A nutrition education curriculum, *Food Talk*, was delivered to EFNEP-eligible adolescents in Georgia. Pre- and post-intervention data was collected using EFNEP’s Youth Evaluation Tool to assess changes in EFNEP’s four priority behaviors. Content coverage was assessed by measuring the degree of curriculum coverage for each quantitative NYET question. Additionally, a subset of the population completed qualitative surveys and a focus group to assess acceptability. Fruit consumption, washing produce, and resource use improved significantly (P<0.05). Content coverage did not correspond to behavior improvement. Qualitative results suggest the curriculum is acceptable, but adolescents want more engagement, more useful educational extenders, and recipes tailored to their food preferences. Future studies should consider knowledge change as well as which models of behavior change are most appropriate for adolescents. Adaptations to the Food Talk curricula should consider providing opportunities for active learning, physical activity, and test recipes for acceptability with adolescents.

**Key words:** EFNEP, Food Talk, Adolescents, Nutrition education
PILOT TESTING THE EFNEP FOOD TALK CURRICULUM WITH GEORGIA ADOLESCENTS

by

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PILOT TESTING THE EFNEP *FOOD TALK* CURRICULUM WITH GEORGIA ADOLESCENTS

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CHAPTER 1

INTRODUCTION

Obesity, malnutrition, poverty, and hunger are pervasive in the United States’ most vulnerable communities. It is critical to develop successful interventions that address the needs of these communities, especially with adolescents, since adolescence is a critical period for developing healthy habits and obesity prevention. The Expanded Food and Nutrition Education Program (EFNEP) is a federally funded program that was created in 1969 to improve health behaviors among rural and urban, low-income communities by providing nutrition education in community-based settings. Curricula used in EFNEP programming must address four core emphasis areas: diet quality and physical activity, food resource management, food safety, and food security. The Food Talk curriculum, developed at The University of Georgia, fulfills EFNEP requirements and has garnered wide acceptance among Georgia EFNEP paraprofessional aides who deliver adult programming.

In recent years, EFNEP’s National Program Leaders issued a directive for states to implement evidence-based curricula for older adolescents to improve nutrition related behavior. However, an evidence-based curriculum that addresses the needs of adolescents as well as the core emphasis areas of EFNEP is not available. The current Food Talk curriculum was not designed to meet the learning needs of adolescents or the specific outcomes assessed in EFNEP’s National Youth Evaluation Tool. Therefore, there is a critical need to study and potentially adapt the adult Food Talk curriculum for older adolescents.
Significance of the Study

Late adolescence is a critical window for changing and establishing health behaviors. However, an evidence-based curriculum that targets each of the behaviors assessed by EFNEP’s National Youth Evaluation Tool is not widely available for this age group. This project will provide information to develop a curriculum tailored to the specific needs of older adolescents in EFNEP-eligible communities in Georgia. The findings will inform modifications of the Food Talk curriculum to better address the needs of adolescents and create lasting impact on diet quality and physical activity, food resource management, food safety, and food security practices. In addition, this research will advance the mission of EFNEP leadership, to deliver and evaluate programming with older adolescents (ages 14-18 years old), and benefit the health and wellbeing of adolescents in the US.

Purpose of the Study and Research Questions

This project is one step toward the long-term goal to modify the adult Food Talk curriculum to be used for adolescent nutrition education in EFNEP-eligible communities in Georgia to improve nutrition and health behaviors among older adolescents from limited-resource families. This research project had the following two aims:

1. Evaluate the effectiveness of the adult Food Talk curriculum to facilitate behavior change among 14-18 year old adolescents as measured by EFNEP’s National Youth Evaluation Tool

2. Evaluate the acceptability of the Food Talk curriculum with adolescents via qualitative data collection.

It was expected that the program would affect some behavior change, but that a modified Food Talk curriculum would have better participant outcomes. Additionally, the results of the
qualitative data collection were expected to reveal potential modifiers for the adapted *Food Talk* curriculum. This project is innovative and impactful because it will provide information to develop the first curriculum tailored to the specific needs of older adolescents in EFNEP-eligible communities in rural Georgia. In addition, this research will advance the mission of EFNEP leadership and benefit the health and wellbeing of adolescents in rural Georgia.
CHAPTER 2
LITERATURE REVIEW

Introduction

In the United States, obesity, malnutrition, poverty, and hunger are pervasive in the nation’s most vulnerable communities (WHO, 2017). In addition, the rates of childhood and adolescent obesity (ages 5-19) have increased exponentially in the past 40 years (WHO, 2017), with the most recent data indicating that 18.5% of children and adolescents in the United States are obese, and 20.6% of adolescents ages 12-19 years old are obese (Carroll et al., 2017). Obese children are at a higher risk of becoming obese adults and can experience the negative health consequences associated with the disease, such as high blood pressure and elevated cholesterol (Singh et al., 2008; Barlow et al., 2007). Few children meet the guidelines on physical activity, screen time use, sugar-sweetened beverage consumption, and fruit and vegetable intake (Kunin-Batson, 2015), suggesting that these outcomes are appropriate targets for behavior-change interventions.

The Expanded Food and Nutrition Education Program (EFNEP) is a federally funded program that was created in 1969 to improve health behaviors among low-income communities by providing community members with nutrition education (USDA, 2018). EFNEP delivers a series of community-based, hands-on, interactive nutrition education sessions on four major priorities: diet quality and physical activity, food resource management, food safety, and food security (USDA, 2017). The target audience includes caregivers of children, pregnant women and adolescents, and youth from low-income households.
The following literature review will address the relationship between adolescence and obesity prevention related to current lifestyle patterns, mediating factors for behavior change, and EFNEP’s current efforts to target older-adolescent youths in low-income communities.

**Effect of adolescent age on behavior and habit development**

Adolescence (approximately ages 14-18) is proven to be a critical period for developing healthy, lifelong habits (Lamb et al., 2001). Physical, emotional, and hormonal changes cause adolescents to develop at different rates and have different levels of maturity (Lamb et al., 2001). In addition, adolescence is a time of social change, understanding identity, and increasing autonomy (Lamb et al., 2001). During this state of flux, unhealthy lifestyles can develop, or continue to develop, contributing to childhood obesity and the likelihood of obesity and excess mortality in adulthood (Engeland et al., 2004; Lamb et al., 2001).

Viner, et al., discuss how adolescence, second to fetal and infant growth, is the most rapid period of growth and change neurologically, physically, and psychosocially (2015). Adolescents undergo changes in their social roles, peer-to-peer relationships, education, and employment. Most importantly, independent choices on health-related behaviors begin at this time, such as alcohol and drug use. Finally, multiple mortality risk factors are strongly determined in adolescence, such as physical inactivity and high BMI. In a study conducted by Engeland and colleagues, approximately 128,000 adolescents (14-19 years old) were measured for height and weight via self-administered questionnaires and then followed up 10 years later to evaluate the association between adolescent and adult BMI and mortality (2004). Researchers found that adulthood obesity correlated with excessive weight gain in adolescence. In addition, those adults who had an overweight BMI percentile in adolescence had an increased mortality rate compared to those within a normal-range BMI percentile. This study suggests than adolescent weight
management can have a large impact not only on weight management in adulthood, but also on mortality.

While adolescents are still cognitively, physically, and socially developing, they are able to make informed decisions about their health and understand health consequences of their actions (Weithorn et al., 1982). In 1982, Weithorn and researchers studied 96 subjects at different age levels (9, 14, 18, and 21) to determine if the youths were able to reason, understand, and have the capacity for health-care decision making. The youths interacted with hypothetical treatment dilemmas and were scored on the competency of their responses. Adolescents ages 14 and older did not differ in measure in comparison to adults. Therefore, this study suggests that adolescents have similar levels of competency with evidence of choice, reasonable outcome, rational reasons, and understanding in healthcare decisions. Additionally, a study conducted by Dunsmore and Quine (2008) explored the treatment experiences of young adults with cancer, aged 12-24 years. A self-administered questionnaire was given to assess their degree of information, support, and preferences in care. The young adults wanted to be involved in the decision-making process and wanted to be aware of their prognosis and treatment options. Again, this evidence suggests that adolescents are not only capable of making healthcare decisions, but prefer to have autonomy and involvement in the process.

**Diet quality and health behaviors among adolescents**

According to the 2008 Youth Activity Guidelines generated by the US Department of Health and Human Services, adolescents need 60 minutes of physical activity per day (UDHHS, 2008). Additionally, they need to incorporate bone and muscle strengthening exercise three times a week (UDHHS, 2008). The American Academy of Pediatrics released general guidelines on screen time in children ages six and older, but there was not a time limit placed on screen time,
only a broad statement that screen time should not interfere with sleep patterns or physical activity and should be personalized to the adolescent (AAP Council, 2016). The USDA recommends that adolescents follow the Dietary Guidelines for Americans 2015-2020, but also highlights the importance of increased iron and dairy intakes and decreased sugar-sweetened beverage intake in adolescents (UDHHS and USDA, 2015).

In order to understand how to generate a behavior change curriculum suitable for adolescents, health trends and patterns of older adolescent youths need to be understood. According to the 2015 results from the Youth Risk Behavior Surveillance System (YRBSS), approximately 14% of adolescents in 9th through 12th grade were obese. Only 14.8% ate more than three servings of vegetables per day, and only 20% ate three or more servings of fruit per day. Overall sugar sweetened beverage consumption greater than three times per day has decreased since 2007 and now is approximately 7%. Only 26% of adolescents surveyed did not consume a sugar-sweetened beverage within the seven days before the survey (CDC, 2015).

Health behaviors of Georgia adolescents are similar to national averages. Approximately 40% of older adolescents grades 9-12 living in Georgia consume fruit and vegetables less than 1 time per day (CDC, 2017). Only 12% of adolescents in Georgia were obese, compared to the nationwide average of 14%. Only 38% of adolescents had a park, sidewalks, and/or accessible recreation centers in their neighborhoods, which may be a contributing factor to the 75% of Georgia adolescents who are not physically active daily. Over half of the schools allow students to purchase sports drinks and 35% of Georgia’s public schools allow students to purchase soda on school grounds (CDC, 2017), so access to unhealthy foods and beverages is a problem for Georgia adolescents. Finally, 32% of Georgia adolescents watch three or more hours of television daily. However, this number does not account for the amount of hours spent in front of
a computer, on a cell phone, or on a tablet, which likely contribute to sedentary behavior and inactivity in adolescents (CDC, 2017). Therefore, Georgia adolescents, similar to adolescents across the nation, have suboptimal health behaviors and are in need of education and intervention to prevent obesity and improve health.

**Targets for behavior change and previous interventions among adolescents**

Obesity and health in general are complex, and there are a variety of factors that affect adolescent health. Several health behavior change theories focus on addressing not only the individual, but also the environment in which he/she exists. These theories and factors may be even more relevant for adolescents, given that they have more environmental factors that are not in their control compared to adults. The following sections review factors that are related to the adolescent health behavior.

