of items was mailed to 15 PAs, who were instructed to identify the items they saw as ranking in the top ten priorities for inclusion. The PI compiled these rankings, noting on the original list of 23 items the number of people who had ranked each item in the top-ten category. In addition, the items on the new list were compared with the 20 items previously selected by Bruce and Elledge, resulting in the identification of 14 items that had not been included on the new list. A decision was made by the investigators to continue considering all 37 items for possible inclusion.

Content validity was assured through expert opinion provided by the graduate committee composed of four Extension foods and nutrition specialists and one evaluation specialist, some of whom provided on-going leadership to the Virginia 4-H EFNEP. They reviewed the two lists of 37 items in a group discussion and arrived at a consensus on those items to be included in the pilot version of the YFBC. The number of items was narrowed to approximately 25.

Also considered in the selection of items for the YFBC were the four domains listed as impact indicators in the EFNEP Evaluation/Reporting System User's Guide. (USDA, 1997) These impact domains are as follows:

1. Eat variety- participants eat a variety of foods
2. Knowledge- participants have increased knowledge of basic human nutrition
3. Select food- participants select low-cost nutritious foods

4. Practices- participants have improved food preparation and safety practices

National leaders of EFNEP have an expectation that states will report the percent of youth exiting from 4-H EFNEP who meet the criteria for each of the four assessment domains. Efforts were made to limit the YFBC to 25 items, so that it could be administered easily by the 4-H EFNEP PAs within the time frame in which they are accustomed to working. When working with youth in public school settings, PAs are restricted to 30-45 minute periods in which to complete the lessons. Since a large portion of the 4-H EFNEP groups are conducted in public schools, this time constraint was a strong consideration in the development of the checklist and its length.

Construction of Pilot Checklist

Based on the 25 selected items, the PI constructed the pilot version of the YFBC considering several factors. First, the grade levels of the youth targeted by this checklist were to be the third, fourth, and fifth grades, or approximately 8-11 years. For this reason, terms and vocabulary used were compatible with the general reading level of this age group. Questions were designed to be short and direct, and did not use abstract terms that are difficult for this age group to understand.²⁸ In order to assess the reading level of the pilot version of the YFBC the McLaughlin SMOG formula was used.³⁰ These steps taken in the construction of the items helped to insure the validity of the checklist.²²

To insure cultural appropriateness of the instrument items, a review of the instrument was conducted with a group of youth in Brookneal, Virginia, composed of limited resource African-American and Caucasian youth. The students were given a printed copy of the preliminary checklist and instructed to read the items. The items were also read aloud to them. During a discussion conducted by the PI, feedback was obtained on the clarity of the questions and students' understanding of words and terms. The students' names were not recorded or identified with their responses to the items. A 4-H EFNEP program assistant who works in Campbell County, Virginia, arranged the youth group.

Cultural sensitivity was also insured by providing a copy of the instrument to four PAs, with a request that they provide feedback to the PI on any words or phrases which

were believed to be culturally insensitive or inappropriate. This group of PAs was comprised of two African-Americans and two Caucasians and represented rural and urban areas. Based on responses received from these PAs, there were no words or phrases included on the checklist believed to be culturally inappropriate or unclear.

Phase 2: Administration of the Pilot Instrument

The pilot version of the YFBC was tested throughout Virginia with youth enrolled in 4-H EFNEP during the summer of 1998. The instrument was administered three times: 1) on the first day the youth met, 2) one week later, but before a lesson was taught, 3) after the series of lessons were completed.

Study Sample

The original intent was to administer the pilot checklist to groups of 4-H EFNEP participants in school settings within 2nd, 3rd, 4th, and 5th grade classes, and with whom a series of 4-H EFNEP lessons were to be taught. However, insurmountable barriers occurred in regard to getting the pilot instrument finalized and obtaining informed consent from school administrators and parents. Thus, pilot administration of the instrument was delayed to the summer months, which severely limited the availability of youth groups meeting the criteria for the study. Furthermore, two PAs resigned and left the program before turning in instruments they had completed and efforts to retrieve this data were unsuccessful.

The final study subjects consisted of low-income youth who had recently enrolled in 4-H EFNEP summer nutrition education groups in five locations, and who would be entering grades 3 through 6 during the next school term. The youth were from low-income families living in one rural county, one mid-sized city, and three large cities in Virginia. The groups consisted mainly of limited-resource African-American and Caucasian youth. The groups were organized and taught by five 4-H EFNEP Program Assistants who also served as the interviewers in administering the Youth Food Behavior Checklist with the group. The method of group selection provided a convenience sample in that only those 4-H EFNEP groups were included that were meeting during the summer

and that would complete at least 6 or more nutrition lessons between June and August, 1998.

Selection and Training of Interviewers

A four-hour training session was conducted with the PAs by the principle investigator. Initially, fourteen EFNEP PAs in Virginia were trained to serve as interviewers. Each PA was instructed to identify a youth group enrolled in the summer that included youth who had just completed the third, fourth, or fifth grade in school. Only five PAs were able to identify groups meeting the criteria of the study. The instrument administered by the PAs included a place for the youth to record their name, age, race, gender and last grade completed in school. Different color forms were used for the first, second, and third administrations of the checklist, and each had a place for the PA to record the group location. (See Appendix E)

The PAs were trained on checklist administration during three, four-hour workshops at three locations during the week of May 18-22. The three sessions were conducted on May 18 in Abingdon, May 20 in Virginia Beach, and on May 22 in the James City County Extension Office. Topics covered were the administration method, age of youth to be included, the importance of consent forms, and procedures for administering the checklist. Administration procedures covered include the importance of not influencing the youth to give certain responses, providing a relaxed atmosphere for the youth to complete the checklist in, and emphasizing to the youth that there are no right or wrong answers.

During the training session held in James City County, it was brought to the attention of the PI that the use of the phrase “principle investigator” on the parent consent forms could cause confusion in the settings of two of the PAs. To avoid any potential problem, the word ‘investigator’ was changed to ‘researcher’ on the parent consent forms that the two PAs were given.

PAs were instructed to read each checklist item aloud to the group, at the same time that the children are reading the items to themselves from their individual copy.³³

PAs were also reminded to allow adequate time for the youth to mark their responses.²² All instructional materials given to PAs are included in Appendix D.

Geographic Sites for Testing

Figure 1 indicates the locations of all current 4-H EFNEP sites. These locations include the counties of Appomattox, Campbell, King and Queen, Lancaster, Scott, Tazewell and Washington, and the cities of Alexandria, Arlington, Chesapeake, Newport News, Norfolk, Richmond, and Virginia Beach. All 16 4-H EFNEP PAs in these units were asked to participate in forming groups and administering the checklist. The racial composition of the PAs includes eight African-Americans and eight Caucasians.

Each 4-H EFNEP site in the state of Virginia was designated as rural or small town, mid-sized city or urban (large city). Rural or small town was defined as a rural area or town with populations under 10,000. Mid-sized cities were defined as towns or cities with populations from 10,000 to 100,000. Urban or large cities were defined as cities over 100,000. Using these definitions, six of the Virginia sites were designated as small towns, one site was designated as a mid-sized city and six were defined as urban areas.³⁹

Data Collection

Written consent to participate in the study was obtained from both the youth and a parent or caretaker of each youth in accordance with University regulations regarding the use of children in research. Consent forms were signed by participating youth at the first meeting. Parental consent forms were sent home with the eligible youth after the first meeting, along with a letter explaining the study. (Appendix B) The youth were instructed to bring the signed consent form back the following week. If the consent forms were not returned, that youth's completed checklist was not included in analysis. Copies of the consent forms are provided in Appendices A and C.

The PAs were instructed to administer the instrument three times to each youth group, twice before lessons began and once after all lessons were completed. Due to the administrations of YFBC1 and YFBC2 occurring only one week apart, the order of the questions was changed on YFBC2 to insure that participants would not recall the sequence from YFBC1. During the PA training sessions, some PAs expressed concern over time constraints brought on by the deadline for completion. In these cases, the PAs were instructed to do the first and third administrations if they were under time constraints that made the second administration of the instrument infeasible.

Each youth in the group was instructed to complete the instrument themselves, with the PA reading each item aloud. Instruments completed by youth that did not fall into the targeted group were excluded from analysis. It was hoped that youth who met the grade level criteria could be separated from the larger group for administration of the instrument. Where this was not feasible, all youth in the group completed the instrument and those not fitting the criteria were discarded.

