THE DEVELOPMENT AND QUALITATIVE IMPACT ASSESSMENT OF
A PHYSICAL ACTIVITY AND NUTRITION CURRICULUM FOR
LOW-INCOME, HIGH SCHOOL ADOLESCENTS

BY
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Debra M Palmer-Keenan
And approved by

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ABSTRACT OF THE DISSERTATION

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by HET DESAI-SHAH

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The New Jersey Expanded Food and Nutrition Education Program (NJ EFNEP) is a federally funded program that focuses on serving diverse, low-income families across the state. After the 2015 national EFNEP meeting, where it was emphasized that outreach to older youth, i.e., teenage children ranging from 13 to 18 years old (teens), was inadequate, the NJ EFNEP staff focused on this objective. Upon further investigation, it was discovered that education curricula addressing teens’ nutrition and physical activity issues were scarce. The purpose of this dissertation was to develop and evaluate an evidence-based nutrition and physical activity curriculum to use with EFNEP teens.

A comprehensive 5-phase model (Figure 4.1) was created to guide the curriculum’s development, using best practices and lessons learned from previous curricula development experiences. It provides applications of these steps and considerations for effective implementation during each phase, (i.e., activities entailing formative research and process evaluation, and key activities required for summative or outcome assessment), and flexibility in case of conflict with program policies, funding limitations, etc.
The curriculum development methods closely followed the steps listed in the model. During the pilot test, qualitative impacts were collected using face-to-face, semi-structured interviews with participating teens. Teens (n=24) reported making behavior changes after attending the lessons providing evidence of the curriculum’s effectiveness. Most teens reported making \( \geq 1 \) behavior change and changed behaviors in an average of three key topic areas. Moreover, teens reported a number of changes in behavioral antecedents, such as their attitudes, social norms, and perceived barriers to behavior modifications. Researchers also observed increased knowledge regarding the key topics among the teens.

Lastly, the author of this dissertation provided recommendations for curriculum improvements based on the findings from interviews conducted with high school teachers (n=6) and NJ EFNEP educators (n=9) as a part of the curriculum’s process evaluation. Improvements were suggested to: enhance teens’ knowledge retention; improve classroom management and discipline; increase communication with teachers so they may be better informed as to how they may assist the educators, and manage activity timings during class periods. Other suggestions made were to modify specific lessons’ content.

Future research that may follow this dissertation warrants quantitative assessment of the teen curriculum using a suitable questionnaire that inquires on curriculum’s impacts in its entirety. An implication of this research was to provide researchers and professionals
with a structured model for the adoption or development of new, evidence-based nutrition education curricula.
DEDICATION

To my two amazing daughters, Aria and Mira, who have been my source of motivation to achieve my goal.

To my husband, who stuck with me through thick and thin and reminded me to stay true to my goal every time I strayed.

To my mum and dad, who sacrificed so much for me and encouraged me to achieve this goal every step of the way.

To my in-laws, who supported my dream and lent a helping hand every time I needed it.
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CHAPTER 1: INTRODUCTION

The Expanded Food and Nutrition Education Program (EFNEP), having begun in 1969, is the oldest nutrition education program funded by the United States Department of Agriculture, National Institute of Food and Agriculture (USDA/NIFA). It operates out of 1862 and 1890 Land-Grant Universities (LGUs) in every state, the District of Columbia, and the 6 U.S. territories. EFNEP provides nutrition education to low-income families and youth, with nearly 4 out of 5 of EFNEP’s adult participants reporting incomes suggesting they live at or below the poverty line. Approximately 70% indicate being of minority status. According to Dr. Helen Chipman, the National Program Leader, “EFNEP’s uniqueness lies in its deep community roots, university connections, and in hiring and training peer educators to teach low-income families to develop healthier behaviors. Peer educators help families understand and apply credible and practical nutrition information.”

While EFNEP serves both adults and youth (grades K-12), its youth outreach has been notably skewed in terms of the age groups it serves. At the March 2015, and again at the March 2020, State EFNEP Coordinators’ conference, Dr. Helen Chipman shared that only a small percentage of the youth served were adolescents (ages of 13 and 18 years of age); annual data supports this statement. More specifically, from the commencement of this research project in federal fiscal year (FFY) 2015 through FFY 2019, the percentage of older youth or adolescent teens (referred to as “teens” henceforth) reached
Teen years represent an excellent opportunity for nutrition educators to improve teens’ short-term and long-term health benefits, as research suggests that healthy dietary and physical activity (PA) behaviors adopted and practiced regularly during childhood years have higher association of these behaviors prevailing during adulthood. Since teens also gain an increasing sense of independence and self-identity, as their personal responsibilities shift from parents/guardians to themselves, they also tend to become more responsible for their own food intake. However, the current literature also highlights that, of all ages, teens engage in a multitude of unhealthful behaviors, as is further discussed in the next chapter of this dissertation.

To increase their outreach to teens, a group of NJ EFNEP educators and researchers searched for a curriculum or lessons that addressed teen nutrition issues. Having failed to find many options independently, they also reached out to their peers in other EFNEP programs nationally (N=74) in 2015 and, again, to update their findings in 2019. Of those reached, 84% (n=62) responded. Approximately a third of those who responded (n=19; 31%), reported they did not work with teens, three (5%), reported they rarely worked with teens outside a few groups of pregnant and parenting teens or independent living groups; and seven (11%) reported they rarely work with teens. Of the 32 (52%) that work with teens, 12 used a curriculum entitled Teen Cuisine, which was designed for middle school and high school-aged children to encourage healthy eating via hands-on cooking
lessons; and one used a teen curriculum that focuses on food shopping/money management, with a secondary emphasis on health. Nineteen programs used curricula designed for other age groups (four for younger youth and 16 for adults). The most used adult curricula were Eating Smart Being Active (n=9), and Families Eating Smart and Moving More (n=3). As a result, the team decided there was a need for the development of an evidence-based curriculum for low-income, high school-aged teens that did not require the use of cooking facilities (since most of the time they are not available in schools).

The dissertation consists of two manuscripts, and additional recommendations for teen curricula in Chapter 6. In the first manuscript, the author proposes a model to guide the development of an evidence-based nutrition education curriculum. This model was a culmination of steps used in the development of various nutrition education lessons and/or curricula, including the one featured in this dissertation, i.e., the curriculum developed for low-income, teens. The model focuses on the steps required for evidence-based curricula’s formative and process evaluations, and briefly describes the considerations for field tests that support curricula’s “evidence-base.” The research conducted by the dissertation’s author and her advisor (i.e., the research team) followed all the formative and process evaluation phases suggested in the model (Chapter 4: Figure 5.1). The second manuscript describes the qualitative impacts of the teen curriculum developed by NJ EFNEP during its final pilot test, which was conducted by the dissertation’s author. It should be noted that the curriculum was initially assessed quantitatively, using the 9th-12th Grade EFNEP Evaluation Survey. However, it failed to capture the curriculum’s
impacts. With anecdotal evidence from participating teens that suggested the curriculum resulted in some behavior changes, curriculum’s impacts were re-assessed using qualitative interviews. By doing so, the research team not only captured the curriculum’s impacts, but also gained valuable insights and feedback from various groups involved in the lessons’ implementation and gathered content to assist in the adoption (or creation of) a more appropriate quantitative evaluation tool. Again, these findings are included in Chapter 6, along with suggestions for additional curriculum and evaluation modifications. Note, the final phase suggested in the model is the field test, which is being conducted by another doctoral student.