*Home-food environment.* While addressing obesity requires coordinated care across multiple platforms and is a multifactorial disease, home-food environment plays a large role in shaping the nutritional habits and beliefs of adolescents (USHHS, 2011). Home-food environment refers to a multitude of environmental factors that influence food choices, such as sociocultural environment (e.g. Family food rules, frequency of eating out), physical environment (E.g. Availability of nutrient-dense foods), and child/parent characteristics (e.g. Child age, parent BMI) (Couch et al., 2014). In 2014, Couch and colleagues published research on their longitudinal cohort study about the relationship between the home-food environment and nutritional outcomes, such as diet quality and weight status, of approximately 700 child-parent pairs (Couch et al., 2014). A survey was given to parents that asked detailed questions about the home-food environment and individual and household-level characteristics. Both the children and the parents completed 24-hour food recalls. Researchers concluded that the children’s diet
quality was associated with home food availability. For example, high availability of unhealthy foods (i.e., high-fat snacks and energy-dense foods) was positively associated with sugar-sweetened beverage intake and negatively associated with fruit and vegetable intake. Additionally, researchers found that the children’s BMIs were negatively associated with the parents’ use of modeling and encouragement of positive eating behaviors to eat fruit and vegetables and positively associated with parents’ use of food restriction, permissive feeding practices, and the cost of healthy foods. A study conducted by Loth and colleagues also addressed the associations between the home-food environment and adolescent dietary intake by studying 2383 parent-adolescent pairs (2016). A positive correlation was found between healthy food availability in the home and fruit and vegetable intake. Additionally, parental modeling of nutrition behaviors, such as fruit and vegetable intake and sugar-sweetened beverage intake, was associated with changes in soda and snack food consumption. These relationships suggest that addressing an adolescent’s home-food environment can play a role in changing their nutrition behavior.

*Additional environmental considerations.* Adolescents’ nutrition choices are affected by other environments outside of their home-food environment. Lamb and colleagues review the various environmental factors affecting adolescent health. An adolescent’s school environment and culture plays a large role in their day-to-day health behavior choices (Lamb et al., 2001). For example, availability of school meal programs and other food outlets, such as vending machines, concession stands, and classroom parties are part of an adolescent’s food environment within their school (Wechsler et al., 2000). Additionally, the type of physical activity courses available and/or required, such as physical education classes, recess, playing fields, and gymnasiums, also affect adolescent physical activity (Wechsler et al., 2000).
Where the adolescent lives, whether that be in a rural or urban area, changes social and economic exposures (Lamb et al., 2001). For example, rural families are more likely to live in poverty than their urban counterparts, and adolescents from low-income families are more likely to have poor physical health and less access to health services (Lamb et al., 2001). While an adolescent’s living situation cannot necessarily be adjusted or addressed in a nutrition intervention, a nutrition curriculum should be sensitive to the sociocultural realities of the adolescents the curriculum is targeting and inclusive of food preferences given the cultures and lifestyles of the adolescents.

*Cooking skills.* Cooking skills can affect an adolescent’s nutritional behaviors and dietary quality. In a survey of 8,500 secondary school students in New Zealand, Utter and colleagues (2016) found that most adolescents felt they could cook a meal with basic ingredients, but adolescents living in poverty were more likely to report no cooking ability compared to those not living in poverty. Few differences were seen between males and females and between age groups. Cooking ability was associated with better dietary quality, such as meeting recommendations for fruit and vegetable intake and a decreased likelihood of consuming fast food. Other researchers have also found that cooking skills are related to dietary quality. For example, Berge and colleagues (2016) found that adolescents engaging in family cooking had better diet quality and better eating patterns, such as increased fruit and vegetable consumption and healthful nutrient intake (e.g. iron, vitamin C, fiber). Adolescents who participated in cooking family meals greater than three times per week had an additional one-fourth cup of vegetables per day compared to adolescents who did not participate in food preparation. This data does suggest that there is an association between cooking skills and nutritional behaviors. Other studies with younger age groups, such as elementary aged children, have found that
nutrition interventions that involve developing cooking skills improved enjoyment, healthy plate identification, and knowledge on the importance of breakfast and healthy snacks (Walther, 2016). However, these interventions did not impact healthy eating self-efficacy. More data is needed to determine the effect of increased cooking skills and frequency with self-efficacy in making healthy nutritional choices. Self-efficacy is a concept studied under both the Theory of Planned Behavior and Social Cognitive Theory, two modalities used to study youth behavior change that will be discussed in more detail in following sections.

**Theories as the basis for nutrition education interventions**

*Theory of Planned Behavior.* The Theory of Planned Behavior (TPB) is frequently used to develop nutrition interventions for youth and addresses three components: attitude, subjective norm, and perceived behavioral control (Fila & Smith, 2006). Attitude is defined as the degree in which an individual has a favorable opinion on the behavioral outcome (Fila & Smith, 2006). Subjective norm is the measure of importance an individual holds about the behavior change and willingness of change (Fila & Smith, 2006). Perceived behavioral control is the perceived ability or difficulty of performing the behavior change (Fila & Smith, 2006). If those three constructs are addressed, theoretically, the more likely an individual is to perform that behavior (Fila & Smith, 2006).

In 2006, Fila and Smith used an adapted TPB model (three traditional components plus self-efficacy and perceived barriers) in a study conducted with 139 urban Native American youths 9-18 years old. Using a Likert scale, the researchers surveyed the adolescents on attitudes, importance, and perceptions to eating healthy. They also measured eating behavior, assessing sugar-sweetened beverage consumption, fast food consumption, and fruit and vegetable consumption. Researchers found no association between intention to eat healthy and eating
behavior in these youths, suggesting that factors other than intention are at play in adolescent youths. However, among boys, healthy eating behaviors were predicted by subjective norm and perceived behavioral control, while in girls, healthy eating behaviors were predicted by barriers, attitude, self-efficacy, and subjective norms. Researchers concluded that because TPB is centered around the assumption that a stronger intention to do a behavior will increase the likelihood to perform that behavior, it seemed as if this model of behavior change was not efficacious in their sample of adolescents.

However, in a study performed by Riebl and colleagues (2015), TPB explained a small degree of variance among adolescents’ sugar-sweetened beverage consumption. The cross-sectional study evaluated 24-hour dietary recalls against a TPB questionnaire from 100 adolescents. Additionally, the adolescents’ parents completed a beverage intake questionnaire, a TPB questionnaire, and a questionnaire that measured their responses to beverages (E.g. encouraging or discouraging consumption at home). Parents’ perceived behavioral control and adolescents’ subjective norms were the strongest predictors of sugar-sweetened beverage consumption, and intention was the strongest predictor of sugar-sweetened beverage consumption in both adolescents and parents. The authors conclude that TPB accounts for a small, but significant, amount variance in sugar-sweetened beverage consumption, but a majority of the variance remained unexplained, suggesting that a theoretical framework that encompasses the heuristic and evaluative aspects of adolescent decision making could account for more of that variance.

Social Cognitive Theory. Social Cognitive Theory (SCT) has been used to guide behavior interventions, including nutrition interventions (Rinderknecht & Smith, 2004). The primary tenant of SCT is self-efficacy, or a person’s judgement on how capable they are to execute a
performance (Rinderknecht & Smith, 2004). This translates into dietary self-efficacy, or one’s perceptions about how they will perform in their ability to choose healthy foods, which has been associated with improved behavior outcomes in youths (Rinderknecht & Smith, 2004).

Rinderknecht and Smith (2004) sought to improve Native American children and youths’ dietary self-efficacy through the use of a 7-month nutrition intervention based on SCT. Dietary self-efficacy was high at baseline, and there was significant improvement among overweight children, but no effect among adolescents. This could be due to broader mediators that affect self-efficacy and behavior, such as environmental and personal factors.

Another study conducted by Lubans and colleagues sought to clarify the connection between SCT and dietary behavior, as they suggest that much of the determinants of dietary behavior has been shaped by SCT but not assessed for utility and effectiveness (2012). Three hundred and fifty-seven Australian, adolescent girls were given a SCT scale (measures included self-efficacy, intention, and family support) and a food frequency questionnaire (measures included total kcals and saturated fat). Self-efficacy was positively associated with healthy eating and inversely associated with unhealthy eating. However, the pathways between intention and behavior were not statistically significant, so the role of intention in dietary behaviors in adolescent girls was not clarified.

Health Belief Model. The Health Belief Model (HBM) is commonly used in nutrition education interventions (Naghashpour, et al., 2014). The HBM relies on the idea that individuals have choice and can make decisions about their health (Naghashpour, et al., 2014). The primary tenants of the HBM are susceptibility, severity, threat, benefits and barriers, cues to action, and health action (Naghashpour, et al., 2014). Naghashpour and colleagues studied the effect of a HMB-based nutrition education model in changing adolescent girls’ dietary calcium intake. A
food-frequency questionnaire and a questionnaire that measured various aspects of the HBM were given twice over the course of the educational intervention. The intervention improved attitude, practice, susceptibility, and perceived barriers, and calcium intake significantly increased. In an experimental intervention study conducted by Ghaffari, et al., 130 adolescents were split between two nutrition education curriculums aimed at promoting nutritional behaviors associated with osteoporosis prevention (2012). The HBM curriculum was more effective than the control in dietary behavior change, and the degree of awareness significantly increased after intervention in the HBM group (Ghaffari, et al., 2012). Additionally, perceived susceptibility, severity, barriers, and benefits all significantly increased after the HBM curriculum intervention (Ghaffari, et al., 2012).

*Overall efficacy of theories.* Cerin, et al., reviewed the theoretical mechanisms of dietary behavior change (2009). They hypothesized that a lack of behavior modification could be due to study designs influenced by incorrectly-used theoretical frameworks and theories, likely related to the fact that many interventions are not based on causal-relationships studied in randomized control trials nor action theories that affect mediators of dietary behavior. Out of 713 studies considered, only seven studies tested for mechanisms of dietary behavior change. While some studies used only one theory, the Social Cognitive Theory, others used a combination of theories, such as the Transtheoretical Model, Theory of Planned Behavior, and the Health Belief Model. The most relevant and significant correlation was between self-efficacy, perceived control, and outcome expectations and behavior change, components of the Social Cognitive Theory and the Theory of Planned Behavior. For example, some studies found that those with higher self-efficacy had higher fruit and vegetable intake and lower fat intake, but other studies found no significance. Additionally, peer norms were found as a mediator of healthful eating at baseline
and at 1-year follow up in one study, but other studies did not study peer norms. Given the equivocal evidence from these studies, the researchers summated that little is known about how to change behavior change in youths.

Review of mediators. As research in adolescent health behavior has been informed by a variety of theories with varying success, it is likely that a variety of factors are involved in adolescent health behaviors. These include self-efficacy, perceived control, expectations, susceptibility and perceived threat, benefits and barriers, attitude, and subjective norm.