Data Analysis

For purposes of data entry and analysis, an identification number was assigned to each youth, each checklist item was coded, and each response was assigned a numeric value. This assisted in the tracking of responses of the youth to each of the three checklist administrations. Responses were compared using the Statistical Package for the Social Sciences (SPSS) for Windows, Version 7.0.⁴⁰ The responses from the first and second checklist administrations were compared to insure that consistent responses were provided on consecutive administrations, when no changes would be expected. The first (YFBC1) and third (YFBC3) checklist results were also compared to assess the behavior changes as a result of the 4-H EFNEP program. Mean scores for YFBC1 and YFBC3 were compared for statistical significance based on age, gender, race, grade, geographic region, and number of contact hours.

Item responses were also analyzed to determine if they measured the appropriate behaviors. For items where there was no change from pre-test and post-test, consideration was given as to whether or not they should be included on the final version

of this instrument. Items for which youth consistently gave the desired responses before receiving the lessons were evaluated to see if they should be eliminated from the final YFBC. Once all of the appropriate statistical analyses and considerations have been made, results will be used by program leaders to design a final version of the checklist for use by the Virginia 4-H EFNEP program as an on-going instrument to assess behavior changes among 4-H EFNEP participants. This version will be further tested in future research by program leaders.

CHAPTER 4

RESULTS

Demographic Characteristics of Participants

Table 1 lists demographic characteristics of participants. A total of 47 4-H EFNEP participants were involved in the study and completed at least one of the two pre-intervention versions of the Youth Food Behavior Checklist (YFBC), as well as the post-intervention version. For simplicity in reporting results, the checklist version used in the first administration of the instrument is labeled YFBC1, the second administration of the instrument is labeled YFBC2, and the third administration of the instrument is labeled YFBC3. YFBC1 and YFBC2 were administered about a week apart before any lessons were taught (i.e. pre-intervention); whereas, YFBC3 was administered at the end of the lessons (i.e. post-intervention). Of those participating, 35 individuals (74%) completed the instrument 3 times, with two of the administrations being done before any lessons were taught and the third administration being given after the lessons were completed. Twelve respondents (25%) completed the YFBC twice, with 4 of these completing only the two pre-intervention versions while the other 8 completed it once before lessons and once after the lessons were completed. These differences in checklist completion explain the variation in the total number of responses for each question.

The majority of participants (43 or 91%) had just completed the third, fourth or fifth grades prior to completing the YFBC. Only four of the participants had completed the second grade prior to joining the youth group and completing the YFBC. Thirty-six (76.6%) of the 47 participants were female, and 10 (21.3%) were male. One participant did not give a response to the question on gender. The majority of participants were 9 to 11 years old.

Geographic region where participants lived is shown in Table 1. For the purposes of this study, small towns were defined as rural areas with populations under 10,000. Mid-sized cities were towns or cities with populations from 10,000 to 100,000. Large cities were defined as areas with populations over 100,000. Based on these definitions,

Table 1. Demographic Characteristics of Respondents (N=47)

Characteristic	Number	Percent
Gender		
Male	10	21.3
Female	36	76.6
Grade Completed:		
Second	4	8.5
Third	17	36.2
Fourth	12	25.5
Fifth	14	29.8
Age (yrs):		
8	7	14.9
9	14	29.8
10	12	25.5
11	14	29.8
Race:		
Black, not Hispanic	24	51.1
White, not Hispanic	19	40.4
Hispanic	1	2.1
Multicultural	3	6.4
Geographic Region		
Small Town	13	27.7
Mid-size Town	7	14.9
Large City	27	57.4

the majority (27 or 57.4%) of participants in the study were from urban areas. Thirteen respondents (27.7%) were from small towns and 7 (14.9%) were from mid-sized towns.

Twenty-four participants (51.1%) reported their race as Black, not of Hispanic origin. Nineteen participants (40.4%) recorded their race as White, not of Hispanic origin. Three participants (6.4%) reported being multi-cultural and one student (2.1%) reported being Hispanic.

Scoring the Instrument

For the purpose of data analyses, each participant completing the instrument was assigned an ID number. Responses to each question were assigned values from 1 to 4 or 1 to 3, depending on how many choices were listed for the question. The greatest value was assigned to each response that was most desirable and 0 or 1 was assigned to each response that was least desirable. This system allowed for a score to be calculated for each participant on individual items and for the total instrument. Due to the scoring method used, a high score was more desirable than a low score and a higher score indicated that more desirable nutrition related behaviors were present. The total score on each YFBC was compared to the other scores for the same participant to determine if there were any changes. Questions twenty and twenty-one, which asked participants how often they consumed salty snacks and sweets, were scored the same as the other questions, although a higher score actually indicated a decrease in negative behaviors (i.e. respondents ate less salty snacks or sweets). Question twenty-three, which asked participants to list as many food groups as they knew, was scored by counting the number of food groups the participant listed correctly and that number was added to their score. Question 24, which listed only one desirable response, was scored as 1 if the participant chose the correct response, or 0 if the incorrect response was chosen. The highest possible total score for the checklist was 91 and the lowest possible score was 22. The responses were analyzed with *SPSS for Windows*.

Reliability

In an effort to determine test-retest reliability, a Pearson Correlation of 0.81 was obtained in a comparison of scores on YFBC1 and YFBC2. The time between the two administrations of the instrument was approximately one week and, during that time, no nutrition lessons were provided.

Cronbach's Alpha measures the internal consistency of items in a scaled instrument that is intended to assess a single factor. Using Factor Analysis, 9 factors were identified in the YFBC, making it unlikely that a reasonably high alpha would be obtained when all 24 checklist items are included. However, when Cronbach analysis was conducted using only those items with high correlation in the Factor Matrix Table (.40 or above), an alpha of .8037 was obtained. This analysis included responses to the following 13 YFBC items: 1,4,5,6,7,9,10,12,13,15,16,17 and 19. Further consideration should be given to re-designing the YFBC to measure fewer factors, but with sufficient numbers of items assessing each factor to yield an acceptable internal consistency.

Effect of Number of Lessons and Contact Hours

Table 2 lists the main topics taught during the intervention as recorded on lesson logs kept by Program Assistants (PAs). For each group, a check was made beside each topic taught to that group, the number of children in the group, the curriculum used and the lesson length. There were five participating PAs, with four working with one group each and one PA working with two groups (i.e. 6 groups being in study). Lesson logs were returned by only four of the five PAs, thus, lessons taught to one of the groups could not be determined.

Table 3 lists the contact hours and mean total scores for participants having different contact hours. The average number of lessons taught to the youth groups was 10. The average number of hours spent with groups was 9.3. The highest number of hours spent with a group was 14, and the lowest number was 6, which is the minimum contact hours required by the program. The highest number of lessons taught to any

Table 2. Number of youth groups receiving lessons on each topic during intervention phase (N= 6 groups, 5 with lesson logs available)

Lesson Topic	Number of Groups Receiving Lesson
Food Guide Pyramid	4
Variety in Foods	4
Breakfast	4
Vegetables	4
Milk and Meat	4
Other Group	4
Fruits	3
Food Preparation and Safety	3
Grains	2
Snacks/Eating out	2
Fitness	2
Label Reading	2
Fiber	1

Table 3. Mean total score on Youth Food Behavior Checklist by number of times respondents completed instrument and by number of class contact hours

	First Admin Mean \pmSD (N)	Second Admin Mean \pmSD (N)	Third Admin Mean \pmSD (N)
Respondents Completed <u>Instrument:</u>			
Two Times	61.18 \pm 9.92 (11)	62.60 \pm 4.92 (5)	66.25 \pm 3.88 (8)
Three Times	65.02 \pm 6.62 (35)	64.25 \pm 8.00 (35)	66.74 \pm 8.69 (35)
<u>Class Contacts:</u>			
9.3 Hours (average number of hours for all participating groups)	64.51 \pm 8.05 (31)	64.92 \pm 7.53 (25)	68.85 \pm 7.80 (28)*
14 Hours (highest number of hours among all participating groups)	63.26 \pm 6.75 (15)	62.60 \pm 7.90 (15)	62.53 \pm 6.78 (15)*
Mean Overall Score	64.10 \pm 7.60 (46)	64.05 \pm 7.66 (40)	66.65 \pm 7.98 (43)

* Indicates significant difference using paired sample t-tests at $p < .01$ when comparing the mean score of the third administration for the group having 14 contact hours vs. the group having 9.3 contact hours.