The primary aims of this project were to:

1) Reflect on the formative ad process evaluations conducted in conjunction with this curriculum’s development to develop a model for creating an evidence-based curriculum,

2) Assess the qualitative impacts of this teen nutrition and PA curriculum among limited-resource, diverse, high school teens, and

3) Determine what additional recommendations teachers and educators would make with regards to additional curriculum and evaluation revisions.
Dissertation Format

Rutgers Graduate School-New Brunswick accepts dissertation formats with data chapters written in manuscript form ready for submission to peer reviewed journals. Chapters 1-3 and 6 are written and referenced separately from the stand-alone data chapters, i.e., Chapters 4 and 5. The format for Chapters 4 and 5 follows the guidelines published by the Journal of Nutrition Education and Behavior (JNEB) and utilizes the American Medical Association reference style.
CHAPTER 2: LITERATURE REVIEW

The teen years are a time when adolescents’ personal responsibilities begin to shift from their parents and caretakers to themselves. During this period adolescents tend to gain a sense of independence and to develop their own identities.\textsuperscript{7,8} Dietary and physical activity (PA) habits adopted during this period are critical, as they not only impact teens’ immediate health, often continue into adulthood.\textsuperscript{3-6}

Yet, as denoted in Chapter 1, limited curricula are available for use with older adolescent (i.e., teen) audiences. Since this dissertation describes the formative research done in the development of a teen curriculum created for use by the Expanded Food and Nutrition Education Program (EFNEP), it opens with an overview of teens’ behaviors with regard to content that must be covered in EFNEP class series (i.e., PA, dietary quality, food resource management and food safety).\textsuperscript{9} It briefly reviews the curricula EFNEP educators were using with teens at the time this curriculum’s development was initiated, and it closes with a description of the Theory of Planned Behavior and its use with teens, since this model was chosen for use in the development of the Rev It Up! curriculum.
Teen Physical Activity and Dietary Behaviors

It has been well-documented that teens’ diets are typically suboptimal. Teens’ physical activity (PA) and dietary issues, as reported in the Scientific Report of the 2020 Dietary Guidelines Advisory Committee\textsuperscript{10} and physical activity (PA) issues, as reported in the Physical Activity Guidelines, 2\textsuperscript{nd} edition,\textsuperscript{11} included:

• Declining rates and engagement in PA\textsuperscript{11}

• Excessive consumption of low nutrient, energy-dense snacks, and fast foods;\textsuperscript{10}

• Excessive consumption of low nutrient, energy-dense, sugar-sweetened beverages (SSBs);\textsuperscript{10}

• Insufficient consumption of vegetables and fruits;\textsuperscript{10}

• Insufficient intake of whole grain foods;\textsuperscript{10}

• Insufficient intake of iron-rich foods among teen girls;\textsuperscript{10}

• Excessive intake of meat and protein foods by teen boys;\textsuperscript{10} and

• Insufficient calcium-rich foods consumption, particularly among teen girls;\textsuperscript{10}

Each of these issues are further discussed and summarized below, after which a description of the theoretical framework used in this work is discussed.
Teen Physical Activity

EFNEP’s expectation that PA be included in class series is particularly warranted for teen audiences as teens’ declining rates of, and insufficient participation in, PA has repeatedly been reported in the literature. This decline in PA and exercise continues into adulthood. This section of the literature review examines the importance of PA for teens, PA recommendations and how many teens are meeting them, what is known about teens’ PA barriers, and what the Palmer-Keenan lab has learned regarding PA preferences reported by less active teens.

The benefits of PA have been well documented for people of every age. Systematic reviews have shown that the odds of developing multiple health conditions were lower among teens that engaged in moderate to vigorous PA as compared to those that did not. The conditions identified have included: undesirable cholesterol and blood lipids levels, high blood pressure, developing metabolic syndrome, being overweight or obese, low bone mineral density, and even depression. Regular PA also appears to lead to adequate (qualitatively and quantitatively assessed) nocturnal sleep, and less daytime sleep, among teens. Furthermore, engaging in vigorous PA was positively associated with better cognitive functions (i.e., mental function involved in gaining knowledge and comprehension). Remarkably, all intensities (light, moderate to vigorous, and vigorous) PA among teens have been shown to affect academic performance, mainly among girls.
Notably, PA behaviors introduced and established during the teen years have been highly correlated to engagement in these behaviors during adulthood.\textsuperscript{3,12} This is important in that systematic analyses and meta-analyses regarding the effects of regular PA on adult health have indicated that engagement in regular PA mitigates weight gain and obesity,\textsuperscript{13,18} the occurrence of cardiovascular disease (CVD) and type 2 diabetes mellitus (T2D),\textsuperscript{18} and the onset of age-related diseases, such as dementia and Alzheimer’s disease.\textsuperscript{17} Further, it improves sleep quality and duration.\textsuperscript{19}

As shown below. (Figure 2.1), the 2\textsuperscript{nd} edition of the Physical Activity Guidelines for Americans\textsuperscript{11} recommended that adolescents engage in at least 60 minutes of PA daily.

![Key Guidelines for School-Aged Children and Adolescents](image)

**Figure 2.1:** Key Guidelines for School-Aged Children and Adolescents as stated by the Physical Activity Guidelines for Americans, 2\textsuperscript{nd} Edition\textsuperscript{11}
The Guidelines went on to state that any period of moderate- or vigorous-intensity activity should be counted towards meeting these recommendations.\textsuperscript{19} Suggestions for meeting aerobic PA recommendations included both organized and “free play” games and sports, and structured exercise programs.\textsuperscript{19} For muscle strengthening PA, suggested activities included the use of free weights, resistance bands, and activities that use body weight for resistance to strengthen the body’s major muscle groups.\textsuperscript{17}

Unfortunately, as of the writing of this dissertation, available data suggested U.S. teens were far from meeting the aforementioned PA recommendations. National 2017 data from the Centers of Disease Prevention and Control (CDC) indicated that 73.9\% of teens did not meet the recommendations, and 15.4\% of the teens were not active 60 minutes for even a single day during the week prior to the assessment.\textsuperscript{11} Notably, these statistics are comparable to 2013 Youth Behavioral Risk Factor Surveillance System data regarding New Jersey teens, wherein 72.4\% did not meet the daily PA recommendation and 11.6\% were not physically activity for 60 minutes on at least 1 day during the week.\textsuperscript{11} The degree to which recommended PA levels were met appeared to vary by age, gender, race, and income.

Regarding age, research has consistently shown a negative association between children’s and adolescents’ ages and the time they spend engaged in PA.\textsuperscript{20-24} Similarly, regarding teens, the Youth Behavioral Risk Factor Surveillance System (YBRFSS) data from 1991-2017 showed that as children entered adolescence, their PA declined.\textsuperscript{25} An analysis of YRBSS 2015 data revealed that 42.5\% of 6-11-year-olds, 7.5\% of 12-15-year-olds, and
5.1% 16-19-year-old teens met the PA recommendation. Further, according to the 2017 YRBSS data, only 54.1% of 9th grade students were active for 60 minutes daily for 5 days a week. This number dramatically dropped to 41.4% for 12th graders.

While teens’ daily PA includes physical Education (PE) in high school, the impact of PE is likely minimal. Results published by the School Health Policies and Practices Study 2014 showed that, nationally, the percentage of high schools requiring PE constituted only 20.6% at the 9th grade level and this decreased to 8.7% of schools at the 12th grade level. In New Jersey (NJ), the Department of Health recommends that, “high school students engage in 225 minutes of physical education per week throughout the school year.” Yet, the curriculum rubric for NJ high school defies this recommendation in that students need only attend the combination of physical education, health, and safety (defensive driving) classes a total of 150 minutes weekly for a minimum of 7 out of 16 grading periods.

PA level discrepancies are pronounced between male and female teens and among teens of different races. Compared to 56.9% of males who reported being active for at least 60 minutes per day, 5 days a week, only 36.8% of females were reported as active to the same degree. In New Jersey, only 38.0% of male and 17.1% of female teens have been found to engage in 60 minutes of PA daily. Age-related PA decline is also steeper among teen girls than boys. The decline from 9th to 12th grade among boys is 63.1% down to 51.2, while that of teen girls drops from 45.3% to 32.2%. 
In terms of racial differences, minority teens appear to be less active than their White counterparts. The least active cohort has been found to be black females, with only 29.9% being active for at least 60 minutes per day for 5 days weekly, as compared to white (38.8%) and Hispanic (36.9%) girls, and only 15.1% meeting the PA recommendations. More white teen boys (59.4%) met these guidelines than did their Black (54.5%) and Hispanic (52.6%) counterparts.

There is very little literature available that establishes an association between socioeconomic levels (SES) among teens and PA engagement. Yet, one review study of 62 papers published between 1998 and 2009 found that teens with higher socioeconomic statuses (SES) were more likely to have higher PA levels than teens with lower SES. Unfortunately, the results from the studies were “not uniform” due to the variety of tools used to collect data. While data specific to activity levels by income is sparse, it is likely that low-income teens are less active since the Center of Disease Control and Prevention (CDC) has reported that Hispanic and non-Hispanic Black teens from low resource families tend to live in neighborhoods that are less supportive of PA when compared to white, more affluent teens.