In a 2017 systematic review, Kelly and colleagues explored a variety of potential mediators of nutrition, physical activity, and screen time behavior. Multiple theories were used between the reviewed studies, including Social Cognitive Theory, Social Determinant Theory, and Theory of Planned Behavior. For nutrition, Social Cognitive Theory mediated the relationship between screen time, physical activity, sugar-sweetened beverage consumption, and fruit and vegetable intake. Significant mediators for nutrition outcomes include self-efficacy, planning, forward stage movement, and goal intention and decreased perceived barriers. For example, in one reviewed study, significant increases in fruit and vegetable intake were found with the planning and self-efficacy interventions. However, planning did not influence energy-dense food intake, and there were no effects on body weight. Additionally, self-efficacy mediated increased fruit and vegetable consumption, decreased fat intake, and decreased sugar-sweetened beverage consumption.

For physical activity, decreased perceived barriers and goal intention were significant mediators. For example, addressing perceived environmental barriers of neighborhood safety and sports facility availability and goal setting increased stair use among boys. Unlike nutritional
interventions, self-efficacy was not found to directly mediate physical activity, but when assessed in multiple-mediator models, it indirectly mediated the effects.

Finally, the only screen time mediator found to be significant was autonomous motivation, or engaging in behaviors because of its alignment with intrinsic goals and values. In two studies, increased autonomous motivation mediated decreased screen time use.

This review suggests that different mediators affect different aspects of adolescent health. Therefore, a knowledge and behavior change nutrition education curriculum for adolescents should address multiple mediators and determinants of change. According to this research, one behavior theory may not encompass all mediators that are relevant to adolescent health behavior change. Still, research suggests that interventions based on Social Cognitive Theory and Theory of Planned Behavior do result in some behavior change in adolescents, and thus, may be useful in designing interventions for this age group. Additionally, the Health Belief Model is shown to account for some variance in behavior change, and components of the model could be used in construction interventions.

Qualitative research can complement quantitative research in explaining health behavior and help enlighten researchers on which mediators affect which behaviors. Qualitative data collected by Neumark-Sztainer, et al., from focus group discussions with 141 adolescents from an urban area suggest that many more factors are at play with nutrition choices, such as food appeal and cravings, time, convenience, guardian influence, media, mood, cost, and habit (1999). For example, the first response to why adolescents ate a particular food was “I was hungry,” or because, “I was craving it.” Additionally, adolescents identified taste preference as barriers for healthy choices. For example, taste and appearance were the 2 factors most commonly discussed as a crucial element of making food choices. One adolescent says, “It looks good and you know
it tastes good because you’ve had it before (10th-grade boy). Time was another aspect of adolescent food choice, willingness to spend time cooking and preparing food, in particular. One adolescent says, “This morning, I was in a rush…I just took a sweet roll because I didn’t have time for cereal (7th-grade girl). Another study conducted by Fitzgerald, et al., found similar results (2010). Researchers conducted focus groups with three age groups: 9-10, 13-14, and 16-18 year-olds. Overall, three themes formed: A link between food preferences and awareness of healthy eating, intra-familial factors, and extra-familial factors. For example, adolescents had increased autonomy and decreased parental control over food choices compared to the younger samples. Additionally, adolescents perceived fast-food as having negative consequences on weight, and was used as a rationale for eating healthier foods. Both adolescents and children discussed taste, texture, and appearance as primary factors that influence food choices. Adolescents also discussed time constraints as potential contributors to unhealthy eating; convenience foods that were easy to prepare or practical for school lunches were also important to adolescents.

These studies complement the previously cited quantitative research suggesting that multiple factors are involved in adolescent food and physical activity choices, and curricula addressing behavior change should consider variables important to the adolescents they are serving. With the rising rates of adolescent obesity and the impact of their choices on lifelong health comes the increased need to develop a nutrition curriculum that is effective in adolescent behavior change.

**Summary of theories and mediators**

Late adolescence is a critical window for establishing health behaviors, as it is a rapid period of change and development of lifelong habits. However, the majority of adolescents living
in the United States do not meet the recommendations for dietary quality and physical activity. This identifies adolescence as a key period for addressing unhealthy behaviors and mediators for change. While the mediators of adolescent behavior change have not been extensively studied and the results are mixed on which mediators affect which element of behavior change, the current literature helps identify places where a nutrition curriculum can target an intervention. For example, self-efficacy has consistently been shown to mediate nutrition behavior change, while physical activity was mediated by goal setting and screen time was mediated by autonomous motivation. Additionally, certain theories used in nutrition education interventions for adults are not necessarily effective in producing behavior change among adolescents. For example, in one study, the Health Belief Model was shown to explain a small degree of variance among change in nutrition outcomes, but Social Cognitive Theory and Theory of Planned Behavior were shown to promote a greater degree of nutrition-related behavior change in other studies. Additionally, qualitative measures suggest that taste, time, appearance of food, and growing autonomy also influence adolescent choices. Therefore, researchers should pay special attention to the theory selected in relation to adolescent behavior change targets and the role of external factors, such as the home-food environment, school environment, and cooking skills, which have also been shown to mediate nutrition-related behavior change.

**EFNEP background and policy**

The Expanded Food and Nutrition Education Program (EFNEP) is a federally funded program that was created in 1969 to affect behavior change in low-income communities by providing community members with nutrition education (USDA, 2018). EFNEP delivers a series of community-based, hands-on, interactive nutrition education sessions on four major priorities: diet quality and physical activity, food resource management, food safety, and food security
(USDA, 2017). Through land-grant universities, EFNEP operates in every state in the United States in addition to the District of Columbia and the six U.S. territories (USDA, 2018). Program assistants (i.e. peer educators) from low-income populations are trained to deliver a series of interactive nutrition education sessions (USDA, 2017). Peer educators of similar socio-economic status have been proven effective in establishing rapport and communication between the educators and participants (USDA, 2017).

The curriculum that is used within EFNEP programming varies across states and territories, but the lessons must address the four major priorities. The evidence-based Food Talk curriculum was developed at The University of Georgia as a part of Dr. Gail Hanula’s dissertation research and is successfully used in Georgia to fulfill EFNEP requirements for adult programming (Hanula, 2009), reaching nearly 5,000 adult participants each year (UGA EFNEP, 2014). The adult Food Talk curriculum has shown to be effective for knowledge and behavior change related to hypertension prevention in adults (Hanula, 2009; UGA EFNEP, 2014). Food Talk was successful in adults in significantly increasing vegetable intake (from 1.07 cups to 1.34 cups/day, \( p = 0.02 \)). Fruit and milk intake increased, and sodium consumption decreased, but not at significance level. Scores at baseline were high for perceived benefits of changing dietary behavior to prevent hypertension and self-efficacy, and perceived barriers were low.

In recent years, the National Program Leaders for EFNEP expressed a desire to deliver and evaluate programming with older adolescents (14-18 years old). While other curriculums were explored, they were not determined to meet all four of EFNEP’s core areas (FDA, 2017). Given the long history of success of the Food Talk curriculum and comfort level of educators, the next step was testing the curriculum with adolescents. The curriculum has only been evaluated for effectiveness towards positive behavior change in reducing hypertension risk
among adults. In addition, the curriculum is based on the Health Belief Model, a model that may not necessarily be the most appropriate for adolescent behavior change (Cerin et al., 2009).

Despite the success of the Food Talk curriculum in adults, it is unknown whether the Food Talk curriculum will successfully address adolescent needs and effect behavior change in accordance with EFNEP’s National Youth Evaluation Tool (EFNEP, 2012). EFNEP’s National Youth Evaluation Tool collects youth demographic data and includes behavior checklists to assess knowledge and skill change development in various age groups of children (EFNEP, 2012). A copy of the National Youth Evaluation Tool adapted for the proposed pilot study can be found in Appendix 1.

The current curriculum used for adult programming, Food Talk, could be adapted in order to be implemented for behavior change in low-income adolescent populations. This research study is a set of first steps to explore the acceptability of the Food Talk curriculum for adolescents and to determine if it can be effective for promoting nutrition related behavior change. Results will help inform adaptations to the curriculum or may motivate EFNEP administrators in Georgia to identify or develop a new curriculum that would be more suited to adolescents. Understanding the various underlying factors that affect adolescent behavior change is essential to appropriately and effectively change adolescent behavior towards lasting, healthy lifestyles, and should be considered when adapting the Food Talk curriculum for adolescents.
CHAPTER 3
PILOT TESTING THE EFNEP *FOOD TALK* CURRICULUM WITH GEORGIA ADOLESCENTS*

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*To be submitted to the Journal of Nutrition Education and Behavior*
ABSTRACT

Objective: Determine the acceptability of the adult Food Talk curriculum and behavior change outcomes after pilot implementation with low-income, older adolescents in EFNEP-eligible communities in Georgia.

Methods: An 8-part adult nutrition education curriculum, Food Talk, was delivered to EFNEP-eligible adolescents in Georgia. Pre- and post-intervention data was collected using EFNEP’s Youth Evaluation Tool (NYET) to assess changes in EFNEP’s four priority behaviors: diet quality and physical activity, food resource management, food safety, and food security. Changes in behavior were determined using Wilcoxon signed rank tests. Content coverage was assessed by measuring the degree of curriculum coverage for each quantitative NYET question. The relationship of content coverage to changes in behavior was explored using a Fisher exact test. Additionally, a subset of the population completed weekly qualitative surveys and a culminating focus group to assess the acceptability of the curriculum. An educator interview was also conducted post-intervention. Qualitative data was explored for themes.

Results: Fruit consumption, washing produce, and resource use improved significantly (P<0.05). Content coverage did not correspond to behavior improvement. Qualitative results suggest that the curriculum is acceptable, but adolescents want more engagement with the curriculum, more useful educational extenders, and better recipes that are more tailored to their food preferences.

Conclusions and Implications: Since only three of fourteen nutrition and physical activity behaviors improved significantly, the curriculum may not have fully address the NYET desired behavior change outcomes. However, the NYET questions do not address knowledge change, which may have been an important outcome of the curriculum delivery that could precede behavior change and was suggested as an outcome in the qualitative data. Future studies should
consider knowledge change as well as which models of behavior change are most appropriate for adolescents. Adaptations to the Food Talk curricula and other curricula for EFNEP adolescents should consider providing opportunities for active learning, physical activity, and test recipes for acceptability with adolescents.

**Key words:** EFNEP, Food Talk, Adolescents, Nutrition education

**INTRODUCTION**

In the United States, obesity, malnutrition, poverty, and hunger are pervasive in the nation’s most vulnerable communities (WHO, 2017). The global economic impact of obesity is estimated to be approximately $2 trillion US dollars (Dobbs et al., 2014). In addition, the rates of childhood obesity (ages 5-19) have increased exponentially in the past 40 years (WHO, 2017), with the most recent data indicating that 18% of children and adolescents are obese (Carroll et al., 2017). Adolescence (approximately ages 14-18) is a critical period for developing healthy, lifelong habits (Lamb et al., 2001). Physical, emotional, and hormonal changes cause adolescents to develop at different rates and have different levels of maturity (Lamb et al., 2001). In addition, adolescence is a time of social change, understanding identity, and increasing autonomy (Lamb et al., 2001). During this state of flux, unhealthy lifestyles can develop, or continue to develop, contributing to childhood obesity and the likelihood of obesity and excess mortality in adulthood (Engeland et al., 2004; Lamb et al., 2001). While adolescents are still cognitively, physically, and socially developing, they are able to make informed decisions about their health and understand consequences of their actions (Weithorn et al., 1982; Wong, 1999). Targeting nutrition education towards this age group could have a lasting impact on their lifelong health.