Table 4. Comparison of mean scores for YFBC items on first, second and third administration (N = 35)

Checklist Item	1st Admin Mean	2nd Admin. Mean	3rd Admin. Mean
1. Fruits/vegetables as snack	2.26	1.98	2.29
2. Skipping meals	3.24	2.59	3.24
3. Assisting with meals	2.34	2.83	2.49
4. Variety in diet	1.93	2.05	1.79
5. Washing fruit	1.41	2.13	1.37
6. Cleaning table/counter	1.85	2.35	1.56
7. Washing hands	1.28	2.28	1.30
8. Refrigeration	1.54	2.25	1.37
9. Purchase fruits/vegs	1.91	2.18	1.91
10. Trying new foods	2.39	3.10	2.67
11. Modifying diet due to fat/sugar content	2.98	2.41	2.70
12. Exercise frequency	1.46	1.95	1.79
13. Eating breakfast	1.57	1.48	1.63
14 Milk consumption	1.70	1.78	1.69
15. Vegetable consumption	2.46	1.43	2.53
16 Grains/bean consumption	2.72	1.53	2.67
17. Eating fresh fruit	2.15	1.88	2.26
18. Water consumption	2.17	2.33	1.95
19. Carbohydrate consumption	2.33	2.93	2.28
20. Salty snacks	2.35	1.55	2.65
21. Sweet consumption	2.24	1.50	2.71
22. Time outside/inside	2.17	2.17	2.29
23. Naming food groups	3.35	3.65	4.74
24. Choosing a cereal	1.68	1.74	1.65

For statistical significance between First Administration (YFBC1) and Third Administration (YFBC3) see

Table 5.

group was 17 and the least number was 6. Participants having 9.3 hours of contact had a mean total score of 64.51 on YFBC1, with the mean increasing to 68.85 on YFBC3. This difference was significant at $p < .01$ using paired sample t-tests. Participants having 14 hours of contact had a mean total score of 63.26 on YFBC1, with the mean score decreasing to 62.53 on YFBC3. This difference was significant at $p < .01$ using paired sample t-tests.

Checklist Individual Item Results

Table 4 lists the checklist item mean scores of the three administrations, while Table 5 shows the results of significance testing on change from pre to post-intervention. Participants were given the checklist twice before any lessons were taught in order to test for consistency in responses when no changes should have occurred. The same questions were used on the first and second administrations, but the order of questions was changed for the second administration. The test-retest reliability coefficient for the responses from the first and second administrations was .81 using the Pearson Correlation procedure.

Question 1 on YFBC1 and YFBC3 corresponds with Question 9 on YFBC2. Forty-six participants responded to this question on the first administration, and 42 responded to it on YFBC3. This question asks participants how often they have vegetables or fruits as a snack, and gives the options of “always,” “most of the time,” “not very often,” and “never” (See Appendix E). The mean score on Question 1 from YFBC1 of the checklist was 2.26, indicating that most responses were either “most of the time” or “not very often.” The mean score for this same question from the third administration was 2.29, indicating a slight increase in mean score. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 2 on YFBC1 and YFBC3 corresponds to Question 10 on YFBC2. Question 2 asks participants how often meals are skipped, and gives the options of “always,” “most of the time,” “not very often,” and “never.” Forty-six participants responded to Question 2 on YFBC1 and forty-one responded to it on the third administration. The mean score from YFBC1 was 3.24, indicating that most responses were “not very often.” The mean score for this question on YFBC3 was 3.24, which

indicates there was no change in this behavior between the first and third checklist administrations.

Question 3 on YFBC1 and YFBC3 corresponds to Question 11 on YFBC2. Question 3 asks participants how often they help someone else fix something to eat, and gives the options of “always,” “most of the time,” “not very often,” and “never.” Forty-six participants responded to this question on the first administration and forty-two responded to it on the third administration. The mean score from YFBC1 was 2.34, indicating that most responses were “not very often.” The mean score from the third administration was 2.49, indicating an increase in the behavior. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 4 on YFBC1 and YFBC3 corresponds to Question 12 on YFBC2. This question asks participants to record how often they eat different foods instead of the same foods over and over and gives the options of “always,” “most of the time,” “not very often,” and “never.” Forty-six participants responded to Question 4 during the first administration and the mean score was 1.93. This score indicates that most responses were “not very often.” Forty-two participants responded to Question 4 during the third administration, and the mean score was 1.79. This indicates a slight decrease in the behavior, but this change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 5 on YFBC1 and YFBC3 corresponds to Question 13 on YFBC2 and asks participants how often they wash fruit before eating it. The options given are “always,” “most of the time,” “not very often,” and “never.” Forty-six participants responded to Question 5 during the first administration, and the mean score was 1.41. This score indicates that most responses recorded were either “not very often” or “never.” Forty-three participants responded to this question during the third administration and the mean score was 1.37, indicating a slight decrease in the desired response. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 6 on YFBC1 and YFBC3 corresponds to Question 14 on YFBC2 and asks participants how often they clean a table or countertop before food is laid on it. The options for this question are “always,” “most of the time,” “not very often” and “never.” Forty-six participants responded to this question during the first administration and the mean score was 1.85, with most responses being “not very often.” Forty-three participants responded to Question 6 during the third administration and the mean score was 1.56, a decrease in the practice frequency. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 7 on YFBC1 and YFBC3 corresponds to Question 15 on YFBC2 and asks participants to record how often they wash their hands before touching or eating food. The options for this question are “always,” “most of the time,” “not very often” and “never.” Forty-six participants responded to this question during the first administration and the mean score was 1.28, indicating most responses were “never.” Forty-three participants responded to this question on the third administration and the mean score was 1.30. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 8 on YFBC1 and YFBC3 corresponds to Question 16 on YFBC2 and asks participants how often they put foods like milk or meat back in the refrigerator. The options given were “always,” “most of the time,” “not very often” and “never.” Forty-six participants responded to this question during the first administration and the mean score was 1.54. This score indicates that most responses were either “not very often” or “never.” Forty-three participants responded to Question 8 during the third administration and the mean score was 1.37. There was a statistically significant decrease in the mean score, when using paired sample t-tests and $p < .001$.

Question 9 on YFBC1 and YFBC3 corresponds with Question 17 on YFBC2 and asks participants how often they ask a parent or adult to buy fruits and vegetables that are liked. The options given were “always,” “most of the time,” “not very often” and “never.” Forty-six participants responded to this question during the first administration of the checklist and the mean score was 1.91. This score indicates that most responses

were “most of the time.” Forty-three participants responded to Question 9 during the third administration and the mean score was 1.91, indicating no change.

Question 10 on YFBC1 and YFBC3 corresponds with Question 18 on YFBC2 and asks participants how often they try foods they have never eaten before. The options given were “always,” “most of the time,” “not very often” and “never.” Forty-six responses were recorded during the first administration and the mean score was 2.43, indicating that most responses were either “not very often” or “most of the time.” Forty-two participants responded to Question 10 during the third administration and the mean score was 2.14. This negative change was statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 11 on YFBC1 and YFBC3 corresponds to Question 19 on YFBC2, and asks how often participants change what they eat due to fat or sugar content. Options given were “always,” “most of the time,” “not very often” and “never.” Forty-six participants recorded responses to this question on the first administration, and the mean score was 2.98. This mean score indicates that most responses were “most of the time.” Forty-three participants responded to Question 11 during the third administration, and the mean score was 2.70. There was a statistically significant decrease in the mean score when using paired sample t-tests, and $p < .05$.

Question 12 on YFBC1 and YFBC3 corresponds with Question 20 on YFBC2 and asks how often participants play or exercise outside. Options given were “always,” “most of the time,” “not very often” and “never.” Forty-six responses were recorded during the first administration, and the mean score was 1.46 meaning that most responses were either “never” or “not very often.” Forty-three responses were recorded during the third administration and the mean score was 1.79. There was a statistically significant increase in the mean score when tested using paired sample t-tests and $p < .01$.