While a lack of support for PA likely influences PA levels, similar research suggests there is an inverse relationship between perceived barriers to PA and PA levels. The most common barriers reported by female teens thus far have been lack of time, energy, and interest.
Other documented barriers found to affect school-based and recreational PA among teens, especially among inactive teen girls, include: a negative attitude towards and/or dislike of PA, laziness, neighborhood safety issues, and a lack of peer support. Additional barriers faced by low-income teens include unfavorable weather, lack of equipment, and not having a place or companion with whom to exercise.

However, findings from Dr. Palmer-Keenan's research team for the development of a barriers to PA scale for teens identified 38 barriers specific to low-income teens. Some of those identified better delineated some of the barriers that had previously been found in the literature (e.g., unfavorable weather was more clearly defined as when it was raining, cold, snowy, or dark). Other barriers identified added to those previously identified and may be specific to low-income audiences, (e.g., barriers related to cost such as not having free or low-cost places to exercise locally).

Another study by Dr. Palmer-Keenan's research team which was, to our knowledge, the first to investigate the kind of activities inactive teens believed they would enjoy. The findings for this study suggested that activities need to be perceived as “fun,” e.g., dancing to popular music or bounce houses, non-competitive in nature, and done with their friends or family. The teens reported they liked indoor activities and those that were “comfortable” (both physically and emotionally). They also believed that if activities were led, they should be led by a ‘relatable’ person (e.g., someone who was young and charismatic).
Teen Dietary Behaviors

Nutrient-Low, Energy-Dense Foods and Beverages

Nutrient-low, energy-dense snacks and beverages, often referred to as empty calorie foods and drinks or SoFAs (foods high in solid fats and/or added sugars) contribute calories with little or no nutrients to the diet.\textsuperscript{43} It is widely accepted that high consumption of SoFAs leads to the development of health conditions such as high blood pressure, heart disease, type 2 diabetes, cancer, osteoporosis, iron deficiency, and dental caries.\textsuperscript{10,43} As such, the 2020 DGAs recommended that empty calorie consumption should not exceed 10\% of teens’ total daily calories, 120 to 250 calories for teen girls and 160 to 330 calories for teen boys per day.\textsuperscript{43}

According to a published report based on the National Health and Nutrition Examination Survey (NHANES), 14-18 year old teens consumed over 50\% of their daily calories from these foods.\textsuperscript{44} This accounted for them exceeding their discretionary calorie allowance by about 275 calories among male teens and 202 calories among female teens.\textsuperscript{44} Compared to younger children, teens have been found to consume more empty calories and sodium, and lower amounts of whole-grain foods.\textsuperscript{45} The top empty calorie sources among children and adolescents (2-18 years) combined have been reported to be soda, fruit drinks, dairy desserts, grain desserts, pizza, and whole milk.\textsuperscript{44}
Teens’ eating behaviors relating to these foods and beverages, specifically, (1) fast foods or foods consumed away from home, (2) snacks and sweets, and (3) sugar-sweetened beverages are detailed below.10

**Foods consumed away from home.** “Foods consumed away from home” are those purchased from quick- or limited-service restaurants, full-service restaurants, or food outlet, e.g., food trucks. The popularity of this industry has been on an upward trend since the 1970s from 18% to 33% in 2010.43

Quick service restaurants, particularly “fast food” outlets are popular among teens.46 According to 2015-2016 NHANES data, adolescent boys and girls, respectively, consume 17% and 19% of their daily calories from “quick service restaurants,” which includes fast food restaurants.45 The results of a national study demonstrated that 40% of high schools had at least one fast food restaurant in walking distance.47 Notably the average numbers of fast food restaurants and the percentage of schools in close proximity was higher in areas with greater concentrations of Hispanic, non-Hispanic Black, and low-income students.47 Consequently, NHANES 2015-2018 data suggested that the percentage of daily calories consumed from fast foods was highest among non-Hispanic Blacks and Hispanic teens (21.5% and 18.5%, respectively) compared to White teens (14.8%).48

No specific data regarding fast foods consumption among low-income teens was available at the time this dissertation was written. However, literature suggested that
high-income households spent more on foods purchased and ate out more frequently, and that the nutritional quality of foods away from home is far less than foods prepared at home, regardless of the household’s income.\textsuperscript{49}

This is disconcerting in that a high frequency of fast foods consumption has been associated with low fruit and vegetable,\textsuperscript{49} and high soda consumption.\textsuperscript{50} Additionally, quick service restaurants have the poorest nutritional quality foods.\textsuperscript{49} The foods purchased from quick service restaurants contain more calories and have been found to be higher in saturated fats and sodium, and lower in calcium, iron, and fiber.\textsuperscript{49} As such, these purchased foods have lower nutritional quality than foods prepared at home.\textsuperscript{51,52}

**Snacking on low-nutrient, energy dense foods.** While not clearly defined in the literature, snacking has been referred to as the consumption of foods or beverages between meals.\textsuperscript{53} Many snack foods are “ultra-processed,” empty calorie foods, such as cakes, cookies, chips and other salty snacks.\textsuperscript{53,54} Although research on the impacts of these foods on teens’ health is inconclusive, as previously noted, their nutritional content tends to be high in added sugars, sodium, and saturated fat.\textsuperscript{53,54}

Over 80\% of teens have reported eating snacks daily, with more than 40\% consuming three or more snacks every day.\textsuperscript{55} Notably, research has shown that snacking in response to hunger cues can lead to the intake of healthy foods, while snacking without a hunger cue can lead to the excessive intake of foods high in sugar, sodium and fat.\textsuperscript{53} Thus, it is troubling that snack foods can readily be purchased at schools, stores within walking
distance from schools, food retail stores, and variety stores. A secondary data analysis of 2005-2016 NHANES data that compared teens’ snacking behaviors revealed that the following were statistically significant findings:

- A larger number of snacks containing added sugars was consumed by low-income teens.
- Male, Black teens consumed snacks higher in saturated fats and sodium compared to other teens.
- Male, Black teens consumed larger snacks and more energy dense snacks more frequently.

**Sugar-sweetened beverages (SSBs) consumption.** Another top contributor of empty calories is SSBs. These SSBs include soda, energy drinks, fruit juices, sweetened coffees and teas, and flavored waters. The 2020 DGAs recommended that all age groups consume less than 10% of their daily calories from added sugars.

Meta-analyses and analyses of national dataset evidence support the notion that the consumption of SSBs increases the odds of becoming overweight or obese and dental caries, and negatively impacts insulin levels among children and teens. Excess intake of added sugars among teens has also been associated with low HDL, increased LDL, cholesterol and triglycerides, increased BMI, metabolic syndrome, and cardiovascular risks. Further, a study that analyzed global, regional, and national dietary surveys worldwide concluded that modifying SSBs intake can prevent disabilities caused by foresaid diseases or death.
Despite a 14% decrease in daily calories from soft drinks among high school students between 2007 and 2015, the 2020 DGAs stated that about 32% of teens’ total sugar intake was from SSBs, which is higher than all other age groups. Further, according to the 2015 YRBS survey, 31.8% of teens reported consuming 1-3 energy or sports drinks during the previous week, and 11.9% reported drinking 4-6 energy or sports drinks. Further, teens’ milk and juice consumption declined by 6% each between 2007 and 2015.

In two studies that used the large, nationally representative datasets, (i.e., 2009 Youth Risk Behavior Surveillance Survey and 1999-2008 NHANES data), the reported odds that SSB or sports/energy drink had been consumed at least once daily by a teen was higher among those who:

- were males,
- were Hispanic or Black,
- were from low-socioeconomic levels,
- had poorer self-reported academic grades
- had parents with low education levels,
- ate less than 3 servings of vegetables per day,
- reported less adequate sleep,
- watched >2 hours of television,
- used the computer for work unrelated to schoolwork,
- were less active, and
were more likely to smoke cigarettes.\textsuperscript{68-9}

Differences in SSB intake did not vary significantly among non-Hispanic white, Non-Hispanic Black, and Hispanic teen boys; however, non-Hispanic Black teen girls consumed more SSB than other teen girls.\textsuperscript{68}

Interventions to decrease teens’ SSB consumption have been on the forefront for health care experts. Noteworthy and successful interventions published within five years of writing this dissertation were:

- School-based interventions have shown a higher success rate compared to home or community-based interventions.\textsuperscript{71}
- Including caloric information at the SSB point of purchase, especially in terms of physical activity equivalents, deterred Black teens from purchasing the SSB (1 study: n= 1600).\textsuperscript{72}

\textbf{Fruit and Vegetable Intake}

Vegetables and fruits are important components of a healthy meal due to their nutrient rich and low-calorie properties.\textsuperscript{73} A rich body of evidence supports the benefits of consuming at least 5 servings of vegetables and fruits each day,\textsuperscript{10,43,72} so U.S. guidance has suggested they make up half the plate at each meal.\textsuperscript{42}

Fruit is generally consumed as a single food or fruit juice rather than in a mixed dish. Fruits provide an array of nutrients, including, but not limited to, dietary fiber.\textsuperscript{43,73}
potassium,$^{43,73}$ carotenoids,$^{74}$ and vitamin C,$^{43,74}$ without contributing any fat or added sugar.