The Expanded Food and Nutrition Education Program (EFNEP) is a federally funded program that was created in 1969 to improve nutrition and health behavior among low-income
community members (USDA, 2018). EFNEP delivers a series of community-based, hands-on, interactive nutrition education sessions on four major priorities: diet quality and physical activity, food resource management, food safety, and food security (USDA, 2017). Paraprofessional aides (i.e. peer educators) from low-income populations are trained to deliver a series of interactive nutrition education sessions (USDA, 2017). Peer educators of similar socio-economic status have been proven effective in establishing rapport and communication between the educators and participants (USDA, 2017). The target audience includes caregivers of children, pregnant women and adolescents, and youth from low-income households.

The curriculum that is used within EFNEP programming varies across states and territories, but the lessons must address the four major priorities. The *Food Talk* curriculum was developed at The University of Georgia and is successfully used in Georgia to fulfill EFNEP requirements for adult programming (Hanula, 2009), reaching nearly 5,000 adult participants each year (UGA EFNEP, 2014). The formative research with this curriculum used the Health Belief Model and addressed self-efficacy, motivation, and perceived benefits and barriers for each of the study’s four behavior change objectives: Consume at least 1 cup of milk per day, eat one cup of fruit or drink 1 cup of fruit juice per day, eat at least one cup of vegetables per day, and consume less than 3,300mg sodium per day. The adult *Food Talk* curriculum has been shown to be effective for knowledge and behavior change related to hypertension prevention in adults (Hanula, 2009; UGA EFNEP, 2014). *Food Talk* was successful in adults in significantly increasing vegetable intake. Nonsignificant increases in intake of fruits and milk products and reduction in sodium were also observed. In regard to nutrition-related behavior change, scores at baseline were high for benefits and self-efficacy, and perceived barriers were low.
In recent years, the National Program Leaders for EFNEP expressed a desire to expand EFNEP programming to older adolescents (14-18 years old) (USDA NIFA, 2017). The *Food Talk* curriculum has previously been used to provide nutrition education for older adolescents. However, the curriculum has only been evaluated for effectiveness in promoting behaviors to reduce the risk of hypertension among adults. In addition, the curriculum is based on the Health Belief Model, a model that may not necessarily be the most appropriate for adolescent behavior change (Cerin et al., 2009).

Despite the success of the *Food Talk* curriculum in adults, it is unknown whether the *Food Talk* curriculum will result in similar behavior change among adolescents. While other curriculums were explored for use in Georgia, they were not determined to meet all four of EFNEP’s core areas (FDA, 2017). Given the long history of success of the *Food Talk* curriculum and comfort level of educators, the next step was testing the curriculum with adolescents.

Therefore, the purpose of this study was to implement and evaluate the *Food Talk* curriculum with low-income adolescents. Specifically, the study had the following two aims: (1) Evaluate the effectiveness of the adult *Food Talk* curriculum to facilitate behavior change among 14-18 year old adolescents as measured by EFNEP’s National Youth Evaluation Tool, and (2) Evaluate the acceptability of the *Food Talk* curriculum with adolescents via qualitative data collection.

**METHODS**

**Study design**

The study was an eight-week nutrition education intervention among Georgia adolescents that utilized the unmodified adult *Food Talk* curriculum. There were two outcomes of interest: 1) Behavior change among all study participants who completed the intervention, evaluated by the
standardized National Youth Evaluation Tool (NYET), and 2) Qualitative feedback regarding the acceptability of the unmodified curriculum as assessed by a small subset (n=15) of program participants, evaluated by weekly follow up survey responses and a moderated focus group at the end of the curriculum implementation. A post-hoc content evaluation was also conducted to quantify the degree to which each item within the YET was addressed within the unmodified curriculum. Statistical tests were performed to assess whether content scores were predictive of behavior change as measure by each YET item.

Study participants consisted of all youth that were enrolled in Georgia EFNEP programming during the federal fiscal year 2018 (FFY18). A total of 226 participants were enrolled, and 91 participants met the minimum requirements for program completion (i.e., attended at least seven of the eight sessions within the Food Talk curriculum and completed pre- and post-intervention evaluations to permit assessment of behavior change).

The curriculum was implemented weekly over the course of eight weeks. Participants completed enrollment paperwork and quantitative evaluation measures at session 1. Participants attended sessions 2-8 and completed exit paperwork and quantitative evaluation measures at session 8.

Qualitative surveys were distributed online after each session. A post-intervention focus group was held with the participants.

All methods and procedures were approved by the Institutional Review Board at the University of Georgia. Both parental consent and child assent was obtained for all participants.

Program description

The Food Talk curriculum consists of eight interactive sessions, and each session includes two recipe demonstrations and educational extenders to help the participants apply the
information presented in the day’s session (Hanula, 2009). An outline of the lessons, objectives, and design is included in Table 1. The curriculum is based on the Health Belief model and each of the eight sessions addresses several tenants of the theory including: self-efficacy, motivation, perceived benefits and barriers (Hanula, 2009). All lessons include skill building activities aimed to improve participants’ ability to select and prepare healthy meals, such as selecting low-sodium foods, reading food labels, and cooking demonstrations. Participants receive the recipes and educational extenders, a physical object to help them apply the information presented in that day’s session, to help them implement knowledge and behavior change at home.
<table>
<thead>
<tr>
<th>Week</th>
<th>Session Number and Title</th>
<th>Recipe #1</th>
<th>Recipe #2</th>
<th>Educational Extender</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Session 1: Your Food, Your Choice</td>
<td>Curly Noodle Supreme</td>
<td>Harvest Muffins</td>
<td>Calendar and EFNEP Pen</td>
</tr>
<tr>
<td>2</td>
<td>Session 2: Keep Your Pressure in Check</td>
<td>Chicken Divan</td>
<td>Cinnamon Dip with Apples</td>
<td>Menu Planner and Grocery List</td>
</tr>
<tr>
<td>3</td>
<td>Session 3: Save with Smart Shopping</td>
<td>Easy Cheesy Broccoli Soup</td>
<td>Carrots with Ranch Dip</td>
<td>Reusable Grocery Bag</td>
</tr>
<tr>
<td>4</td>
<td>Session 4: Color Me Healthy</td>
<td>Fiesta Quesadillas with Ranch and Zesty Sauces</td>
<td>Peach Crumble</td>
<td>Measuring Spoon and Measuring Cup</td>
</tr>
<tr>
<td>5</td>
<td>Session 5: Eat Well on the Go</td>
<td>Breakfast Burritos</td>
<td>Fruity Parfaits</td>
<td>Reusable Lunch Bag and Ice Pack</td>
</tr>
<tr>
<td>6</td>
<td>Session 6: Become a Nutrition Detective</td>
<td>Garden Fresh Tortizza</td>
<td>4-fruit Smoothie</td>
<td>Water Bottle</td>
</tr>
<tr>
<td>7</td>
<td>Session 7: Keep Yourself Well</td>
<td>Famous Fried Rice</td>
<td>Creamy Pineapple Pudding</td>
<td>Cutting Boards</td>
</tr>
<tr>
<td>8</td>
<td>Session 8: Keep Your Health Out of Jeopardy</td>
<td>Skillet Spaghetti</td>
<td>Crunchy Apple Salad</td>
<td>Meals in Minutes Recipe Book</td>
</tr>
</tbody>
</table>

**Study participants**

Researchers established partnerships and invited stakeholders (agency partnerships established by local county Extension agents) to be a part of this project. The participants were a convenience sample based on age and were not excluded based on race or sex. As
aforementioned, 226 total students received at least one session of the *Food Talk* curriculum at 22 sites. Of the total sample, 67.3% were female, and 99% of the students were in 9-12\(^{th}\) grade, with 46% of the students in 9\(^{th}\) grade (Table 2). Approximately a third of the adolescents were from towns and rural non-farm communities under 10,000 people. Thirty five percent of the students came from towns and cities with populations of 10,000-50,000 and their suburbs. The remaining 32% came from central cities over 50,000 people. Of the total sample of 226 adolescents, 67% were black, 12% were white, 4% indicated belonging to multiple races, and 17% did not give their race.

**Table 2. Demographics for *Food Talk* Participants (n=226)**

<table>
<thead>
<tr>
<th>Demographic variable</th>
<th>Total participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, Female</td>
<td>67.3</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>67</td>
</tr>
<tr>
<td>White</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
<tr>
<td>Did not answer</td>
<td>17</td>
</tr>
<tr>
<td>County Population</td>
<td></td>
</tr>
<tr>
<td>&lt; 10,000</td>
<td>33</td>
</tr>
<tr>
<td>10,000-50,000</td>
<td>35</td>
</tr>
<tr>
<td>&gt; 50,000</td>
<td>32</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>9-12(^{th}) grade</td>
<td>99</td>
</tr>
<tr>
<td>9(^{th}) grade</td>
<td>46</td>
</tr>
<tr>
<td>10(^{th}) grade</td>
<td>16</td>
</tr>
<tr>
<td>11(^{th}) grade</td>
<td>16</td>
</tr>
<tr>
<td>12(^{th}) grade</td>
<td>20</td>
</tr>
</tbody>
</table>

For the 22 sites, Extension program assistants delivered the curriculum in a group setting. Program assistants are peer-educators, or individuals who have completed the EFNEP program themselves and are now instructors. These individuals have a high school diploma or GED (USDA NIFA, 2017), and are peers for adult EFNEP participants, not peers of the adolescents enrolled in this study. Additional education is not required; more so, these educators should be
members of the community they support, be skilled in hands-on interactive lessons, be committed to influencing and dedicating themselves to their students and low-income populations (USDA NIFA, 2017).

Data collection and measures

Dietary, physical activity, resource management, and food safety behaviors

Program evaluation followed requirements of all EFNEP programs as defined by USDA NIFA. The National Youth Evaluation Tool (NYET) measures the four core areas of EFNEP programming: diet quality and physical activity, food resource management, food safety, and food security (Appendix 1). Participants indicated how likely they were to engage in these behaviors before the Food Talk curriculum compared to after the program. The NYET includes 14 questions on behaviors related to the four EFNEP priority areas. The NYET was completed by the adolescents in a group setting with the Extension educator present during sessions 1 and 8.