Question 13 on YFBC1 and YFBC3 corresponds with Question 21 on YFBC2 and asks participants how often they eat breakfast. The options given were “every day,” “often but not everyday,” “almost never” and “never.” Forty-six participants responded to this question during the first administration, and the mean score was 1.57. Based on the mean score, most responses were either “never” or “almost never.” Forty-three

participants responded to this question during the third administration, and the mean score was 1.63, indicating a slight increase in desired behavior. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 14 on YFBC1 and YFBC3 corresponds with Question 1 on YFBC2 and asks participants how often they drink milk or have milk on cereal. The options given were “2 or more times a day,” “1 time a day,” and “Less than once a day.” Thirty-seven participants responded to this question during the first administration, and the mean score was 1.70. The mean score indicates that most responses were either “1 time a day” or “less than once a day.” Forty-one participants responded to this question on the third administration, and the mean score was 1.69. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 15 on YFBC1 and YFBC3 corresponds with Question 2 on YFBC2 and asks participants how often they eat vegetables. The options given were “3 or more times a day,” “2 times a day,” “1 time a day” and “Less than once a day.” Forty-six participants responded to this question during the first administration, and the mean score was 2.46. The mean score indicates that most responses were either “2 times a day” or “1 time a day.” Forty-three participants responded to this question during the third administration and the mean score was 2.53, indicating a slight increase in the desired behavior. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 16 on YFBC1 and YFBC3 corresponds with Question 3 on YFBC2 and asks respondents how often they eat whole grain cereals, peas or beans. The options given were “3 or more times a day,” “2 times a day,” “1 time a day” and “Less than once a day.” Forty-six participants responded to this question during the first administration and the mean score was 2.72, showing that most responses were either “1 time a day” or “2 times a day.” Forty-three participants responded to the question during the third administration and the mean score was 2.67, which is a slight decrease from the first administration. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 17 on YFBC1 and YFBC3 corresponds with Question 4 on YFBC2 and asks participants how often they eat fresh fruit or drink real fruit juice. The options given were “3 or more times a day,” “2 times a day,” “1 time a day” and “Less than once a day.” Forty-six respondents responded to this question on YFBC1, and the mean score was 2.15, indicating that most responses were “1 time a day.” Forty-three respondents responded to question 17 during the third administration and the mean score was 2.26, an increase from the mean score of the first administration. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 18 on YFBC1 and YFBC3 corresponds with Question 5 on YFBC2 and asks respondents how much water they drink every day. The options given were “6 or more glasses a day,” “2-5 glasses a day,” and “1 glass or less a day.” Forty-six participants responded to this question during the first administration, and the mean score was 2.17 indicating that most responses were “2-5 glasses a day.” Forty-three participants responded to this question on the third administration and the mean score was 1.95, a decrease from the first administration’s mean score. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 19 on YFBC1 and YFBC3 corresponds with Question 6 on YFBC2 and asks participants how often bread, tortillas, noodles or rice is eaten. The options given were “6 or more times a day,” “2-5 times a day” and “Less than once a day.” Forty-six respondents responded to this question during the first administration and the mean score was 2.33. Based on the mean score, most responses were “2-5 times a day.” Forty-two participants responded to this question during the third administration and the mean score was 2.28, a slight decrease from the first administration. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 20 on YFBC1 and YFBC3 corresponds with Question 7 on YFBC2 and asks respondents how often potato chips, cheese doodles or corn chips are eaten. The options given were “3 or more times a day,” “2 times a day,” “1 time a day” and “Less than once a day.” Forty-six participants responded to this question during the first administration and the mean score was 2.35. The mean score indicates that most

responses were “1 time a day” or “2 times a day.” Forty-three respondents responded to Question 20 during the third administration and the mean score was 2.65, an increase over YFBC1 mean score. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 21 on YFBC1 and YFBC3 corresponds with Question 8 on YFBC2 and asks respondents how often sweets are eaten. The options given were “3 or more times a day,” “2 times a day,” “1 time a day” and “Less than once a day.” Forty-six participants responded to this question during the first administration and the mean score was 2.24. Forty-one participants responded to Question twenty-one during the third administration and the mean score was 2.71, indicating that participants ate less salty snacks after intervention. This increase was statistically significant when using paired sample t-tests and $p < .01$.

Question 22 on YFBC1 and YFBC3 corresponds with Question 9 on YFBC2 and asks participants whether they spend more time inside or outside. The options given were “more time inside,” “more time outside,” and “about the same amount of time inside and outside.” Forty-six participants responded to this question during the first administration and the mean score was 2.17. The mean score indicates that the majority of responses were “more time outside.” Forty-two respondents responded to Question twenty-two during the third administration and the mean score was 2.29, indicating an increase in the desired behavior. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Question 23 on YFBC1 and YFBC3 corresponds with Question 9 on YFBC2 and asks respondents to list as many of the food groups as they can. Blank lines were given for respondents to write in their responses, and 1 point was given for each correct food group listed. Forty-six respondents responded to this question during the first administration and the mean score was 3.35. Forty-three participants responded this question during the third administration, and the mean score was 4.74. This increase was statistically significant when using paired sample t-tests at $p < .001$.

Question 24 on YFBC1 and YFBC3 corresponds to Question 10 on YFBC2 and asks participants how they would choose a cereal in the store. The options given were

“how cool the prize is,” “how healthy it is,” “how the box looks,” and “how it tastes.” Forty-four participants responded to this question during the first administration and the mean score was 1.68. In scoring this question, 1 point was given for the correct response “how healthy it is” and 0 points were given for any other response. Forty participants responded to Question twenty-four during the third administration, and the mean score was 1.65. This change was not statistically significant when tested using paired sample t-tests, with significance determined at $p < .05$.

Table 5 lists the topics by whether there was positive, negative, or no change between administrations. Eleven of the twenty-four questions showed positive changes from the first to third instrument administrations. For three items, these changes were found to be statistically significant using paired sample t-tests. For YFBC Question 12, “how often do you exercise or play outside?” there was a significant increase in reported frequency from pre- to post- at $p < .05$. For YFBC Question 21, “I eat sweets..,” there was also a significant increase in score, indicating a decrease in sweet consumption, from pre- to post-intervention at the $p < .05$ level. For YFBC Question 23, “name as many of the food groups as you can,” there was a significant increase in the number of correct responses at the $p < .001$ level.

Eleven of the twenty-four questions showed a decrease in the mean score. Of the eleven demonstrating a decrease in mean score, responses to four questions showed statistically significant decreases. (i.e. cleaning table/counter, refrigeration, trying new foods and modifying diet due to fat/sugar). Two of the twenty-four questions showed no changes between administrations. The topics addressed by these questions were frequency of skipping meals and how often participants ask adults to buy fruit or vegetables that they like.

Results Related to Total Score on Checklist

Table 6 shows a comparison of the total mean scores from 1st and 3rd (pre and post-intervention) administrations of the instrument based on demographic information. **Age** When comparing means between groups, 8-year old participants showed the most changes between the first administration and the third administration (7.83 points) while

10 year old participants tended to show an opposite effect with a -.84 point difference between means.

Race White, non-Hispanic participants tended to show the greatest change in mean score, with a 3.15 point difference. Multi-cultural participants showed the least change, with -.50 point difference between instrument administrations, although there were only 3 participants in this category making it difficult to generalize these results.

Gender Males showed a higher point increase between instrument administrations, with a difference of 2.76 points, although females had higher scores than males for both the first and third administrations. Females had a significant increase in mean score from YFBC1 to YFBC3 at the $p < .05$ level.

Geography Participants from small towns showed the greatest improvements from the first to the third instrument administration, with a 6.11 mean point difference which was significant at the $p < .01$ level. Mid-sized town participants showed the least change, with a -1.55 difference in mean scores. Small town participants had a significantly higher score on YFBC3 than participants from large cities when comparing the means on a paired sample t-test at $p < .05$.

Grade Second graders tended to show a large improvement from the first to third administrations, with a 12.16 point increase in mean scores, however with only four participants in this category, the sample lacked the power to be statistically significant. Fifth graders tended to show the least improvement, with a .61 point increase. Third grade participants had a significant increase from the mean score of YFBC1 to YFBC3 when using paired sample t-tests at $p < .05$.

Number of Checklists Completed Participants who completed two of the three instruments tended to show greater increase in their mean scores, with a 5.07 point increase. Those who completed three instruments had a mean increase of 1.72 points. Participants with the most hours of contact (14 hours) had a mean decrease of 0.73 points, compared to those that had the average 9.3 hours of contact, who had a mean increase of 4.34 points.