Vegetables are more often a food group combined with others to make up a mixed dish.$^{43}$ There are five subgroups of vegetables – dark green, red and orange, legumes such as beans and peas, starchy, and other.$^{43}$ Each subgroup provides different nutrients, making it essential to include all varieties in the diet. Vegetables offer dietary fiber, potassium, vitamin A, vitamin C, vitamin K, copper, magnesium, vitamin E, vitamin B6, folate, iron, manganese, thiamin, niacin, and choline.$^{43}$ Fruits, vegetables, and legumes also contain anti-inflammatory substances called phytochemicals.$^{74,75}$ Phytochemicals elicit an array of benefits, ranging from their anti-inflammatory responses, which causes beneficial effects on risk, and etiology of cancer, CVD, T2D, asthma, and Alzheimer’s disease.$^{74}$ Their antioxidant properties also aid in normal aging, weight management, bone health, pulmonary function, and gastrointestinal protection.$^{74}$

Adequate intake of vegetables and fruits are related to decreased weight gain.$^{76}$ They are also rich in soluble fiber, which aids in decreasing constipation.$^{77}$ The long-term benefits of vegetable and fruit intake have been linked to lower odds of chronic diseases, including CVD, and may be protective against certain types of cancers.$^{43}$

The 2020 DGAs advise the consumption of 2 cup-equivalent (C) of fruit intake per day.$^{43}$ Specifically, teen boys are recommended to consume 2-2.5 C and teen girls are recommended to consume 1.5-2 C daily.$^{43}$ While 1 cup of raw, frozen, canned and juice
forms translates to 1 C of fruit, ½ cup of dried fruit makes up 1 C. While 100% juice (1 of the most popular forms consumed to meet daily requirements) is acceptable, juice is devoid of dietary fiber. Juice can also be overconsumed, and therefore contribute to excess calories. Therefore, it is recommended that its consumption be limited to ½ of daily fruit intake.

The 2020 DGAs recommended that 2.5 C of a variety of vegetables be consumed daily. The recommendations for teen boys ranged from 2.5-4 cups while for teen girls’ recommendations ranged from 2.5-3 cups of vegetables daily.

An analysis of 2007 NHANES data revealed that only 8.5% and 2.1% of high school students met their fruit and vegetable intake recommendations, respectively. The 2017 YRBSS reported that between 2011 to 2017:

- Teens that did not eat fruit increased from 4.8% to 5.6%.
- Teens who drank 100% fruit juice 3 or more times a day decreased from 22.4% to 18.8%.
- Teens who did not eat vegetables daily increased from 5.7% to 7.2%.

The 2020 DGAs noted that neither teen girls nor boys ate enough produce to meet vegetable and fruit intake recommendations, with teen girls reporting the lowest intake for both food groups. According to the 2020 DGAs, teen boys reported consuming an average of 1 C of fruit daily, and just over 1 C of vegetables daily, while teen girls consumed 1 cup or serving of vegetables and less than 1 cup or serving of fruit every
Both genders failed to meet recommendations specific to any vegetable subgroups.43

New Jersey teens fell below the national average for vegetable intake with only 1.0% meeting the 2020 DGA recommendation.78

At the time this dissertation was written, data on teens’ fruit and vegetable intake by race or ethnicity, or by income levels were scarce despite a deep search of studies that had evaluated data collected by NHANES, YRBSS, CDC, and the NYPAN survey. Despite the dearth of such studies, it is likely intake levels are disproportionate in that the availability of the vegetables and fruits in low-income neighborhoods is inadequate. Further, reports have suggested income disparities accounted for lower vegetable intake (7.0%) among adults from low-income households as compared to their higher income counterparts (11.4%).80

**Whole Grain Food Intake**

Whole grain foods include whole-wheat breads, rolls, bagels, and crackers, as well as food items such as popcorn, oatmeal, and whole-grain ready-to-eat cereals. Foods that use amaranth, barley (not pearled), brown rice, buckwheat, bulgur, millet, quinoa, dark rye, and whole-grain cornmeal, as its primary ingredients are also considered whole-grain products.43 Whole grains are rich in fiber, which offer numerous health benefits. Benefits of a fiber-rich diet includes, appetite control, blood lipid levels, glycemic control, digestive health, and secondary cancer prevention.81 The consumption of recommended intakes of whole grain foods lowers the incidence of type 2 diabetes, cardiovascular
disease, and colorectal, pancreatic, and gastric cancers. It can also moderately affect body weight, waist circumference, and body fat mass. More specifically, adequate whole grain intake lowers the risks of: metabolic syndrome, elevated cholesterol, elevated diastolic blood pressure, risk of obesity, and elevated triglyceride, among teens.

The 2020 DGAs recommended that teens consume six-10-ounce equivalents of total grain foods, with whole grain foods making up at least half of their grain food consumption. According to the 2020 DGAs, the average whole grain foods intake among both teen males and females teens was less than 1-ounce equivalent. Teens reported excessive refined grain food intake and inadequate amounts of whole grain food intake. Teens from lower-income households have been found to consume fewer whole grain foods than teens from higher-income households; although there was no significant difference in refined grain food intake between the 2 groups.

**Protein Foods and Red Meat**

Protein provides essential amino acids for growth, development and maintenance of the body. In addition, some protein foods, such as red meat, are important sources of iron. Protein is required to support rapid growth and development during the teen years. An array of animal and non-animal sources are deemed good for protein intake, including seafood, lean meats and poultry, eggs, legumes (beans and peas), and nuts, seeds, and soy products. Additionally, dairy and grains also contribute to protein in diets.
The 2020 DGAs indicated that 60% of teen boys met the 5.5 to 6.5 daily ounce equivalents recommendation.\textsuperscript{10} However, fewer than 25% of teen girls met their 5 to 5.5 daily ounce equivalents recommendation.\textsuperscript{10} Male and female teens aged 14-18 years vastly under consumed nuts, seeds, soy products, and seafoods.\textsuperscript{43} Animal protein sources, such as red meat, also provide heme-iron, which is more bioavailable from them than from plant sources of iron.\textsuperscript{10} The 2020 DGAs do not consider protein to be a “shortfall nutrient.” Protein intake for all ages, except teen girls and older women, are adequate. However, iron is considered a shortfall nutrient among teen girls, who should thus increase their intake of iron-rich foods.\textsuperscript{10}

On the other hand, teen boys exceed their daily red meat, poultry, and egg intake,\textsuperscript{43} and while these foods contribute highly to one’s saturated fat and cholesterol intake, they also contribute other nutrients such as vitamin A, vitamin B1, vitamin B2, niacin, vitamin B6, vitamin B12, and zinc.\textsuperscript{84} Consuming foods high in saturated fats and cholesterol have been associated positively with weight gain, type 2 diabetes, cardiovascular distress, and stroke,\textsuperscript{84} as well as increased risk of colorectal cancer.\textsuperscript{43}

There are scarce data detailing the protein consumption patterns among low-income teens available at the time this literature review was written. Clearly the intake of protein foods, particularly red meat, are complex and messages conveyed to gender-mixed groups should be carefully tailored.
Low Intake of Calcium-Rich Foods

One of the few minerals of public health concerns declared by the 2020 DGAs is calcium. The primary function of dietary calcium is for bone mineral deposition since 99% of total body calcium is found in the bones. Remaining calcium, found in the plasma and extravascular fluid, is essential for metabolic processes, such as muscle function, nervous system function, hormone regulation, and vascular contraction and vasodilation.

The body maintains calcium serum levels, and in case of hypocalcemia or low calcium levels, the mineral is made available by freeing it from bone deposits. This causes a slow calcium depletion that, over time, leads to lower bone density and brittle bones. Severe cases of low bone density can lead to osteoporosis with age.