Fourteen behaviors were assessed with NYET using ordinal scales. Eight behaviors (washing fruits and vegetables, whole grain consumption, healthy choices while eating out, hand washing, replacing refrigerated foods within 2 hours, checking the expiration date, frequency of vigorous physical activity, and utilizing low cost food resources) were assessed on a 5 point Likert-type scale from “Never” = 1 to “Almost always” = 5. Frequency of eating vegetables, fruits, low-fat dairy, and sweetened beverages was reported in number of times consumed the previous day from 0 to 3+. Frequency of daily physical activity for at least one hour was reported on a five-point scale from 0 days to All 7 days. Daily screen time frequency was measured on a five-point scale from none to 7+ hours.
Content evaluation

The content evaluation followed the structure of a previous study to measure the degree of curriculum coverage for each quantitative NYET evaluation outcome using a ranking scale (Hernandez-Garbanzo Y et al., 2013). For each session of the Food Talk curriculum (eight sessions total), the researcher identified all specific examples on how the NYET outcome was addressed in the lesson plan, including statements within the lesson plans or leader guide, activity components, and educational extenders (Appendix 2). For example, one question on the NYET is, “Yesterday, how many times did you each vegetables, not counting French fries?” In session 1, the researcher identified two statements within the lesson plan that addressed this outcome (vegetables), including, 1) “Harvest muffins used canned carrots, which are often available on sale” (pg. 12), and 2) “Carrots provide vitamin A, which is important for vision. Not all children like cooked carrots as a vegetable, so these muffins make a good snack” (pg. 12). Vegetables were not addressed in any other part of the lesson. The educational extender for the lesson was a Curly Noodles Supreme Recipe Card, a Harvest Muffins recipe card, and a calendar with additional recipes, all of which were determined to address this NYET outcome (vegetables). For each NYET question that is not addressed in the specified session, the researcher entered “N/A” under the relevant category.

Following this method, the researcher reviewed the content of each session and assigned a score to each NYET outcome within a session to indicate the degree to which the outcomes was addressed in that session. The degree of coverage was measured on a scale of 0-3: 0 = no information, 1 = only information, 2 = information and one opportunity or activity to apply and practice learned knowledge and/or skills, 3 = information and more than one opportunity or activity to apply and practice learned knowledge and/or skills.
Relationship of content coverage (score 0 to 3) and changes in behavior were assessed with Fisher’s exact test due to small cell sample sizes. A Fisher exact test was used to determine whether there was a significant association of improvement and content coverage.

**Program acceptability and feasibility**

A subset of the students (n=15) from one of the completed rural sites participated in weekly qualitative surveys evaluating the content and acceptability of each *Food Talk* session (Appendix 3). Participants could opt to use paper surveys or complete the questions online. Online surveys were completed using university supported survey software (Qualtrics, Provo, UT, 2018). The questions were designed to address acceptability of the curriculum, knowledge change, and to inform adaptations needed. Questions included: What did you learn in Food Talk session number and title? What activities in this session did you enjoy? What information or activities in this session were not interesting? What did you think of the recipe #1? Would you or someone in your household make this recipe? (yes/no) What did you think of the recipe #2? Would you or someone in your household make this recipe? (yes/no) What did you do with the educational extender? How would you change this session to make it better?

Within two weeks of completing the *Food Talk* series, researchers returned to the programming site to conduct a focus group with participants to assess acceptability of the curriculum by adolescent participants. Focus group questions are included in supplementary material (Appendix 4) and intended to address likes/dislikes, learning styles, and meal pattern behavior. An interview was also conducted with the Extension Educator who delivered programming to the same subset population. The educator questions are provided in Appendix 5. Questions were designed to address the adolescents’ likes/dislikes, appropriateness, difficulties,
and desired modifications. The focus group and the interview were audio recorded and transcribed for analysis.

**Statistical analysis**

Data from the NYET (baseline and post-intervention) were entered, aggregated, and exported using the Web-Based Nutrition Education Evaluation and Reporting System (WebNEERS). WebNEERS is the evaluation software nationally used by EFNEP (USDA, 2018). The Youth Evaluation Tool includes 14 questions, and Wilcoxon signed rank tests were used to determine whether the responses to each item were significantly changed from pre- to post-intervention. All statistical analyses were completed using IBM SPSS Statistics v. 25. Significance level was set at $P < 0.05$ for all analyses. A Fisher exact test was used to determine significance between content coverage and NYET improvement, an appropriate measure for small data sets.

**Interview and focus group analysis**

**Conceptual framework**

Qualitative coding was informed by a combination of inductive and deductive processes. Deductive coding was informed by the quantitative data. For example, initial codes used were related to the NYET questions like, “fruit consumption,” and curriculum concepts like, “Reducing sodium.” An inductive process was used for codes regarding acceptability and was informed by grounded theory, an analysis method that constructs theories on the data from the ground up (Omasta & Saldaña, 2018). For example, codes like, “Areas of improvement,” and, “Preferred learning style,” evolved as the researcher reviewed the data. Grounded theory was used in combination with a mixed-methods approach, studying both quantitative and qualitative methods to triangulate each other during analysis.
Data coding, analysis, and interpretation

Responses to weekly surveys, focus groups, and interviews were transcribed by a third-party transcriptionist (Rev.com) and de-identified. Next, the researcher condensed the interview transcripts to remove uninformative language (e.g., Um, like, really, just, etc.) and murmuring. The methods for coding and analysis were adapted by Omasta and Saldaña (Omasta & Saldaña, 2018). ATLAS.ti software (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany, ver. 8) was used as a tool for analysis and coding.

For the analysis, the researcher read a first pass through of the data, constructed major categories, and coded for these categories (Omasta & Saldaña, 2018). These categories were condensed to create larger themes as codes. The researcher coded the data, added a few additional themes, and then clarified the coding scheme. For example, the “breakfast” category and “snacks” category were combined to create the theme of meal patterns. The themes used for coding can be found in Appendix 6. For context, the codes ranged from more behavior-oriented (e.g. Meal patterns) to adolescent preference-oriented (e.g. Potential areas of curriculum improvement). Upon completion of the qualitative data analysis, the coded data including constructed themes and categories was evaluated by two additional members of the research team for consistency and face validity.

RESULTS

Quantitative results

Behavior Change

Three of the fourteen behaviors assessed changed significantly from baseline to post-intervention, all of which were positive: 1) Frequency of eating fruit, 2) Washing produce before consumption, and 3) Helping the family with free or low-cost food resources.
For frequency of eating fruit, 40.7% of all participants, and 52.2% of those who completed the curriculum indicated they were eating no fruit at baseline. After the intervention, the most common response was eating fruit one time per day (33%). Importantly, the number of participants eating fruit 3 or more times per day increased from 2.2 to 11.1%. Overall, there was a significant increase in fruit consumption from baseline to post-intervention ($Z = -3.838$, $p < 0.0001$, Figure 1).

![Frequency of eating fruit reported at baseline and post-intervention](image)

*Figure 1. Frequency of eating fruit reported at baseline and post-intervention*

For frequency of washing fruits and vegetables, 46.8% of all students and 43.8% of completers at baseline indicated they always washed their produce. Post-intervention, the most common response was still always washing produce (52.8%). Overall, there was a significant increase in washing produce from baseline to post-intervention ($Z = -2.245$, $p = 0.025$, Figure 2).
For helping the family with free or low-cost food resources, 57.2% of all students and 59% of completers at baseline reported never helping their family with free or low-cost food resources. After the intervention, 42.2% of completers reported never helping their family, while 20.5% reported helping their family once in a while and 22.9% reported sometimes helping their family. Overall, there was a significant increase in using free or low-cost food resources ($Z = -2.049$, $p = 0.041$, Figure 3).
Although not statistically significant, there was a trend toward increasing vegetable intake ($Z = -1.664, p = 0.096$), with the most common answer at entry being “0” (37.6% for all, 42.7% for completers) and the most common answer at exit being “1” (36%).

**Content Coverage and Improvement**

Ten of the 14 behaviors in the NYET were covered by the curriculum (fruit consumption, vegetable consumption, low-fat dairy consumption, sugar-sweetened beverage consumption, whole grain consumption, fast food restaurant choices, physical activity for 1 hour, hand washing, refrigeration practices, and food resource management.) Four behaviors (washing fruits and vegetables, moderate to vigorous physical activity, screen time, and checking expiration dates) were not covered by the curriculum. Of the 4 items on the NYET that were not covered in the Food Talk Curriculum (content coverage = 0), 1 (or 25%) was significantly improved:
washing fruits and vegetables before eating or cooking. Of the 10 areas that were covered, 2 (or 20%) were significantly improved: eating fruit and helping the family with free or low-cost food resources. There was not a statistically significant association between content coverage with improvement \( (p = 1.000) \).

**Qualitative Results**

The key themes presented relate to the acceptability of the *Food Talk* curriculum by adolescents and the educator. The following were the primary themes that arose: Acceptability of content, method of content delivery, level of physical activity, certificate and type of extenders, recipe enjoyment, and knowledge change. Within the surveys and focus group, students primarily shared their opinions about the curriculum, not necessarily what they learned or what patterns they changed. The educator interview, in general, supported the adolescents’ opinions about the curriculum and their recommended changes. The quotations included are drawn from the subset population that were given weekly survey responses, the post-intervention focus group transcript, and the educator interview to describe the themes that presented.

*Acceptability of content.* There were varying degrees of content acceptability, but no students expressed negative opinions about the content. There was a range of attitudes regarding the content, and students had few recommendations in the survey responses on how they would like to see the curriculum content improved. Survey responses supported this theme, while the educator response suggested that the content needs to be revised to better fit adolescent needs. The focus group questions did not assess the acceptability of content with distinctive responses.

“*It was all okay.*” (Session 3 Survey Response)

“All of the activities were interesting.” (Session 3 Survey Response)

“I thought that all of the activities were great.” (Session 4 Survey Response)
“Everything was pretty interesting.” (Session 6 Survey Response)

“That session [is] something an adult would like.” (Educator Interview Transcript)

Content Delivery. The content delivery is where students voiced the most frustration, both within the survey responses and the focus group. Most students wanted more interaction with the content compared to the traditional lecture style of the lessons, and the educator agreed that students wanted to be more engaged. The majority of the students agreed that they were hands on learners who liked the idea of being taught to do something and then having the space to interact and learn on their own.

“I’m more hands on.” (Focus Group Response)

“I like doing it yourself.” (Focus Group Response)

“Show me how to do it first and then I’ll do it on my own.” (Focus Group Response)

“I like how she presented it. She went through everything and the way she explained it, it wasn’t like she was just talking.” (Focus Group Response)

“Make it more engaging.” (Session 1 Survey Response)

The majority of the students suggested that there be more interaction through cooking themselves.

“Let us be interactive with the cooking session.” (Session 1 Survey Response)

“Let the students put the ingredients in the pot and help put them together.” (Session 1 Survey Response)

With each session, students often noted their least favorite part being the waiting, and frequently asked for more student involvement across the sessions. The educator made a similar suggestion.

“Let us help make the food instead of waiting on it.” (Session 1 Survey Response)
“A way for them to get active in the session is letting them cook... I was thinking of maybe doing a jeopardy game. It gets competitive.” (Educator Interview Transcript)

In contrast, the students enjoyed the interactive activities where they could make choices and engage with the content.