DISCUSSION

The participants in this study were predominantly black and white females with more than half residing in cities. Based on 1998 statewide reports, the majority of participants in the program were 9-11 years old, with over half of the participants being black and female.¹⁵ Forty-six percent of the youth participating in 4-H EFNEP statewide were from cities with populations over 50,000. The demographics of participants in the current study are reflective of the population reached by the Virginia 4-H EFNEP program in 1998. The majority of youth (31 of 47) in this study had 9.3 contact hours, which is higher than the average of 7.4 hours for all 4-H EFNEP youth in 1998. Participants who completed the YFBC three times as opposed to two times tended to have higher overall scores on all three administrations, but demonstrated less of an improvement from the YFBC1 to YFBC3. Participants who completed two of the three instruments showed greater increase in their overall scoring, with an overall increase of 5.07 points, compared to a mean increase of 1.72 for those completing it three times. It may be that the participants who were present for all three administrations of the YFBC demonstrated desirable nutrition behaviors before the lessons thus, improvements in nutrition related practices were not detected by the instrument. The same effect is seen in participants having an average of 9.3 hours of contact compared to those with 14 hours of contact. Participants with an average of 9.3 contact hours tended to show greater improvement from the YFBC1 to the YFBC3 than did participants with 14 contact hours. This is the opposite of what was expected, if one assumes that the more one is exposed to treatment the greater the increase in desired behavior. In this instance, the quality of the contact time may need to be evaluated to determine its effectiveness.

Increases in mean scores from 1st to 3rd administrations, tended to show an increase in desired nutrition practices for eleven of the twenty-four questions on the YFBC, though only three showed statistically significant increases. Topics such as eating breakfast, vegetable consumption, frequency of salty snacks, and sweet consumption all tended to show an increase in desirable behavior and lessons on these topics were taught to all four of the participating groups for which lessons were reported. Practices such as eating fresh fruit and washing hands also tended to show improvement, while lessons on

these topics were taught to three of the four groups. Hand washing as a part of food safety is presented in nearly every lesson in 4-H EFNEP, which may explain the tendency towards improvement in this area. Lessons on snacks/eating out and fitness were taught to only half of the groups, but the survey items on fruits/vegetables as snacks, exercise frequency, and the amount of time spent inside versus outside all tended to show improvement. Exercise frequency showed significant improvement from YFBC1 to YFBC3 at $p < .01$, although only half the participants received this lesson. The principles of exercise are presented in several lessons, and exercise or other activity is integrated into these lessons. Therefore exposure to this information could have taken place, even if the lesson specifically on exercise was not presented. Naming the food groups in the Food Guide Pyramid showed a significant increase from YFBC1 to YFBC3 when using paired sample t-tests at $p < .001$. Nearly every lesson in the 4-H EFNEP lesson series covers the Food Guide Pyramid, which may explain this statistically significant increase.

Decreases in overall mean scores, indicating a possible decrease in desirable nutrition practices, were seen in eleven of the twenty-four questions on the YFBC, though only four had statistically significant decreases. Variety in diet and milk consumption were topics that tended to demonstrate a decrease in mean score from YFBC1 to YFBC3, although both of these topics were presented to all four of the groups for which lessons were reported. Washing fruit, cleaning the table and counter, and refrigeration also tended to show decreases in practice, although a food preparation and safety lesson was presented to three of the four groups. The decreases in scores were significant for the topics of cleaning the table and counter and refrigeration. There was no apparent explanation for these showing significant decreases versus other practices.

Lessons on grains, snacks and eating out, and label reading were presented to two of the four groups whose lessons were reported. Practices such as modifying diet due to fat or sugar content, carbohydrate consumption, and choosing a cereal each tended to show a decrease in practice from YFBC1 to YFBC3, with the decrease in score for modifying diet due to fat or sugar content being statistically significant at $p < .05$. This may be explained by inadequate presentation of the material, since less than half of the participants received these lessons. Water consumption reportedly decreased from the

Table 5. Mean Scores for Individual Items at Pre and Post-Intervention according to positive or negative change (N = 43)

Checklist Item:	Entry Score Mean Item Score±SD	Exit Score Mean Item Score±SD
<u>Those with Positive Change:</u>		
Fruits/vegetables as snacks	2.26±.74	2.29±.74
Washing hands	1.28±.58	1.30±.71
Assisting with meals	2.34±.94	2.49±.84
**Exercise frequency	1.46±.59	1.79±.67
Eating breakfast	1.57±.72	1.63±.72
Vegetable consumption	2.46±.96	2.53±.88
Eating fresh fruit	2.15±1.09	2.26±1.0
Salty snacks	2.35±1.08	2.65±1.07
**Sweet consumption	2.24±1.12	2.71±1.19
Time inside/outside	2.17±.85	2.29±.83
***Naming food groups	3.25±1.64	4.47±.88
<u>Those with Negative Change:</u>		
*Trying new foods	2.43±.77	2.14±.90
Variety in diet	1.93±.90	1.79±.78
Washing fruit	1.41±.72	1.37±.58
**Cleaning table/counter	1.85±.92	1.56±.73
*Refrigeration	1.54±.91	1.37±.72
*Modifying diet due to fat/sugar	2.98±1.0	2.70±.99
Milk consumption	1.70±.79	1.69±.78
Grains/bean consumption	2.72±.96	2.67±.87
Water consumption	2.17±.71	1.95±.58
Carbohydrate consumption	2.33±.52	2.28±.55
Choosing a cereal	1.68±.52	1.65±.53
<u>Those with No Change</u>		
Skipping meals	3.24	3.24
Purchase fruits/vegs	1.91	1.91

Differences between mean score at 1st Administration and 3rd Administration: *Significant at p<0.05, ** Significant at p<.01, *** Significant at p<.001 on paired sample t-tests.

Table 6. Mean total scores on Youth Food Behavior Checklist by demographic characteristics at 1st and 3rd administrations.

Demographic Characteristic	First Admin. (Pre-test) Mean \pm SD (n)	Third Admin. (Post-test) Mean \pm SD (n)	Difference Score
<u>Age:</u>			
8	59.57 \pm 7.02 (7)	67.40 \pm 9.12 (5)	+7.83
9	66.00 \pm 8.62 (14)	70.00 \pm 7.01 (13)	+4.00
10	66.50 \pm 6.05 (12)	65.66 \pm 7.77 (12)	-0.84
11	62.30 \pm 7.23 (13)	63.92 \pm 8.33 (13)	+1.62
<u>Race:</u>			
Black, not Hispanic	64.26 \pm 8.19 (23)	66.62 \pm 6.98 (24)	+2.36
White, not Hispanic	63.78 \pm 7.40 (19)	66.93 \pm 9.88 (16)	+3.15
Hispanic	61.00 (1)	65.00 (1)	+4.00
Multi-Cultural	66.00 \pm 7.54 (3)	65.50 \pm 9.19 (2)	-0.50
<u>Gender:</u>			
Male	62.90 \pm 8.07 (10)	65.66 \pm 7.56 (9)	+2.76
Female	64.54 \pm 7.63 (35)	66.96 \pm 8.30 (33)	+2.42*
<u>Geographic Region:</u>			
Small town	66.69 \pm 4.81 (13)**	72.80 \pm 7.72 (10)**	+6.11* \blacklozenge
Mid-sized town	66.71 \pm 8.19 (7)	65.16 \pm 9.49 (6)	-1.55
Large city	62.11 \pm 8.19 (26)	64.70 \pm 6.78 (27)	+2.59* \blacklozenge
<u>Grade Completed:</u>			
2 nd	58.50 \pm 9.43 (4)	70.66 \pm 10.69 (3)	+12.16
3 rd	66.17 \pm 7.10 (17)	69.46 \pm 7.15 (15)	+3.29** \blacklozenge
4 th	65.33 \pm 7.72 (12)	66.50 \pm 7.66 (12)	+1.17
5 th	62.00 \pm 7.03 (13)	62.61 \pm 7.67 (13)	+0.61

*Significant difference between females mean scores on YFBC1 and YFBC3 using paired sample t-tests at p<.05.

* \blacklozenge Significant difference between mean scores on YFBC3 for participants from small towns and participants from large cities using paired sample t-tests at p<.05. **A significant difference between small town participants' mean scores on YFBC1 and YFBC3 using paired sample t-tests at p<.01.** \blacklozenge Significant difference between third grade participants mean scores on YFBC1 and YFBC3 using paired sample t-tests at p<.01.