While calcium absorption is highest through puberty, when intake levels are low it is impossible to reach peak bone mass. The 2020 DGAs suggests teens consume 3 C of low-fat or fat-free dairy products daily, or 1,300 mg of calcium from non-dairy sources. While neither teen girls or boys meet these requirements, the DGAs suggest that increasing intake of this mineral among female teens qualifies as a public health concern. Low-income teens consume an average of 1.060 mg of calcium.

Rich sources of dietary calcium include:

- Fat-free or low-fat fluid milk and milk products, such as cheese and yogurt;
- Fortified juices, soy and soy products, and RTE (ready to eat) breakfast cereals;
- Some plant foods, such as spinach, collard greens, and turnip greens.
However, the quantity of plant-based sources consumed and the bioavailability of free calcium from plant sources are inadequate to deem them to be major sources of calcium in one’s diet.¹⁰

Sodium, protein, and caffeine all increase the rate of calcium excretion via urine, feces and sweat.⁸⁷ This is a problem because, as mentioned throughout this literature review, teens’ diets are high in snacks and fast foods that are high in sodium, and protein among boys, and energy and sports drinks that are high in caffeine. Teens’ diets are also deficient fruits and vegetables, which reduces calcium excretion.⁸⁵

There are also health risks associated with calcium supplements due to the high dosage of the minerals.¹⁰ Hypercalcemia has a possible association with CVD risk, however, there is very little evidence published on the effects of high calcium serum levels.¹⁰ Moreover, a review of controlled trials that examined supplementation during adolescence to aid bone growth and reaching peak bone mass found that results do not seem to persist beyond the calcium supplementation period.⁸⁸⁶

**Meal Skipping and Sleeping Behaviors Among Teens**

Meal skipping has been identified as a prevalent unhealthy behavior among teens that increases with age.¹⁰,⁸⁸-⁸⁹ Breakfast among this age group has been reported to be the most skipped meal; followed by lunch.⁹⁰
Of note, most New Jersey high schools in low-income areas participate in the National School Lunch and Breakfast Program.\textsuperscript{91,92} This program provides teens with nutritious, well-balanced food and drinks options at reduced or no cost within school premises.\textsuperscript{93}

It has been found that teens struggle to find a balance between their biological needs, such as sleep and nourishment, and newly bestowed commitments from school, activities like sports, jobs, etc, on their time.\textsuperscript{94} They naturally gravitate towards a later bedtime to meet these new demands.\textsuperscript{94,95} Thus, teens get less than the recommended amount of sleep, i.e., less than 8 to 10 hours each night.\textsuperscript{95} Only about a quarter of high school teens sleep for 8 hours or more per night, while about one-fifth of teens sleep for less than 5 hours a night.\textsuperscript{86} Lack of sleep has been reported as being a frequent reason they skip breakfast.\textsuperscript{88} The inability to listen and concentrate in school, forgetfulness, aggressive behaviors, caffeine and nicotine use, intake of unhealthy foods and beverages leading to weight gain are linked directly to sleep deprivation.\textsuperscript{90,95}

Research supports the claim that the importance and impact of breakfast skipping among teens is far less conclusive than is the evidence that they are starved for sleep.\textsuperscript{95,96} Furthermore, to provide food to the teens who may have skipped breakfast at school to sleep a bit longer, New Jersey officials implemented breakfast after the bell’ options, such as, Grab ‘n’ Go, classroom breakfast, and Second Chance Breakfast, in 2018.\textsuperscript{88,91}
Food Safety

Food safety practices, such as hand washing, storing foods at a safe temperature, or preventing cross-contamination are encouraged and taught in all EFNEP based curricula. To the author’s knowledge, no statistics on teens’ adherence to such food safety practices and no research studies on interventions with this age group were available at the time this research was done. Hand-washing interventions are implemented more frequently in elementary schools.

Food Resource Management and Insecurity

One in five children aged 18 years or younger come from food insecure households. In New Jersey, 13.2% (or 260,340) of children were food insecure. Nationally, more African American and Hispanic youth are from food insecure or very insecure households. Research yielded that scientific publications on teens’ knowledge and engagement regarding their family’s finances and insecurity status are scarce. Still, food insecurity is a core EFNEP topic only assessed with adult participants.

In a focus group report published by Feeding America in 2018, sensitive issues regarding food insecurity were discussed. In the report, teens informed the researchers that, despite their parents’ efforts to shelter them from consequences and responsibilities of food scarcity, they had to contribute by acquiring foods for themselves and for their younger siblings. They admitted being embarrassed by their family’s food insecurity status or receiving food from charitable programs. Notably, teens were of the opinion that
assistance programs were for adults, and programs such as weekend backpacks were for younger children only.

Summary of Teens’ PA and Dietary issues
This literature review discussed the most pertinent teens’ PA and unhealthy eating behaviors, as addressed in the 2020 DGAs, 2018 PA guidelines, and EFNEP policy manual. In summary, problematic teen nutrition/physical activity behaviors were:

- Insufficient PA: PA declines throughout adolescence, more so among teen girls than boys, especially non-Hispanic Black girls.
- Overconsumption of nutrient poor and energy dense foods, most in the form of foods purchased away from home, such as fast foods, snacks and SSBs, with rates being highest among male Black and Hispanic teens.
- Overconsumption of SSBs, so much so that about 66% of teens report consuming at least 1 SSB each day.
- Underconsumption of vegetables and fruits (≈1 C/day instead of the recommended 2.5-4 C/day), and whole grain foods (≈1 oz-equivalent/day compared to ≈5.5-7.5 oz/day of refined grain foods.
- Insufficient iron and calcium intakes, especially among girls.
- Overconsumption of red meat among boys.
Meal skipping, particularly breakfast, which is likely due to the struggle balancing their biological needs, such as sleep, with their newly established responsibilities, independence, and freedom, which is being ameliorated (in part) by programs such as the National School Breakfast and Lunch programs and Grab n Go carts in schools to increase teens’ access to foods and eliminate meal skipping.
Theory of Planned Behavior

The theoretical underpinnings of Rev It Up! is the Theory of Planned Behavior (TPB). The TPB, based on Fishbein and Ajzen’s 1970 Theory of Reasoned Action (TRA), which hypothesizes that a person’s intentions lead to their behavior changes. Ajzen later added the “perceived behavioral control” construct to create the TBP.

![Diagram of Theory of Planned Behavior]

**Figure 2.2: An Illustration of the Theory of Planned Behavior**

As can be seen in the Figure 2.2, the TPB proposes that behavioral intentions determine behavior changes or engagement in targeted behaviors. It has been suggested that the strength of the intention is directly related to the odds of the individual changing behavior. The theory also suggests that behavioral intentions are impacted by 3 constructs: attitudes, subjective norms, and perceived behavioral control.
‘Attitudes’, or behavioral beliefs, are the positive or negative feelings about the behavior or the outcome of engaging in the behavior. Societal pressure, in terms of encouragement or discouragement, in combination with the motivation to conform to peers’ actions and beliefs is known as ‘Subjective Norms’. ‘Perceived Behavioral Control’ is one’s perception of their ability to make the change, and the ease or difficulty perceived to be affiliated with performing the behavior.

A systematic literature review and meta-analysis of TBP studies with youth indicated that TPB has been effectively used to predict nutrition behaviors. The review found that the behaviors evaluated using this theory included healthy eating, sugary snacks and beverage intake (i.e., behaviors common among teens). The review also found that intention was the strongest predictor of behavior, while attitude towards the behavior predicted intentions. Other meta-analytic reviews demonstrated TPB’s important contributions to PA behavior predictions. Similar findings were presented in a sleep and PA intervention study among urban adolescent girls.

TPB has also been used in intervention studies with youth and teens to influence specific behavioral changes. Examples of successful interventions embedded in TPB have been used to promote (a) an array of healthy behaviors, (b) PA, (c) family mealtime and eating at home, (d) breakfast consumption, and (e) lessen SSB intake. For example, a study conducted by Mazloomy-Mahmoodabad et al. researchers tested the effects of a 5-week TPB-based intervention on some anthropometric measures among a random sample of 86 adolescents. Pre- and post-intervention surveys were also collected.
The intervention resulted in decreased BMI, weight, and waist circumference, as well as significant positive changes in mean knowledge and TPB construct scores.

In summary, there is convincing literature supporting the use of TPB to predict and explain teens’ behavior changes in response to an intervention, with, hypothetically, the strongest correlations between their intention and behavior change, as well as teens’ attitude and/or beliefs on teens’ intent to change behavior.