“I like looking at the cards from different fast food restaurants and seeing which ones were the most unhealthy.” (Session 5 Survey Response)

“I liked picking which food I liked from fast food restaurants.” (Session 5 Survey Response)

“I liked picking which food is a refined grain.” (Session 6 Survey Response)

“I enjoyed playing Jeopardy.” (Session 8 Survey Response)

“Deciding which items to pick depending on unit price.” (Session 3 Survey Response)

“I liked when we had to pick foods for the lady and her family.” (Session 3 Survey Response)

Physical activity. Overall, students wanted more physical activity incorporated into the curriculum. The majority of the students hoped to see more activity through overall increased interaction in session activities and cooking, as discussed above. This was consistent throughout the survey responses, focus group, and educator interview.

“Do more physical movement.” (Session 2 Survey Response)

“I like to learn something and then have to go do it by myself, [like] hands-on.” (Focus Group Response)

“Let the students put the ingredients in the pot and help put [recipes] together.” (Session 1 Survey Response)

“Let us help make the food instead of waiting on it.” (Session 2 Survey Response)
“I would just play Chacha slide. They even showed me the moves. So maybe if we did something like that for physical activity.” (Educator Interview Transcript)

Extenders. Overall, the adolescents did not seem to interact much with their educational extenders outside the classroom. They did report using the water bottle and the lunch box, but otherwise, the majority of the extenders went to the parent(s).

“[I enjoyed] getting a reusable bag.” (Session 3 Survey Response)

“I put the menu planner on my refrigerator and gave the grocery list to my mother.” (Session 2 Survey Response)

“ Took it home for my mom to use.” (Session 3 Survey Response)

“Some of the educational extenders they do need to change. Some of those components they didn’t see beneficial for them, they saw it more for their parents.” (Educator Interview Transcript)

Certificate. The adolescents had positive perceptions of the completion certificate. The survey prompted the students: What did you think about the University of Georgia certificate that you received? Approximately half the students agreed that it would help them with college.

“It felt like I succeeded at something.” (Session 8 Survey Response)

“I was happy to receive the certificate.” (Session 8 Survey Response)

“It was very nice and I hung it up.” (Session 8 Survey Response)

“I think it is a nice achievement to have earned.” (Session 8 Survey Response)

Recipe enjoyment. Consistently, adolescents expressed dislike for the recipes and the wait time for the food. Typically, more students expressed greater dislike for the savory recipes versus the sweeter recipes. Recipes were a common theme that occurred across all data collection methods: surveys, focus groups, and educator interview, but the participants and the educator were
prompted specifically to discuss recipes. Nonetheless, opinionated responses to the recipes were a salient theme across all qualitative responses. Some suggestions for recipe improvement included:

“Add more seasoning to the recipe.” (Session 1 Survey Response)

“The soup recipe needed jug milk and not dried milk.” (Session 3 Survey Response)

“Make the burrito with less vegetables” (Session 5 Survey Response)

“I would take the spinach out of the pizza” (Session 6 Survey Response)

“Some of those recipes were not for them. It’s not really appropriate for a teenager.” (Educator Interview Transcript)

The Educator also recommended changing the recipes to “choices based on what they might eat…Recipes where you don’t have to cook anything. They would have liked that.” (Educator Interview Transcript). When the students were asked what sort of recipes they would like to make, they asked to learn how to make healthy version of their favorite foods, like macaroni and cheese, chicken nuggets, fries, and milkshakes (Focus Group Transcript). Despite the mixed reviews on the recipes, eating was frequently listed as the most enjoyable part of the sessions.

Knowledge change. Each of the surveys asked the students, “What did you learn in Food Talk session x?” Participants indicated that they learned a variety of topics, and typically they reflected on the main takeaway for each lesson. Some examples include:

“You can make easy and great food using simple recipes for cheap.” (Session 1 Survey Response)

“To read food labels.” (Session 3 Survey Response)
“I learned more about whole grains, and how they are healthy for the body.” (Session 6 Survey Response)

“Do not cut fresh vegetables and raw meat on the same cutting board.” (Session 7 Survey Response)

Students rarely left this question blank. While the focus group questions were not formatted to address knowledge change, the survey knowledge-change responses related to the activities teens enjoyed, particularly the interactive activities. Additionally, many of the skills the adolescents discussed learning were modeled through the recipes and cooking demonstration.

**DISCUSSION**

This study contributes important information from pilot testing the Food Talk EFNEP curriculum with older adolescents. Notably, there were relatively few (3 out of 14) significant changes in behavior as assessed by the NYET from baseline to post intervention, and there were surprising findings with regard to the relationship of improvement in NYET assessed behaviors and content coverage of the curriculum. Only 2 of the 10 covered areas were significantly improved, and 1 of the 4 areas not covered were significantly improved. Possibilities as to why this occurred should be considered when modifying the curriculum for adolescent audiences and are discussed in the following sections. The qualitative data showed that adolescents wanted increased involvement throughout the session, but they otherwise did not feel as though the content was inappropriate or uninteresting.

**Relationship between content evaluation and improved outcomes**

Perhaps the most surprising finding was that content coverage and behavior change were not related, overall. Despite curriculum coverage, other factors are likely influencing these
behaviors, such a food preferences, role modeling by the PAs, knowledge of resources for addressing the behavior, and the model used to inform the Food Talk curriculum.

For example, for some items, like fruit consumption, the curriculum did cover the content (score 3 out of 3) and the behavior improved. For others, like vegetable consumption, the curriculum did cover the content (score 3 out of 3), but the behavior did not improve. The qualitative data is helpful in explaining some of these discrepancies in behavior, despite consistency in content coverage. The surveys and focus groups suggested that adolescents enjoyed the sweeter, fruit-based recipes more than the savory, vegetable-based recipes. Preference for sweet, fruit-based recipes over the savory, vegetable recipes may explain the significant improvement in fruit consumption and the lack of significant improvement in the vegetable consumption NYET outcomes. Similarly, 6.2% of U.S. adolescents meet the recommended amount of fruit consumption, while only 0.9% of adolescents meet the recommended amount of vegetable consumption (Kimmons, Gillespie, Seymour, Serdula, & Blanck, 2009). Thus, while Food Talk adequately addressed both behaviors, other factors, such as food preferences may explain the discrepancy in improvement.

Interestingly washing fruits and vegetables was not specifically addressed in the lesson plan, but the behavior did improve. While the educators do not typically have access to a sink during the food demonstrations, they may have mentioned they washed produce prior to the food group sessions. Thus, role modeling, albeit indirectly, by the PA may have been an important factor in changing adolescent behavior, as suggested by Social Cognitive Theory (Zimmerman, 2000). This could support some of the significant behavior changes observed; for example, each cooking demonstration showed how to prepare a fruit, washing produce, and using low-cost ingredients. The active cooking model could have facilitated knowledge, and therefore, behavior.
change. Additionally, it is possible that the educator deviated from the lesson plan and mentioned fruit and vegetable washing to the adolescents. Thus, in future studies, more detailed fidelity evaluation may be needed. Additionally, it is possible that the evaluation tool itself may have served as a prompt for behavior change when it asked adolescents about frequency of washing fruits and vegetables.

In other cases, like physical activity, the content was not covered and the behavior did not improve. The qualitative measures confirmed this lack of coverage in that students did not feel they received enough information on physical activity nor did they engage in enough of it during the lesson, which could relate to the lack of significant improvement in physical activity.

Finally, the wording of the NYET may have influenced how adolescents answer questions from pre to post-intervention. For example, the food resource item had moderate coverage (2 out of 3), yet improved, but it may be, in-part, due to the fact that the food resource question may have been interpreted differently from the pre- to post-intervention. For example, adolescents might not have considered using coupons as a “reduced-cost resource,” when completing the baseline NYET, but once they completed the program, they had a greater understanding of the question. This could have led to an “improvement” in the results, even if students were partaking in the same practices pre-intervention.

The degree in which curriculums address self-efficacy are important for behavior change (Anderson, Winnett, Wojcik, Winnett, & Bowden, 2001). It is possible that while behavior did not change, knowledge of healthful behaviors improved. However, since the NYET used by EFNEP does not measure knowledge change, how much the adolescents learned was only assessed with the survey. It is plausible that knowledge changed, but behavior has not yet
changed. Reasons that knowledge may change, but behavior did not, may be explained by the health behavior theory on which the curriculum is based.

The *Food Talk* curriculum is based on the Health Belief Model; the tenants of change include addressing self-efficacy, motivation, and perceived benefits and barriers (Hanula, 2009). The curriculum addresses self-efficacy, motivation, and perceived benefits and barriers for each of the study’s four behavior change objectives. The curriculum addresses these concepts through the lens of hypertension prevention, and explains the perceived benefits for preventing hypertension, the barriers for achieving nutrition-related behavior change, and self-efficacy in making changes that support healthy blood pressure. Discussing nutrition through the lens of disease prevention may not be the most appropriate for adolescents, who are typically more short-term, immediate-gratification oriented (Jaworska & MacQueen, 2015). However, the tenants of the model could be adjusted for something more likely to engage adolescents to make changes. For example, perceived benefits, barriers, and self-efficacy towards achieving a healthy body that feels energized and healthy could be more appealing and result in more behavior change while using the Health Belief Model. Additionally, Cerin, et al., reviewed the theoretical mechanisms of dietary behavior change (2009) and hypothesized that a lack of behavior modification could be due to study designs influenced by incorrectly-used theoretical frameworks and theories. The most significant correlation was between self-efficacy, perceived control, and outcome expectations and behavior change, components of the Social Cognitive Theory and the Theory of Planned Behavior, not the Health Belief Model. While the researchers summated that little is known about how to change behavior change in youths, this research suggests that a curriculum created using the Health Belief Model may not affect significant behavior change, and that another theory, such as SCT or TPB may be more appropriate for
influencing behavior change in adolescents. This research adds valuable information on theoretical framework and behavior change in adolescents.

**Qualitative measurements as an access point to acceptability**

The focus group data proved interesting, especially for further research and curriculum improvements that were not fully explained by the quantitative data. Adolescents agreed with what the educational literature suggests (Lonsdale et al., 2013): Active learning may have enhanced the learning experience and increased behavior change. Students believed that they would have been more engaged if they had been able to help cook and do physical activity during the sessions. They also enjoyed the more active games, such as the Jeopardy review game and the interactive lessons where they could make food choices based on newly acquired knowledge and personal preferences. This suggests adapting the curriculum to be more active, interactive, and physically engaging in order to increase acceptability.