YFBC1 to YFBC 3. There are no lessons on the lesson log that specifically address water consumption, so there is no record of this information being presented to any of the participants.

Two topics, skipping meals and asking adults to purchase fruits and vegetables, showed no change from YFBC1 to YFBC3. Lessons were presented to most participants on fruits and vegetables causing the absence of change in practice to be surprising. Since this question asks participants how often they ask adults to purchase fruits and vegetables that the participant likes, it may be that children are not asked by their parents or caregivers what they might like from the grocery store, and so there is no opportunity for the child to make a request. It may also be that fresh fruits and vegetables are cost prohibitive to families whose children participate in 4-H EFNEP, since the program targets limited resource families. The other topic that showed no change was skipping meals. One lesson addresses skipping meals and specifically focuses on the importance of not skipping breakfast. This lesson was presented to three of the five groups whose lessons were reported. However the pre- as well as post- scores were high indicating that these youth do not generally skip meals.

All of the above findings of negative change or lack of change may also be explained by the low number of participants on which a checklist was completed at pre- and post-intervention, and by the relatively short period of only a few weeks between pre- and post-assessment. Due to the small sample size of this study, the test has relatively low power. Power refers to the probability of correctly rejecting a false null hypothesis, and increases with sample size. Greater power is desirable because it decreases the likelihood of not finding a difference that is there (Type II error).⁷

When evaluating mean scores on the YFBC3 by age, no statistically significant differences were found between age groups. Eight- year old participants tended to have the lowest mean score on YFBC1, and ten year olds tended toward the highest scores. On YFBC3 nine year olds had slightly higher mean scores, and eleven year olds tended to have the lowest. One might expect that the oldest age group would score the highest on YFBC1 due to the possibility that they had been exposed to this information before 4-H EFNEP and may already practice good nutrition behaviors; however this was not

demonstrated by the participants scores. The eight year old participants tended to have the lowest mean score on YFBC1, but also showed the greatest increase between the score on YFBC1 and YFBC3, increasing their score by 7.83 points. The ten year olds, who had the highest mean score on YFBC1, showed a slight decrease between the mean of YFBC1 and YFBC3, decreasing their score by -.86 points. It may be that the youngest age group showed the greatest increase in score because they are more easily influenced by the lessons presented in 4-H EFNEP and have not yet developed nutrition habits that are difficult to change.

When evaluating mean scores on the basis of last grade completed, patterns similar to those observed among age groups emerged. Students having just completed the second grade had the lowest score on YFBC1, while these students had the highest mean score on YFBC3. Third graders had the second highest score, fourth graders had the third highest, and fifth graders had the lowest mean score on YFBC3. Second graders increased the mean score from YFBC1 to YFBC3 by 12.16 points, while the other age groups increased their mean scores considerably less, and the amount of points their score increased got lower as the grade level went up. This may be due to lower prevalence of poor nutrition habits on the part of older participants. It may also be that lessons used are geared towards younger learners, such as the use of games and hands on activities. Older participants may already have nutrition practices in place that are difficult to change with a short-term treatment such as 4-H EFNEP.

The Hispanic participant in this study showed a tendency to have a lower score on YFBC1, but also showed the greatest increase between YFBC1 and YFBC3 and had the highest score on YFBC3. Multi-cultural participants tended toward the highest mean score on YFBC1, but had a decrease of .50 points from YFBC1 to YFBC3. However, with only four participants in these race categories, more investigation is needed before definite statements can be made about scoring on the YFBC.

Black and white participants had similar scores on YFBC1, but white participants showed a greater increase in score from YFBC1 to YFBC3. However, there was not a statistically significant difference between these two groups mean scores on YFBC3. It is difficult to determine the cause of differences between mean scores based on race, but

food and nutrition may be viewed differently by ethnic groups. This may effect how children respond to treatment, especially when the treatment may or may not be specifically tailored to the child's particular culture. Presentation of the material may also vary depending on the ethnicity and culture of the PA or volunteer presenting the information. Language and nutrition views may effect the presentation of material due to cultural differences.

Female participants tended to have a higher mean score on YFBC1 than their male counterparts and also had a slightly higher mean score on YFBC3. Male participants tended to have a greater increase in their mean score from YFBC1 to YFBC3, increasing their mean score by 2.76 points. However, no statistical significance was found when comparing YFBC3 mean scores based on gender.

There was a significant difference between the means of small town participants and large city participants when comparing the mean scores on YFBC3. ($p < .05$) This difference was unexpected and suggests that further qualitative research may need to be done to examine what accounts for the differences between geographic regions. Participants from large cities had the lowest mean score on YFBC1, and participants from small towns had the highest score on YFBC1. Participants from small towns had significantly higher scores on YFBC3 than large city participants and also had the greatest increase in score from YFBC1 to YFBC3, with an increase of 6.11 points. This increase from pre- to post- was statistically significant at $p < .01$.

Participants with an average of 9.3 hours of contact tended to score higher on YFBC1 and YFBC3, increasing their mean score by 4.34 points. Participants with fourteen hours of contact tended to show a decrease in mean score on YFBC3, but the decrease was not significant. The difference in mean scores on YFBC3 between these two groups was statistically significant, with the group with the lower number of contact hours having a higher mean post- score. This difference was the opposite of what is expected, if one assumes that the more one is exposed to treatment the greater the increase in desired behavior. The difference may be due to differences in treatment quality. This finding suggests that differences in teaching style, experience, and

presentation of material have a large impact on treatment outcome. In this study no evaluation was done on the participating PAs experience or education.

CHAPTER 5

SUMMARY AND RECOMMENDATIONS

Summary of Results

A 24 item Youth Food Behavior Checklist (YFBC) was developed based on 13 topics and food-related behaviors that are expected to be taught to youth (aged 9 to 13 years) in the Virginia 4-H EFNEP youth program. The instrument was designed to insure content validity by the following procedure. A systematic process was used by the researchers to review all lessons in the curriculum to identify key behaviors that are expected to be taught in 4-H EFNEP and to develop instrument items that addressed those key behaviors. Program leaders and field workers (i.e. Program Assistants) reviewed the checklist items and helped to determine additional items to be added or those to be deleted.

The instrument was tested for test-retest reliability and ability to detect change from pre- to post-intervention with 47 youth. Data were collected in the summer of 1998 with youth who had just completed the 2nd through the 5th grades of school. The YFBC demonstrated a fairly high level of test-retest reliability with a Pearson correlation coefficient of 0.81, indicating that participants gave consistent responses when completing the instrument on two occasions, about a week apart, with no intervention.

Results were mixed in regard to the ability of the YFBC to detect change from pre- to post-intervention. Generally, the YFBC demonstrated sensitivity to change in nutrition behaviors, by showing positive change for some items and negative change for other items in all but nine of the participants. These nine included the five participants who had not completed both YFBC1 and YFBC3 and the four participants who demonstrated no change.

The instrument appeared to successfully measure behaviors taught in 4-H EFNEP lessons, as questions regarding only two topics (skipping meals and asking adults to buy fruits or vegetables) did not demonstrate change from YFBC1 to YFBC3. Information on these topics was reportedly presented to four of the five groups participating in this study. It is possible that the lack of change is due to ineffective teaching methods, but this needs

to be studied through additional research. The checklist question on skipping meals showed no change, but participants tended to report desirable behavior before treatment and had the same positive level of behavior after treatment, thus, change could not be expected. Topics that tended to show positive change, indicating an increase in desired behavior, included fruits and vegetables as snacks, washing hands, assisting with meals, exercise frequency, eating breakfast, vegetable consumption, eating fresh fruit, salty snack consumption, sweet consumption, time spent inside/outside, and naming the food groups. Topics that tended to show negative change, indicating a decrease in desired behavior, included trying new foods, variety in diet, washing fruit, cleaning the table/counter, refrigeration, modifying diet due to fat/sugar, milk consumption, grains/bean consumption, water consumption, carbohydrate consumption and choosing a cereal.

Only three of the forty-seven participants demonstrated a significant increase in the overall score from YFBC1 to YFBC3, while twenty-two others showed a slight, but non-significant increase. Thirteen participants had a slight decrease in overall score, and four participants demonstrated no change between YFBC1 and YFBC3 on overall score.

Recommendations

Since only a few items on this instrument detected significant change by participants, it is recommended that it be tested again with a larger sample of participants. This will increase the power of the study and give more credibility to the findings.