Chapter Summary

This chapter focused on literature that explored unhealthful behaviors among high school teens. Further, examination of teen interventions suggested that the promotion of healthful behaviors with teens may lead to improvement in health outcomes and potentially predict favorable behaviors during adulthood. This review’s findings also suggested that the TPB appeared to have a degree of support for guiding the design of teen interventions and their evaluations.
CHAPTER 3: METHODS

The purpose of this project was to conduct, and describe the results of, the formative and process assessments done to support the development of an evidence-based, teen nutrition and physical activity (PA) education curriculum, and to conduct a qualitative assessment of its impacts. This curriculum, (i.e., Rev It Up! curriculum, referred to as RIU henceforth) was designed for use in school classrooms with low-income, diverse, high school-aged teenage children (referred to as “teens” henceforth). Birthed in 2015, a team of NJ EFNEP nutrition educators and researchers, including this dissertation’s author, created these lessons to address the leading health-related behavioral issues among teens as outlined in the most recent research and the 2020 Dietary Guidelines for Americans (DGAs). The aim of this chapter is to discuss the methods used in meeting the study aims. The chapter begins with an account of the methods used in the formative research done in the curriculum’s inception. It follows with a description of the process evaluation methods used in developing the curriculum. Lastly, it concludes with a discussion of the methods employed to qualitatively assess the impact of the curriculum and to acquire teens’ and educators’ advice for any needed curriculum changes.
Research Methods

Development of the RIU took place in 5 phases – Phases I and II were formative assessments and Phases III and IV were process evaluations. Phase V will be the curriculum’s field test, which is currently underway and will be published elsewhere by the graduate student who assisted with this research. Data collected and analyzed in each research phase served as a basis for curriculum modification prior to each subsequent research phase.

Phase 1: Needs Assessment

The first step of the formative evaluation was a needs assessment. This was comprised of a literature review, followed by an examination of all available educational materials.

Literature Review. First, a detailed literature review regarding teens’ dietary and physical activity behaviors was performed. As the findings from this search revealed specific behaviors of concern, they were further investigated regarding trends among teen participants with similar demographic make-up to the teens served by NJ EFENP (i.e., those from low-income, ethnically/racially diverse backgrounds). The 2020 Dietary Guidelines’ Advisory Committee’s Scientific Report,\textsuperscript{10} the 2020 Dietary Guidelines for Americans,\textsuperscript{43} and the 2008 Physical Activity Guidelines\textsuperscript{19} were then consulted to identify the most pertinent behavioral recommendations associated with the issues identified in the aforementioned search. The literature was also searched for successful educational strategies and intervention methods that had been found to, or had been identified as potentially being able to, engage teens and to elicit intended behavior changes.
**Curriculum Criteria Drafted.** A set of criteria necessary to deem a curriculum to be appropriate, in terms of addressing teen issues, making practical recommendations, and successfully engaging teens in the learning process, were drafted based on the findings from the aforementioned literature searches. These criteria enabled the researchers to set standards by which existing available curricula could be assessed.

**Existing Curricula.** The researchers began their investigation of existing teen curricula by conducting telephone interviews with a national sample of all known SNAP-Ed program directors and by emailing all State EFNEP Coordinators to ascertain what curricula they were using with teen audiences. The curricula were then obtained, or researched, for comparisons to the established criteria. No curricula designed for classroom use with low-income teens (one of the primary criteria) were deemed appropriate, so the researchers began to take the necessary steps for the development of a new curriculum, including the selection of a theoretical framework for its design.

**Phase 2: Concept Testing**

The second step of the formative evaluation was the identification of a theoretical framework for the curriculum and its evaluation, followed by the development of sample lessons and their testing.

**Selection of Theoretical Framework.** Theories developed to guide behavior change interventions have been pegged as one of the key elements for successful nutrition education development, as they provide a map to predict and explain specific
behaviors. Evidence shows that effectiveness of nutrition education should be guided by a theoretical framework that focuses on behavior and action. A literature review was conducted to identify successful frameworks used to elicit similar nutrition and PA behavior changes among teens.

**Program Draft.** Between January and September 2015, a series of 6 lessons and a social marketing competition (MVPA, My Way!), were drafted, based on the criteria set for appropriate teen curricula. To do so, a development team, consisting of 3 graduate students (one of whom was the author), their advisor, and 3 nutrition educators who had experience teaching high school teens, was assembled.

**Concept testing pilot.** The intervention was piloted at high school summer camps where NJ EFNEP’s regular programming was taking place (i.e., Title 1 schools, in which at least 50% of teens received free or reduced-price lunches). Lessons were taught by 1 of 4 members of the development team and who were assisted/observed by another research member of the development team. Lessons were delivered once weekly, during 1.5 hour-long classes. At the conclusion of the intervention implementation, group interviews were conducted.

**Concept Testing Assessment.** This research protocol for the group interviews with the participating teens was approved by Rutgers Office of Research and Sponsored Programs Institutional Review Board (#15-275MC). A purposive sample of teens from the aforementioned intervention sites who had attended all 6 lessons was invited to
participate in the interviews. Interviews took place 1 week following the intervention completion at the site where the teens received the intervention. Researchers ensured all interview participants had submitted a completed parental consent form prior to the start of the interview. Teen consent to participate in the audiotaped interviews were also collected.

A team of CITI-certified researchers (i.e., 3 graduate students [again, one being the author] and 3 professional employees) took on the roles of moderators and/or assistant moderators for 4 semi-structured, in-depth groups interviews. Prior to the interview the researchers attended a 3-week (1 day/week) training, that included opportunities to role play the parts of interviewers and participants using the project interview guide. The training was provided by the faculty advisor, who was very experienced in conducting group interviews.

Prior to the start of each interview, the researchers collected demographic information including gender, race/ethnicity, grade, free/reduced price school lunch program participation; and PA participation, in terms of approximate days active for an hour. After an opening question, querying the participants’ names, things they liked to do when they got home in the afternoon, and ways they liked to be physically active or exercise, the teens were asked a series of questions, with regards to 1) the social media campaign, and 2) the curriculum lessons.

The questions regarding the “MVPA, My Way!” campaign were:
• What do the letters of “MVPA” stand for?

• What do you think about when you hear the words: “moderate to vigorous PA?”

• Why did or didn’t you participate in the MVPA competition?

• If you had been in charge of getting all your friends and other kids in your school to actively post to the campaign’s Facebook page and/or Instagram, what would you have done to encourage them?

The questions regarding the curriculum were:

• What about the lessons did you like or dislike?

• From what you learned in the lessons, what stuck out to you the most?

• What, if any, changes have you made since you participated in these lessons?

• Think back to the times we did all the different lessons. What about the lessons would you change and what would you keep the same?

At the conclusion of each group interviews, the participants were awarded a subject payment of $25 and thanked for their participation.

**Modifications.** Findings from the group interviews were used to modify the existing activities and to guide the development of the remainder of the curriculum.
Phase 3: Development Team Pilot Testing and Expert Review

The Phase 3 consisted of the curriculum’s implementation with a corresponding process evaluation. Two rounds of pilot tests in high schools where regular EFNEP programming was taking place were required. Simultaneously, an expert review was conducted.

Development Team Pilot Testing. The pilot test was conducted during the Spring of the 2016-2017 school year by two of the lesson developers, both of whom had formerly been high school teachers. They taught 1 lesson per week during 3 consecutive classroom periods. Since the developers were rapidly alternating between teaching and observing, if they noted ways in which they believed a lesson could potentially be improved upon with modest changes, they made tweaks in its delivery when they were next up to teach (i.e., the following class period). Due to the limited time between periods, they waited to “debrief” and to discuss modifications until after they returned to the office, at which time all changes they deemed prudent were incorporated into the lesson plans, which at this point were written out in step-by step detail. Since major changes were required, it was determined that the curriculum development team should re-pilot the curriculum prior to passing it on to others.

The second round of piloting occurred during the 2017-2018 school year, when one of the educators/developers who had taught in the previous round taught all the revised lessons. Two professional nutrition educators and the author conducted observations during this second round.
The observer(s) took notes regarding:

- any places in the lesson plan where the written lesson steps did not clearly reflect how the lesson activities were being carried out.
- seemingly successful and less successful educators’ teaching techniques.
- teen engagement and evidence of learning.
- content and lesson delivery successes and issues; and
- teacher/site leader engagement.

The group, along with the author’s advisor, held weekly conference calls during which all notes were discussed. Any warranted lesson modifications were made prior to the next step in the curriculum development process.