Interestingly, the adolescents found the content appropriate and interesting, despite the educator suggesting the content was inappropriate for adolescents. Adolescents liked making choices for the curriculum’s reoccurring main character and her children, including shopping for groceries, which was one of the points the educator found irrelevant because none of the participants had children, and she believed few went grocery shopping. Some of the content directly addresses hypertension prevention, which is not outlined as a goal for adolescents by EFNEP. But adolescents found the sodium lesson to be engaging and interesting. It should be noted that it is difficult to separate the adolescents’ interest in the content with the method of delivery due to the adolescents’ lack of in-depth responses. Additionally, the students, overall, enjoyed the sodium lesson, but voiced dislike for the savory recipes, which were primarily low-sodium. It would be interesting to see if, since the recommended daily sodium goal for
adolescents age 14-18 is 2300mg (USDA, 2015), and because sodium consumption is not one of the NYET’s targeted behavior outcomes, recipes without reduced sodium would enhance taste and be more acceptable (Neumark-Sztainer, et al., 1999).

Surprising, too, was the degree of excitement and pride around completion of the programming and receiving the certificate. Adolescents believed the certificate and completion of the course would help them with college applications, and almost all of the adolescents expressed positive regard to completing the program. Further curriculums should consider providing more opportunities for adolescents to experience feelings of accomplishment and pride.

STRENGTHS AND LIMITATIONS

A strength of this study is the volume of data acquired through the various methods of evaluation. More specifically, the focus group, survey, and educator interview data allowed the researchers to triangulate findings to determine consistencies between the three qualitative evaluation measures and the quantitative measures. For example, students mentioned enjoying the fruit recipes more frequently than the savory, vegetable-based recipes, which is supported by their behavior change outcomes. They also described “healthy eating” as consuming more fruit, and regularly mention how they can incorporate fruit into their diets through snacks, smoothies, and parfaits. Additionally, students reflected on learning money saving techniques when buying produce, but they do not specifically discuss resources (e.g. Food banks, SNAP) to save their family money. The students and educator also mentioned the students being most engaged during the cooking demonstration, which, as aforementioned, could have influenced behavior change in all three of the significantly improved outcomes. Conversely, a lack of physical activity improvement is paralleled in the qualitative data from the educator and students suggesting more
physical activity would have been enjoyable. Additionally, the content evaluation shows to what degree the current *Food Talk* curriculum covers the NYET questions, which will help modify the adult *Food Talk* curriculum to better address the NYET outcomes and change these behaviors. Finally, since the initiative from EFNEP to start youth programming is relatively recent, data of other interventions using the NYET is limited. This research contributes to the knowledge base for developing EFNEP curriculum appropriate for older adolescents that addresses the NYET outcomes.

This study included limitations. The NYET has not been validated for older adolescents. Therefore, it is unknown if these changes are reflective of real change in adolescent behavior. Future research should validate the tool for use with this audience and in relation to dietary intake measures validated for this population group, such as an individually administered 24-hour recall (NCI, 2018). EFNEP’s youth initiative is relatively recent, and there are plans to validate the tool in the near future. Next, the NYET does not measure knowledge change, only behavior change. While behavior change is the desired outcome, the structure of the NYET leaves gaps in curriculum evaluation on knowledge change. Additionally, there was a gap in the focus group questions in regard to what adolescents learned and what changes were made. Participants who completed the qualitative portion of the study provided information regarding both knowledge via survey questions (E.g. What did you learn in *Food Talk* session 1?) and behavior change (NYET questions). However, for all other participants, only behavior change was assessed with the NYET.

There was no fidelity measure for educators. Lack of fidelity among educators could be responsible for outcome improvement on measures not covered by *Food Talk* or lack of
improvement in areas that were covered. Future research could video record sessions, conduct surveys with participants, or have researchers observe sessions to ensure fidelity.

Finally, the focus group may have been a limitation in determining the adolescents’ true perceptions of the curriculum. Social desirability bias could have played a role in how the adolescents responded, especially if they considered the questions to be sensitive in nature (Kelly, Soler-Hampejsek, Mensch, & Hewett, 2013). Adolescents rarely gave in-depth responses. This suggests that other qualitative evaluation measures could be more appropriate for adolescents to minimize bias and provide them space to speak freely. For example, individual interviews may remove the social desirability bias and allow adolescents more space for individual thoughts (Rich & Ginsberg, 1999). Participant observation, or watching the participants interact in their natural environment has also been suggested as an effective method of collecting qualitative data on adolescents (Rich & Ginsberg, 1999). The structure of the focus group seemed to leave little room for in-depth discussion, and hence, in depth-analysis.

Lastly, the intervention was only conducted in EFNEP eligible communities in the state of Georgia, and the group was selected opportunistically. The group is a convenience sample and is, therefore, not representative of all potential EFNEP older adolescent participants.

CONCLUSIONS

This study not only provided insight into older adolescents’ acceptability of an adult nutrition education curriculum, but provided insight into best practices for evaluation of an adolescent sample. Adolescents who received the adult Food Talk curriculum improved fruit consumption, washing produce, and food resource use. However, content coverage did not correspond to behavior improvement, suggesting additional factors outside of the intervention could be impacting behavior change, or alternatively, the tool was not valid for measuring the
intended behavior change outcomes. Additionally, since knowledge change was not addressed in the NYET, it is unknown whether knowledge improved despite limited behavior change. Limited behavior change could also be affected by the theory used to create *Food Talk*, the Health Belief Model, which may not be the best fit for adolescents. A modified curriculum should consider restructuring the design around the Social Cognitive Theory or Theory of Planned Behavior.

Qualitative measures suggest that curriculum content acceptability was high, but the method of delivery needed improvement to include more active participation. Students enjoyed the recipe demonstrations, interactive learning opportunities, and the sweeter recipes. These suggestions should be considered in adapting Food Talk, but also by other educators seeking to develop curricula for use with adolescent EFNEP audiences.
CHAPTER 4
CONCLUSION

This study contributes important information from pilot testing the Food Talk EFNEP curriculum with older adolescents and provides key information for adapting the adult Food Talk curriculum for adolescents’ needs. While there were relatively few (3 out of 14) significant changes in behavior as assessed by the National Youth Evaluation Tool (NYET) from baseline to post intervention, the Food Talk curriculum provides a platform for which improvements can be made to optimize behavior change. As seen in the content evaluation analysis, only 2 of the 10 covered areas were significantly improved, and 1 of the 4 areas not covered was significantly improved. Various possibilities as to why this occurred were considered, such as food preferences, role modeling by the PAs, knowledge of resources for addressing the behavior, and the model used to inform the Food Talk curriculum.

Additionally, implications for adjusting the NYET to better encompass what adolescents learned and validating the tool were discussed. The current NYET is not validated and does not measure knowledge change, so how much the adolescents learned was only assessed with the survey. It is plausible that knowledge changed, but behavior has not yet changed. Reasons that knowledge may change, but behavior did not, may be explained by the health behavior theory on which the curriculum is based, the Health Belief Model. The curriculum addresses these concepts through the lens of hypertension prevention, and explains the perceived benefits for preventing hypertension, the barriers for achieving nutrition-related behavior change, and self-efficacy in making changes that support healthy blood pressure. Discussing nutrition through the
lens of disease prevention may not be the most appropriate for adolescents, who are typically more short-term, immediate-gratification oriented. However, the tenants of the model could be adjusted for something more likely to engage adolescents to make changes. For example, perceived benefits, barriers, and self-efficacy towards achieving a healthy body that feels energized and healthy could be more appealing and result in more behavior change while using the Health Belief Model. Additionally, the Health Belief Model may not be the most appropriate model for immediate behavior change, and a modified curriculum based on the Social Cognitive Theory or Theory of Planned Behavior could see more significant nutrition-related behavioral improvements. TPB is centered around the assumption that a stronger intention to do a behavior will increase the likelihood to perform that behavior, but research suggests that intention does not always translate to behavior in adolescents. Still, Cerin, et al., concluded that the best theoretical mechanisms for dietary behavior change address self-efficacy, perceived control, and outcome expectations and behavior change, components of the Social Cognitive Theory and the Theory of Planned Behavior, but much is still unknown about how to change behavior change in youths. If self-efficacy, perceived control, and outcome expectations were addressed in the revised curricula, it is possible that there would be improved behavior change outcomes in adolescents.

The qualitative measures provided useful data for further research and curriculum improvements that could not otherwise be studied through the NYET alone. Students wanted to be more engaged throughout the lessons through hands-on demonstrations, physical activity, games, and interactive activities where they had autonomy in choice. This suggests adapting the curriculum to be more active, interactive, and physically engaging could increase acceptability. Despite the content being directed towards hypertension prevention, the adolescents found the
content appropriate and interesting. Students tended to dislike the low-sodium savory recipes. Adjusting sodium content to match adolescents’ preferences could enhance recipe acceptability, but that could be a lost opportunity for helping adolescents adjust their pallets to lower-sodium foods and build healthy, life-long habits that support disease prevention.

Surprising, too, was the degree of excitement and pride around completion of the programming and receiving the certificate. Giving the students more opportunities for pride and accomplishment throughout the curriculum could also lead to increased acceptability, like winning points towards a reward or goal setting. In my own counseling practices with clients, having short-term, measurable goals leads to increased behavior change, and I imagine similar success could be had with adolescents. However, incorporating goal setting in a way that isn’t stepping into a dietitian’s scope of practice would need to be discussed.

This study had a few strengths and weaknesses. A strength of this study is the volume of data acquired through the various methods of evaluation. More specifically, the focus group, survey, and educator interview data allowed the researchers to triangulate findings to determine consistencies between the three qualitative evaluation measures. Additionally, the content evaluation shows to what degree the current Food Talk curriculum covers the NYET questions, which will help modify the adult Food Talk curriculum to better address the NYET outcomes and change these behaviors. Finally, since the initiative from EFNEP to start youth programming is relatively recent, data of other interventions using the NYET is limited. This research contributes to the knowledge base for developing EFNEP curriculum appropriate for older adolescents that addresses the NYET outcomes. Future research should validate the NYET for use with adolescents and in relation to dietary intake measures validated for this population group, such as an individually administered 24-hour recall.
Next, the NYET does not measure knowledge change, only behavior change. While behavior change is the desired outcome, the structure of the NYET leaves gaps in curriculum evaluation on knowledge change. Additionally, there was a gap in the focus group questions in regard to what adolescents learned and what changes were made. While the survey accounts for the knowledge change (E.g. What did you learn in Food Talk session 1?), the NYET, focus group, and survey questions did not ask adolescents both about what they learned and what changes they made. Future research should assess adolescent knowledge change through a variety of measurements.

There was no fidelity measure for educators. Lack of fidelity among educators could be responsible for outcome improvement on measures not covered by Food Talk or lack of improvement in areas that were covered. Future research should include measures of fidelity, such as video recordings of the sessions to be cross-checked by an Extension coordinator or in-person drop-ins by an Extension coordinator to cross-check the degree in which they adhere to the curriculum guide.