The researcher believes that certain adverse circumstances among the youth groups in this study contributed to the mixed or absence of positive results with the YFBC. In communication with the program assistants (PAs) who collected data, it was revealed that there was major difficulty in getting parents to return consent forms for their children to participate in this study. This greatly reduced the number of participants that could be included in the study. Furthermore, PAs reported that the summer groups were often large and unorganized and did not provide a suitable setting for administering the instrument according to the study plan. It is recommended that the instrument be tested further with children in school groups, as it is possible that a greater percentage of parents

would return consent forms. Also, a school setting would be more organized and allow the instrument to be administered properly.

Another possibility for increasing the return of consent forms from parents would be to offer compensation. This compensation would not need to be monetary, but could be vouchers from local restaurants or food coupons that could be mailed to those parents who returned a consent form.

Most of the PAs also indicated that the length of the instrument made it difficult to administer it in a timely and orderly manner. The instrument should be evaluated to determine if it can be shortened, but still detect the most important behavior changes. Organization and length of time involved are particularly important when working with large groups, as are commonly worked with in the summer. The length of time to administer the instrument is also of particular concern since many of the 4-H EFNEP groups in Virginia meet in school and the length of time allotted to the program is about 30 to 45 minutes. The time to administer the instrument was the single greatest concern expressed by PAs during the course of this study.

To shorten the instrument, it is recommended that Questions 12 (how often one exercises or plays outside) and 22 (whether more time is spent inside or outside) be combined into one question regarding how much time is spent outside in physical activity. The total number of questions could also be decreased by having fewer questions on food preparation and safety. Questions 5, 6, 7, and 8 are all on the topic of food preparation and safety, making this topic the most frequently addressed on the YFBC.

If Question twenty-four regarding how best to choose a breakfast cereal is kept as part of the instrument for future use, it is recommended that the options be changed. The only answer counted as correct was “how healthy it is” and the answer “how it tastes” was considered incorrect. This is not in keeping with the principles of good nutrition, as food that is healthy can also taste good, and taste of food should not be disregarded when making food choices. Instead, an option of “how healthy it is and how good it tastes” could replace the two choices previously listed separately.

It is recommended that a standard set of directions for administration be put into place and that PAs be required to follow standard procedures. Variations in presentation and the way the instrument was administered appeared to affect the outcome. PA experience and education also seem to impact the outcome of the program. The PAs participating in this study were given explicit directions on how to administer the instrument, but there was no way to monitor whether the instructions were followed or to enforce their use. PAs also admitted that following these instructions was difficult with large, unorganized summer groups.

To insure greater PA participation in future studies involving this instrument, it is recommended that some means be used to encourage all PAs working with youth to participate. The number of PAs involved and the number of youth groups enrolled in this study was very low, despite efforts to have every PA in Virginia to enroll at least one group.

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APPENDIX A
4-H EFNEP PARTICIPANT PARENT CONSENT FORM

APPENDIX A

Parental Consent

Virginia Polytechnic Institute and State University

Informed Consent for Participants of Investigative Projects

Title of Project: An Assessment Instrument for Measuring Behavior and Knowledge Change Among Virginia 4-H EFNEP Participants

Principal Investigator: Angela Wood

I. The Purpose of this Research/Project

Your child is invited to take part in a study about nutrition and food sponsored by researchers in the Department of Human Nutrition, Foods and Exercise at Virginia Tech. The purpose of this study is to develop a checklist which accurately measures nutrition behavior and knowledge change among 4-H participants in Virginia. Your child's participation in this project is purely voluntary.

II. Procedures and Methods

Each child will answer a series of questions regarding his or her current nutrition behavior and knowledge. The checklist will be administered on three different occasions, as part of your child's participation in 4-H EFNEP.

III. Risks

There are no risks associated with this study.

IV. Benefits of this Project

There will be no compensation or reward for the participants in this study. No promise or guarantee of benefits has been made to encourage your child's participation. If you would like the results of this research, you may contact the principal investigator for a copy.

V. Extent of Anonymity and Confidentiality

Your child's name will be recorded on their responses, but will not be released to anyone other than the researchers for this project.

VI. Compensation

There is no payment or compensation for taking part.

VII. Freedom to Withdraw

Your child is free to withdraw from this study at any time without penalty.

VIII. Approval of Research

This research has been approved, as required, by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University and the Department of Human Nutrition and Foods.

IX. Subject's Responsibilities

My child has permission to take part in this study. My child has the following responsibilities:

- 1. Answer the checklist given to him or her by the 4-H EFNEP Program Assistant. The checklist will be given on 3 different occasions.

X. Subject's Permission

I have read and understand the informed consent and conditions of this project. I have had all of my questions answered. I hereby acknowledge and give my voluntary permission for my child to take part in this project.

If my child chooses to take part, he or she may withdraw at any time without penalty.

Signature

Date

Please Print Child's Name

Please Sign Here Only if You Do Not Want Your Child to Take Part

If I have any questions about this research or its conduct, I will contact:

Angela D. Wood, Investigator

phone: 540-231-7708

Ruby H. Cox, Faculty Advisor

phone: 540-231-7156

H. T. Hurd, Chair, IRB
Research Division

phone: 540-231-5281

APPENDIX B
LETTER TO PARENTS OF PARTICIPANTS

APPENDIX B

Dear Parent or Guardian,

Your child has been chosen to take part in a project about nutrition and food. The project is sponsored by researchers at Virginia Tech, in the Department of Human Nutrition, Foods and Exercise. The purpose of the study is to find out what children in 4-H learn from this program. To take part in this study, your child will be asked to answer several questions on the foods they eat. Their answers will not be graded and the questions will be given to them during their 4-H lessons.

In order for your child to take part, we will need your consent. Please read the form enclosed, sign where indicated and have your child bring it with them to the next 4-H group meeting. If you have any questions, please call me at 540-231-7708.

Thank you for your help with this. Remember, your child's participation is strictly voluntary.

Thanks again!

Angela D. Wood

APPENDIX C
4-H EFNEP PARTICIPANT CONSENT FORM

APPENDIX C

Child Consent

Virginia Polytechnic Institute and State University

Informed Consent for Participants of Investigative Projects

Title of Project: An Assessment Instrument for Measuring Behavior and Knowledge Change Among Virginia 4-H EFNEP Participants

Principal Investigator: Angela Wood

I. The Purpose of this Research/Project

You are invited to take part in a study about nutrition and food sponsored by researchers at Virginia Tech. The purpose of this study is to develop a checklist to measure changes kids make after being in 4-H EFNEP. You are free to decide whether or not to take part in this study.

II. Procedures and Methods

The procedures to be used in this research are as follows:

1. You will answer some questions regarding what you eat. Your answers will not be graded. The time involved is about one hour.
2. The checklist will be given on 3 different occasions.

III. Risks

There are no risks associated with this study.

IV. Benefits of this Project

There will be no compensation or reward for the children in this study. No promise or guarantee of benefits has been made to encourage me to take part. If I would like the results of this research, I may contact the principal investigator and request a copy.

V. Extent of Anonymity and Confidentiality

I understand that my answers will be numerically coded for evaluation. My name will not be released to anyone beyond the researchers for this project.

VI. Compensation

There is no payment or compensation for taking part.

VII. Freedom to Withdraw

I am free to withdraw from this study at any time without penalty.

VIII. Approval of Research

This research has been approved, as required, by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University and the Department of Human Nutrition and Foods.

IX. Subject's Responsibilities

I voluntarily agree to take part in this study. I understand that I have the following responsibilities:

1. Answer the checklist given to me by the 4-H EFNEP Program Assistant. The checklist will be given to me on 3 different occasions.

X. Subject's Permission

I have read and understand the informed consent and conditions of this project. I have had all of my questions answered. I hereby acknowledge and give my voluntary consent to take part in this project.

If I choose to take part, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

Signature

Date

Please Print Child's Name

If I have any questions about this research or its conduct, I will contact:

Angela D. Wood, Investigator

phone: 540-231-7708

Ruby H. Cox, Faculty Advisor

phone: 540-231-7156

H. T. Hurd, Chair, IRB
Research Division

phone: 540-231-5281

APPENDIX D
PROGRAM ASSISTANT INSTRUCTIONS

More About You

Initial Meeting

(Blue checklist)

No lesson should be taught at this initial group meeting. Each of the following steps should be followed – check each step off as you proceed.