**Expert Review.** Simultaneous to the curriculum’s pilot testing, EFNEP coordinators from across the nation were invited to complete questionnaires to gauge their opinions of the curriculum’s written lesson plans. Researchers sent a recruitment email out to the national EFNEP Coordinators’ listserv. The email informed them of the aim of the study and the estimated time commitment participation would require. A consent (Appendix A) form was attached. Attempts were made to contact all program coordinators who did not respond to the initial email via email or phone. All coordinators who returned signed consent forms were provided with the first lesson plan, a lesson evaluation questionnaire (Appendix B), and a demographic questionnaire. Information collected on the questionnaire included their names, ages, genders, highest levels of education, number of years they had worked with EFNEP, what States they had worked in, and their races and ethnicities. The lesson evaluation questionnaire was adopted from an unpublished tool
originally designed to evaluate lessons from the Eating Smart, Being Active curriculum. Participants were asked to rate their impressions of the lessons’ content, readability and comprehension level, activities, visuals, and handouts (e.g., recipes, worksheets, etc.) using a 5-point Likert-like scale ranging from “Strongly Agree” to “Strongly Disagree,” and to provide any other comments they had specific to the lesson.

Upon completion of the questionnaire for the first lesson, the experts were emailed the next lesson and asked to complete the same evaluation. This process continued until data saturation was reached (i.e., all comments received on additional lessons reviewed became redundant). No subject payment was provided for participation. EFNEP experts were thanked for their time and contribution.

**Phase 4: Nutrition Educator Pilot Testing**

The purpose of Phase 4 was three-fold. First, it was to do more process testing under the condition that the lessons were interpreted and taught by EFNEP staff who had not been involved in the lessons’ development. The second aim was to gain reflections and insights about the lessons from the teens, educators, and teachers. The third aim was to qualitatively reveal the curriculum’s impacts on the teens. This research protocol was approved by Rutgers Office of Research and Sponsored Programs Institutional Review Board (Pro2019000822).

Process evaluation was conducted in two rounds. In the first round, the NJ EFNEP’s professional staff members implemented the curriculum. In the second round, the curriculum was implemented by the paraprofessional staff.
Prior to each round, development team members provided rigorous curriculum implementation training. For the 1st of the 11 training sessions, those being trained: 1) had reviewed the first lesson, 2) attended a demonstration of the lesson being taught by the development team, 3) were provided instructions on high school classroom management, and 4) were oriented to the training plan for the remaining sessions. Before training sessions 2-10 they reviewed the next lesson plan and practiced teaching the lesson they had seen demonstrated at the previous training session.

At training sessions 2-10 they:

1) Observed the next lesson being taught by a member of the development team,

2) Took turns teaching portions of the lesson they had been exposed to at the previous training session (while the others in the training session pretended to be participants). The trainer repeatedly stopped the lesson at random points and named a new person to assume the role of educator. These practice opportunities were referred to as “teach backs”.

3) Critiqued one another’s teaching and received feedback from the trainer.

At the 11th training session steps 2 and 3 were repeated. The training concluded with the trainer addressing any follow-up questions participants posed.

After both the professional educators and the paraprofessionals had been fully trained and had implemented the entire curriculum, interviews were conducted with all the EFNEP educators who had taught the lessons, and all participating high school teachers and some teen participants were interviewed.
**Educator Interviews.** The graduate student extended an in-person or phone call invitation to participate in the study (interview) to each of the NJ EFNEP professionals and paraprofessionals who had delivered the curriculum. In-person or web-based interview video call (virtual) interviews were scheduled with affirming educators at a mutually agreed upon date and time. The in-person interviews were held at the NJ EFNEP’s main office, located on Rutgers’ School for Environmental and Biological Sciences’/Rutgers Cooperative Extension’s campus. The virtual interviews, which were offered to all educators who could not travel to the State office due to scheduling restrictions, were done via Zoom or WebEx online video calling applications.

Since the author’s advisor was the NJ EFNEP director, she was not involved in the NJ EFNEP staff recruitment or interviews, or the consequential analyses. This was done to reduce any feelings of coercion to participate in the study. Therefore, all NJ EFNEP professional and paraprofessional staff interviews were conducted by the author. The interview analyses were conducted by the author and another trained doctoral student from her research group. Findings from these interviews were shared with the advisor in form of group findings only.

At the beginning of the interview, an oral consent to participate in the interviews was obtained. Upon consent, the educators were asked to complete either a paper or Qualtrics version of a demographic questionnaire, which queried their names, ages, genders, races, ethnicities, highest levels of education, and the number of years they had worked for the EFNEP. Thereafter, the semi-structured, face-to-face interview was conducted and
audiotaped using the interview guide found in Appendix C. With the exception of one question which inquired as to any observations the educator had made regarding the teen’s behaviors, the questions explored their comfort and lesson delivery, if they were able to remain compliant with lesson plans, any modifications they needed to make, to what degree the teacher had assisted them, and what they liked about the lessons and what they would change. Each interview lasted between 30-60 minutes.

**Teacher Interviews.** Using the help of the NJ EFNEP educators who delivered the curriculum, the researcher recruited the high school teachers who had assisted the educator when the lessons were being delivered to be interviewed. Upon receiving signed consent forms (Appendix A), interviews were scheduled on a mutually agreed upon date and time and at the school where they worked. At the start of each interview the teachers were asked to complete demographic questionnaires that inquired their names, ages, genders, race, ethnicity, highest levels of education, numbers of years they had worked with teens. Once completed, the researcher conducted the individual face-to-face, audiotaped interviews that lasted no more than 30 minutes. All interviews were conducted by the author, according to the interview guide (Appendix C). Similar to the educators, teachers were asked for their impressions of the curriculum and their required lesson preparations prior to and their role during the lessons. They were also asked a single question regarding any lesson impacts they had observed or discussions they might have had with participating teens regarding the curriculum’s impacts.
Teen Interviews. Interviews with participating teens were conducted to gain insight on RIU’s impacts and the teens’ impressions on the lesson content and delivery. Research took place after receiving site authorization from the schools where the curriculum had been taught by NJ EFNEP professional or paraprofessional staff.

Using the help of classroom teachers to identify eligible participants, all teens who had attended at least 80% of the classes and who were deemed good sources of information by the high school teachers were invited to participate in the study. Those who were interested were asked to return signed copies of the “Parent Consent form” (Appendix A). The researcher and classroom teachers worked together to schedule the teen interviews on mutually agreed upon dates and times at their schools.

At each interview’s commencement, the teen provided written consent to participate in the interview (Appendix A), in addition to the parental consent previously received. For descriptive purposes, each teen completed a demographic questionnaire, which included his/her name, grade, age, gender, race, and ethnicity. A semi-structured, face-to-face, audio-taped interview was conducted with each teen using the interview guide (Appendix C). All interviews were conducted by trained researchers (the author, another graduate student, and a program staff member). The interviewer read each question out loud and used additional prompts, as needed. Each interview took no more than 30 minutes.
Data Analysis

All data analyses conducted are listed, by phase, below. All quantitative analyses were conducted using SAS 9.4 (SAS Institute, Inc., Cary, North Carolina).

Phase 1: Needs Assessment

Findings of the literature review were compiled and can be found in Chapter 2.

Phase 2: Concept Testing

The demographic data were analyzed using descriptive statistics, such as frequencies, means, and standard deviations. Two researchers, the author, and her advisor, independently transcribed and analyzed the interviews. The interview transcripts were analyzed using the 6-step process outlined by Nowell et al.\textsuperscript{122} i.e.:

1. *Familiarizing yourself with the data:* This is a step wherein the researchers read through all transcripts to search for meanings and patterns, in this case researchers used some initial codes (i.e., the educator, the dance, the games) and also kept an open mind in case some themes emerge, suggesting that some thematic analysis may be prudent.

2. *Generating initial codes:* The codes were used for content analysis; if the researchers feel any themes emerge, new codes will be initialized during this step.

3. *Searching for themes:* Researchers triangulated their findings to develop hierarchies of concepts and themes.
4. **Reviewing themes**: Themes and sub-themes are vetted by the researchers by returning to the raw data.

5. **Defining and naming themes**: post-review, themes were revised, as needed. Aligned with qualitative research methodology, discussion ensued until consensus was reached.

6. **Producing the report**: The report produced can be found in Chapter 4 of this dissertation.