This study not only provided insight into older adolescents’ acceptability of an adult nutrition education curriculum, but provided insight into best practices for evaluation of an adolescent sample. The focus group may have been a limitation in determining the adolescents’ true perceptions of the curriculum. Social desirability bias could have played a role in how the adolescents responded, and adolescents rarely gave in-depth responses. This suggests that other qualitative evaluation measures could be more appropriate for adolescents to minimize bias and provide them space to speak freely. For example, one-on-one interviews of the adolescents could replace a focus group setting, or the researchers could offer another round of online surveys that allows the adolescents to answer the focus group questions on their own time, privately.
In summary, adolescents who received the adult *Food Talk* curriculum improved fruit consumption, washing produce, and food resource use. However, content coverage did not correspond to behavior improvement, suggesting additional factors outside of the intervention could be impacting behavior change, or alternatively, the tool was not valid for measuring the intended behavior change outcomes. Additionally, since knowledge change was not addressed in the NYET, it is unknown whether knowledge improved despite limited behavior change. Limited behavior change could also be a result of the theory used to create *Food Talk*, the Health Belief Model, which may not be the best fit for adolescents. A modified curriculum should consider restructuring the design around the Social Cognitive Theory or Theory of Planned Behavior. Qualitative measures suggest that curriculum content acceptability was high, but the method of delivery needed improvement to include more active participation. Students enjoyed the recipe demonstrations, interactive learning opportunities, and the sweeter recipes. These suggestions should be considered in adapting Food Talk, but also by other educators seeking to develop curricula for use with adolescent EFNEP audiences.
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APPENDIX 1: National Youth Evaluation Tool

FOOD + PHYSICAL ACTIVITY QUESTIONNAIRE

As you read each question, think about how you usually do things. This is not a test! There are no wrong answers.

1. Yesterday, how many times did you eat vegetables, not counting French fries?
   - 0
   - 1
   - 2
   - 3+

2. Yesterday, how many times did you eat fruit, not counting juice?
   - 0
   - 1
   - 2
   - 3+

3. Yesterday, how many times did you have skim milk, 1% milk, or yogurt?
   - 0
   - 1
   - 2
   - 3+

4. Yesterday, how many times did you drink sweetened drinks like soda, fruit-flavored sports/energy drinks, or vitamin water?
   - 0
   - 1
   - 2
   - 3+

5. When you eat grain products, how often do you eat whole grains (i.e., whole grain bread instead of white bread)?
   - Almost always
   - Most of the time
   - Sometimes
   - Rarely
   - Never

6. When you eat out at restaurants or fast food places, how often do you make healthy choices when deciding what to eat?
   - Almost always
   - Most of the time
   - Sometimes
   - Rarely
   - Never
7. During the past 7 days, how many days were you physically active for at least 1 hour?
   - All 7 days
   - 4–6 days
   - 3–4 days
   - 1–3 days
   - 0 days

8. During the past 7 days, how often were you so active that your heart beat fast and you breathed hard most of the time?
   - Almost always
   - Most of the time
   - Sometimes
   - Rarely
   - Never

9. How many hours a day do you spend watching TV/movies, playing video games, or using a computer for something other than school work?
   - 7+ hrs
   - 5–7 hrs
   - 3–5 hrs
   - 1–3 hrs
   - None

10. How often do you wash your hands before eating? (Think about eating at school or home.)
    - Almost always
    - Most of the time
    - Sometimes
    - Rarely
    - Never

11. How often do you wash your fruits and vegetables before eating them?
    - Almost always
    - Most of the time
    - Sometimes
    - Rarely
    - Never

12. When you take food out of the refrigerator, how often do you put them back within 2 hours?
    - Almost always
    - Most of the time
    - Sometimes
    - Rarely
    - Never

13. How often do you check the expiration date before eating or drinking foods?
    - Almost always
    - Most of the time
    - Sometimes
    - Rarely
    - Never

14. In the last month, if your family did not have enough food, how often did you help by going to a food pantry or finding other free or low cost food resources?
    - Almost always
    - Most of the time
    - Sometimes
    - Rarely
    - Never
## APPENDIX 2: Overall Content Evaluation

<table>
<thead>
<tr>
<th>YET Questions</th>
<th>Overall Content Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Sessions Addressing Question</td>
<td># of opportunities for application/activities **</td>
</tr>
<tr>
<td>1. Yesterday, how many times did you eat vegetables, not counting French fries?</td>
<td>7</td>
</tr>
<tr>
<td>2. Yesterday, how many times did you eat fruit, not counting juice?</td>
<td>6</td>
</tr>
<tr>
<td>3. Yesterday, how many times did you have skim milk, 1% milk or yogurt?</td>
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</tr>
<tr>
<td>4. Yesterday, how many times did you drink sweetened drinks like soda, fruit-flavored/sports/energy drinks, or vitamin water?</td>
<td>1</td>
</tr>
<tr>
<td>5. When you eat grain products, how often do you eat whole grains</td>
<td>1</td>
</tr>
<tr>
<td>Question</td>
<td>1</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>6. When you eat out at restaurants or fast food places, how often do you make healthy choices when deciding what to eat?</td>
<td>4</td>
</tr>
<tr>
<td>7. During the past 7 days, how many days were you physically active for at least 1 hour?</td>
<td>1</td>
</tr>
<tr>
<td>8. During the past 7 days, how often were you so active that your heart beat fast and you breathed hard most of the time?</td>
<td>0</td>
</tr>
<tr>
<td>9. How many hours a day do you spend watching TV/movies, playing video games, or using a computer for something other than school work?</td>
<td>0</td>
</tr>
<tr>
<td>Question</td>
<td>1</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>10. How often do you wash your hands before eating? (Think about eating at school or home.)</td>
<td>1</td>
</tr>
<tr>
<td>11. How often do you wash your fruits and vegetables before eating them?</td>
<td>0</td>
</tr>
<tr>
<td>12. When you take foods out of the refrigerator, how often do you put them back within 2 hours?</td>
<td>1</td>
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<tr>
<td>13. How often do you check the expiration date before eating or drinking foods?</td>
<td>0</td>
</tr>
<tr>
<td>14. In the last month, if your family did not have enough food, how often did you help by going to a food pantry or finding other free or low cost food resources?</td>
<td>2</td>
</tr>
</tbody>
</table>
APPENDIX 3

Survey Questions for Adolescent Participants

Standard survey questions for weeks 1-8:
What did you learn in Food Talk session number and title?
What activities in this session did you enjoy?
What information or activities in this session were not interesting?
What did you think of the recipe #1?
Would you or someone in your household make this recipe? Y/N
What did you think of the recipe #2?
Would you or someone in your household make this recipe? Y/N
What did you do with the educational extender?
How would you change this session to make it better?

Additional survey questions for week 1:
List your age in years:
List your home zip code:
In a typical day, where do you consume food (select all that apply)? Home/School/Fast Food Restaurant/Traditional Restaurant/Convenience Store/Church/Other
Do you purchase your own food? Usually/Sometimes/Rarely
Do you think you eat enough fruits and vegetables? Yes/No
Would you like to make any changes to the way you currently eat? Yes/No
If yes, what would you like to change?
Would you like to make any changes to your physical activity levels? Yes/No
If yes, what would you like to change?

Additional survey questions for week 8:
What changes have you made after attending the Food Talk sessions?
What changes would you like to make now that you have attended the Food Talk sessions?
What did you think about the University of Georgia certificate that you received?
Do you have any additional comments about the program that you would like to share?
APPENDIX 4

Focus Group Questions for Adolescent Participants

Project summary: Our goal is to create a curriculum that addresses topics related to food and physical activity that helps older adolescents make healthy choices. We want to get to know you to find out what you would like to learn and what we can do to create activities and resources that will be interesting to you and your peers. There are no right or wrong answers to our questions. We just want your honest opinions.

Introductory question: Tell us your first name and one thing you enjoy doing (hobby, activity, etc.).

1. Thinking back to when you were attending the Food Talk series, what activities or topics did you like best?
2. Thinking back to when you were attending the Food Talk series, what activities or topics did you like least?
3. Which recipes did you like best?
4. Which recipes did you like least?
5. What other types of recipes would you like to learn how to make?
6. Did you or anyone in your household make any of the recipes at home? What are some reasons why you did or did not try the recipes at home?
7. What did you do with the educational extenders? (Provide examples of the educational extenders since this term may be foreign to the participants.)
8. Are there other materials that you would have liked to have received instead?
9. Where do you usually eat breakfast?
10. Where do you usually eat lunch?
11. Where do you usually eat dinner?
12. Where do you have snacks?
13. Do you ever skip meals? Why?
14. When do you get to choose what you eat?
15. What does healthy eating mean to you?
16. What would help you make healthier food choices?
17. What would help you be more physically active?
18. How do you like to learn? (Should we provide a list of options after they have had time to respond?)
19. What did you think about the enrollment and exit questions? (We can’t change the questions, but we can change the presentation format.)
20. What types of technology could we use to make this curriculum more interesting?
21. Summarize responses from 6, 9, and 21. Have we missed anything?
22. Our goal is to create a program that is educational and interesting for your age group. Do you have any additional advice for us?
APPENDIX 5

Interview Questions for PAs who Taught Adolescents

1. What parts of *Food Talk* did the groups seem to enjoy/learn from?
2. What parts of *Food Talk* seemed inappropriate for these groups?
3. What was the group make up when you were working with adolescents? Genders? Age range? EFNEP-eligible?
4. What questions did these groups ask during the *Food Talk* series?
5. What did the students say about the recipes?
6. What did the students say about the educational extenders?
7. What factors made it difficult to implement the *Food Talk* series with this age group?
8. What topics would you include in a new adolescent curriculum?
9. What do you think about including technology in a adolescent curriculum? Are there any types of technology you'd like to work with?
10. Would you be willing to review the revised curriculum and do some more pilot work?
APPENDIX 6

Qualitative data coding scheme

• Meal patterns
  o Sub codes:
    ▪ Skipping meals
    ▪ School lunch
    ▪ Packed lunch
    ▪ Cooking
    ▪ Weekend meal patterns
    ▪ Snacking
    ▪ Dinner
    ▪ Breakfast
    ▪ Grocery store
    ▪ Weight loss
    ▪ Eating out

• Food/Activity Environment
  o Sub codes:
    ▪ Fast food restaurants
    ▪ School
    ▪ Grocery stores
    ▪ Home
    ▪ School vending machines

• Potential areas of curriculum improvement
  o Sub codes:
    ▪ Wait time
    ▪ Amount of talking
    ▪ Comfort food
    ▪ Quick food
    ▪ Knowing healthy choices when eating out
    ▪ Motivation
    ▪ Physical activity
    ▪ Engagement
    ▪ Technology
    ▪ Recipes

• Participation/Engagement of adolescents
• Educational extenders
• Recipe success
• Definition of healthy living
  o Sub codes:
    ▪ F+V
    ▪ Calories
    ▪ Junk food
    ▪ Weight
    ▪ Fried food
- Sodium
- Eating out less
- Exercise
- Inexpensive
- Simple
- Sugar
- Food labels
- Fats
- Fiber
- Food safety

- Physical activity patterns
- Preferred learning style
- Technology interactions with learning

**Educator data codes**

- Meal patterns
- Participation/Engagement of adolescents
- Food environment
- Recipe success
- Potential areas of curriculum improvement