1. Separate students (from the larger group) those who have just completed the third, fourth or fifth grade.
2. Distribute pencils and a Child Consent Form to each student.
3. Read aloud the entire Child Consent Form.
4. Ask for the students who wish to participate to sign the form. Collect all of the signed forms.
5. Distribute the ***More About You*** checklist (blue). (**Note, if any child does not wish to take part in this study, he or she should not be given the checklist.**)
6. Administer checklist according to directions.
7. Collect all of the completed checklists.
8. Distribute to each student a Parent Consent Form to take home and have signed. Instruct students to return the form at the next meeting!

*[Note, when going over Child Consent forms with the children, please read each section aloud. Be sure the children understand that if they do not wish to take part in this study for any reason, they are not required to do so. **At no time** should any child be persuaded to take part if they do not want to participate.]*

Before Lesson 1 is taught

*(Important! Important! Before teaching Lesson 1, administer **More About You Green** checklist)*

1. Collect signed Parent Consent forms. If a parent indicates they do not wish for their child to take part, **do not** give the child checklist to complete.
2. Distribute pencils and checklists (green).
3. Administer checklist according to directions
4. Collect completed checklists.
5. Remind children who did not return Parent Consent forms to bring them to the next meeting

After the last lesson has been taught.
(Cream checklist)

Note, if a child has not returned a Parent Consent form, they should not be given to complete.

1. Distribute pencils and *More About You* checklist (cream).
2. Administer checklist according to directions.
3. Collect completed *More About You* checklists.

What needs to be turned in?

After the second administration of the *More About You* checklist, the following items should be delivered or sent to Angela Wood:

1. ***More About You*** (blue), completed checklists
2. ***More About You*** (green), completed checklists
3. Collected Child Consent forms
4. Collected Parent Consent forms

After the last administration of the *More About You* checklist, the following items should be delivered or sent to Angela Wood:

1. ***More About You*** (cream), completed checklists
2. Remaining Parent Consent forms
3. Remaining Child Consent forms
4. Copy of Lessons Log – to include which lessons that were taught to the group(s) that completed the three ***More About You*** checklists
5. Your master copy of each checklist, with notes on which items children had questions on.

Materials should be sent to:

Expanded Food and Nutrition Education Program
Attention: Angela Wood
229 Wallace Hall
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061-0228

MORE ABOUT YOU

Directions for administering the **More About You** checklist

Important Points to Remember

- This is a checklist. At no time should it be called a test or quiz.
- We are trying to find out what the children actually do in regard to their eating habits, NOT what we want them to do. The children should be instructed that there are no right or wrong answers, and to respond according to what they do.
- Allowing enough time for the children to answer is very important. Read each item and option slowly and clearly. Pause after each question to allow them time to answer.
- If there is any question from a child on one of the questions, please make a note on your copy of the checklist, which will be turned in.
- For some of the questions responses can be communicated (if asked) as follows:
Always- Done all the time
Most of the time- Done a lot, but not always
Not very often- Done sometimes, but not very frequently
Never - Not ever done
- It is important for **More About You** to be presented in the same way each time.

Directions

Please read the following statement before proceeding with these directions.

“We are going to have some special lessons and fun together! I need to find out more about you! I am going to read you some questions. I want you to mark the answer that is most like what you do. There are no right or wrong answers. When you get the paper, do not write on it until I tell you. Okay?”

Distribute pencils and appropriate checklist.

“Okay, let’s all look at the first page together. Do you see the space for your name? Please write in your name. *(pause)* Now write in how old you are. *(pause)* Next, write in what grade you have just completed. *(pause)* Now mark whether you are male or female. *(pause)* Next please mark your race. *(pause)*

“Now I am going to read some questions aloud to you, and I would like for you to read the questions to yourself at the same time. After I read the question, you should mark the answer which is most like what you do by placing an X beside your answer. Remember, there is no right or wrong answer, so mark the answer that is most like what you do. If you have a question, raise your hand and I will help you. Are we ready? Okay, let’s begin with question number one.”

Read each question and answer aloud to the group, allowing time after each question for the children to mark their answers. Periodically (perhaps after questions 7 and 14) ask if anyone has any questions.

When you get to question 18, make this statement “We’re almost finished. Just a few more questions to go. Does anyone have any questions?”

Proceed with remaining questions. When all questions have been answered, have children turn in pencils and checklists, and take a quick break. It’s done!

APPENDIX E

Youth Food Behavior Checklist

More About You

Name_____

Age_____

Last Grade Completed in School_____

Gender: () Male () Female

Race: () Black, not of Hispanic origin () Hispanic
 () White, not of Hispanic origin () Asian or Pacific Islander
 () American Indian or Alaskan native () Multi-cultural

1. When you can choose, how often do you have vegetables or fruits as a snack?
 () Always
 () Most of the time
 () Not Very Often
 () Never
2. When you can choose, how often do you skip meals?
 () Always
 () Most of the time
 () Not Very Often
 () Never
3. When you can choose, how often do you help someone else fix something to eat?
 () Always
 () Most of the time
 () Not Very Often
 () Never
4. When you can choose, how often do you eat different kinds of foods instead of the same foods over and over?
 () Always
 () Most of the time
 () Not Very Often
 () Never

5. When you can choose, how often do you wash fruit before you eat it?
 Always
 Most of the time
 Not Very Often
 Never

6. When you can choose, how often do you clean the table or counter before you lay food on it?
 Always
 Most of the time
 Not Very Often
 Never

7. When you can choose, how often do you wash your hands before touching or eating food?
 Always
 Most of the time
 Not Very Often
 Never

8. When you can choose, how often do you put foods like milk or meat back in the refrigerator after using them?
 Always
 Most of the time
 Not Very Often
 Never

9. When you can choose, how often do you ask a parent or adult to buy fruit or vegetables that you like?
 Always
 Most of the time
 Not Very Often
 Never

10. When you can choose, how often do you try foods you have never eaten before?
 Always
 Most of the time
 Not Very Often
 Never

11. When you can choose, how often do you change what you eat because of how much fat or sugar it has?
 Always
 Most of the time
 Not Very Often
 Never
12. When you can choose, how often do you exercise or play outside?
 Always
 Most of the time
 Not Very Often
 Never
13. I eat breakfast....
 Everyday
 Often, but not everyday
 Almost Never
 Never
14. I drink milk, or have milk on cereal....
 2 or more times a day
 1 time a day
 Less than once a day
15. I eat vegetables....
 3 or more times a day
 2 times a day
 1 time a day
 Less than once a day
16. I eat whole grain cereals, peas or beans....
 3 or more times a day
 2 times a day
 1 time a day
 Less than once a day
17. I eat fresh or canned fruit or drink real fruit juice....
 3 or more times a day
 2 times a day
 1 time a day
 Less than once a day

18. How much water do you drink every day?
 6 or more glasses a day
 2-5 glasses a day
 1 glass or less a day
19. I eat either bread, tortillas, noodles, or rice....
 [Count for bread or tortillas - 1 slice of bread, 1 roll, 1 biscuit, or 1 tortilla]
 [Count for noodles or rice - 1 large spoonful of either]
 6 or more times a day
 2-5 times a day
 Less than once a day
20. I eat potato chips, cheese doodles, or corn chips....
 3 or more times a day
 2 times a day
 1 time a day
 Less than once a day
21. I eat sweets....
 3 or more times a day
 2 times a day
 1 time a day
 Less than once a day
22. When you are not in school or in daycare and you have a choice, how much of your time do you spend inside (for example, reading, watching TV, playing board games, etc.) and how much do you spend outside (playing tag, hide and seek, shooting basketball, etc.)?
 More time inside
 More time outside
 About the same amount of time inside and outside
23. Name as many of the food groups as you can.

24. I would choose a cereal in the store by....
 How cool the prize is
 How healthy it is
 How the box looks
 How it tastes

VITA

Angela Wood Dunham

Angela Dawn Wood was born November 3, 1972 in Radford, Virginia. She received her Bachelor of Science degree in Health and Physical Education from Radford University in 1994. While at Radford University she was a member of Alpha Sigma Tau sorority, Psi Chi National Honor Society in Psychology, and Pi Gamma Mu International Honor Society in Social Science. She received her Master of Science degree in Human Nutrition, Foods and Exercise from Virginia Tech in December of 1999. Ms. Wood was married to John Dunham on August 29, 1998. After completing her Master's degree, she would like to work with low- income populations in the area of nutrition education.