**Phase 3: Development Team Pilot Testing**

Observation and meeting notes from both rounds of the pilot testing were independently reviewed by the author and her advisor. Both researchers conducted content analysis, again, by the following steps outlined by Nowell et al,\(^\text{122}\) as described above in Phase 2 data analysis section. Reports were created in form of a list of process evaluation recommendations.

**EFNEP Experts.** Sociodemographic information was analyzed via frequencies, percentages, means, medians, and standard deviations. Rating averages from the questionnaire responses were calculated to gauge the overall success of various lesson components. A list of reviewer comments was also compiled.

**Phase 4: Nutrition Educator Pilot Testing**

Frequencies, percentages, means, and medians, were calculated for all three groups’ data gleaned from the demographic questionnaires.
All interviews were transcribed and analyzed using Halcomb and Davidson’s 6-step alternative data management method. Steps for this method are described below:

1. *Audiotaping of interview and concurrent note taking:* While conducting the interviews, the interviewer took notes and audiotaped the interviews.

2. *Reflective journaling immediately post-interview:* The interviewers then added his/her impressions or any other pertinent details to their field notes immediately after the interview.

3. *Listening to the audiotape and amending/revision of field notes and observation:* The dissertation author listened to the recording and edited the field notes as necessary.

4. *Preliminary content analysis:* The researcher conducted the content analysis. In this case the data analysis was done primarily deductively to answer the research questions.

5. *Secondary content analysis:* The author’s adviser who was not involved in the data collection, reviewed the field notes and audiotapes, and compare her findings with the author’s preliminary analysis. Since qualitative research employs subjective interpretation of the data, researchers discussed their findings until they unanimously agreed upon the research codes.

6. *Thematic review:* Researchers reviewed the secondary content analysis, identified themes, and re-listened to the audiotapes for examples for each theme.

Final findings were tabulated and presented in Chapter 4 of this dissertation.
**Educator Interviews.** The author of this dissertation and another doctoral candidate who had been involved in the research, listened to the interviews, and coded the findings independently using Halcomb and Davidson’s methods stated above. Coding was based by grouping likes or dislikes regarding similar topics together. Using an iterative process, the researchers created final tables that listed and described process evaluation findings. The results for this portion of the research can be found in Chapter 4.

**Teacher Interviews.** Using steps similar to the NJ EFNEP educators’ interview data analysis, the dissertation author and her advisor performed high school teachers’ interviews data analysis. The interviews were transcribed and analyzed using Halcomb and Davison’s data management method. The interview transcriptions were repeatedly visited, and codes were discussed until the two researchers agreed on the final tables. The results for this portion of the research can be found in Chapter 4.

**Teen Interviews.** The teen interviews were transcribed using the Halcomb and Davidson’s protocol, described above. There was one alteration to the steps while analyzing teen data, i.e., the data was coded deductively according to theory constructs rather than thematically when coding the interview’s impact question findings. The dissertation author and her advisor listened to the interview recordings independently. The impact findings were discussed during regular meetings and deductively charted the using the theory’s framework. To further assess the curriculum’s impacts, comments made by different people but that appeared multiple times were quantified, as were the number of “types” (i.e., perceived behavioral control, intentions, etc.) of changes made
for each topic taught. Congruent with qualitative research protocol, content analyses did not follow a linear path. Interview recordings and interviewer notes were revisited several times until final findings were charted. Lists of process evaluation comments were grouped with educators’ and teachers’ interview findings that advised any changes to the curriculum. The results for this portion of the research can be found in Chapter 5.

Chapter Summary

In summary, numerous formative and process research procedures were used in the development of this nutrition and PA curriculum for teens. Qualitative impacts were also reported. The results of the research are shown in the upcoming chapters. The reader should note that, because Chapter 4 proposes that educators who embark on curriculum development projects use the methodology employed in RIU’s development, the methodology section of Chapter 4 will often repeat, word-for-word, what appeared in this chapter.
CHAPTER 4: A MODEL FOR THE DEVELOPMENT OF EVIDENCE-BASED NUTRITION EDUCATION CURRICULA

Abstract

This manuscript describes a 5-phase model with stepwise guidance for the creation of an evidence-based and theory-driven nutrition education curriculum, and examples to illustrate “best practices” and lessons learned from the development of various curricula. The phases are: 1) conduct a needs assessment to discern if a new curriculum is necessary; 2) concept testing for any novel educational strategies that will be employed; 3 & 4) pilot testing and process evaluations; and, 5) field testing to establish an evidence-base. Implication is to provide professionals and researchers with a valid structured framework to adopt or create other evidence-based nutrition education curricula.

This chapter was written according to the author guidelines for submission to the Journal of Nutrition Education and Behavior (JNEB) which publishes research related to nutrition education and dietary/physical activity behaviors.
Introduction

Community nutrition professionals (CNPs), including practitioners with and without a research background, are often called upon to identify or create evidence-based curricula (i.e., a curriculum used in an intervention that has undergone rigorous randomized controlled trials to demonstrate its effectiveness). However, without a model for doing so, valuable resources can be exhausted without accomplishing this aim. The purpose of this manuscript is to propose a detailed model for curriculum development that compiles best practices employed and lessons learned during the development of the award-winning curriculum Jump Start Your Bones (JSYB)\(^1,2\) for middle school aged adolescents\(^3\text{-}^5\); MP-Saurus preschool curriculum; and the newly developed Rev It Up! (RIU) Expanded Food and Nutrition Education Program (EFNEP) high school curriculum.

Some models that list guiding steps that researchers employed while developing other nutrition curricula for a variety of audiences have been previously published in the research. These include models associated with the development of: Eating Smart Being Active curriculum;\(^3\text{-}^5\) the In Defense of Food curriculum;\(^6\) the Food Talk: Better U curriculum,\(^7\) and the iCook 4-H Youth curriculum.\(^8\) Each of these frameworks provide similar advice, (i.e., conduct a needs assessment, choose an appropriate theory for behavior change, create content for the education materials, and implement, monitor, and assess its impacts). However, RIU researchers adds to these models with additional activities, and while providing advice for CNPs who may face barriers and restrictions due to funding limitations and/or program policies.
Discussion

The authors propose a 5-phase model for curriculum development (see Figure 4.1). Phases 1 and 2 of the model are formative assessments, Phases 3 and 4 are process evaluations, and Phase 5 is a summative impact and/or outcome assessment. Data collected and analyzed in each phase serve as a basis for curriculum modification prior to the subsequent phase. We recommend that, when possible, curricula be created by a team of CNPs who have experience with the target audience.

**Phase 1: Needs Assessment.** Phase 1 consists of 5 steps (Figure 4.1). The literature review conducted to accomplish step 1 should focus on papers published up to 7 years back, as even these likely include data that was collected a decade back. Publications any older than this may reflect findings that are no longer valid. Step 2 necessitates the identification of practical solutions for addressing the issues from research-based recommendations and/or guidelines, such as the Dietary Guidelines for Americans (DGAs) and the Physical Activity (PA) Guidelines for Americans. Additional recommendations should be sought from practitioners who, by virtue of their experience, are uniquely aware of the target audience’s lifestyles, and practical and “doable” solutions and examples.
Figure 4.1: A Model for The Development of an Evidence-Based Nutrition Curriculum

<table>
<thead>
<tr>
<th>Phase 1: Needs Assessment</th>
<th>1.1: Review The Literature On Target Audience’s Nutrition-related Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Formative Evaluation]</td>
<td>1.2: Research Current Recommendations on Identified Audience’s Nutrition Issues</td>
</tr>
<tr>
<td>Note: If an evidence-based curriculum, meeting the established criteria is identified, Phases 2-5 are not necessary. If a practice-based curriculum meeting the criteria is identified, Phases 3-5 can be used to establish the its evidence base.</td>
<td>1.3: Discern Effective Educational Strategies</td>
</tr>
<tr>
<td></td>
<td>1.4: Establish Curriculum Criteria Using 1.1-1.3 and Other Program Policies</td>
</tr>
<tr>
<td></td>
<td>1.5: Identify Potential Curricula and Compare to Established Criteria</td>
</tr>
<tr>
<td></td>
<td>1.6: Use Phase 1 Note to Decide Whether A New Curriculum is Needed</td>
</tr>
</tbody>
</table>

| Phase 2: Concept Testing                                      | 2.1: Develop Sample Lessons Drafts for Testing Novel Educational strategies |
| [Formative Evaluation]                                         | 2.2: Implementation of Sample Lessons |
|                                                                | 2.3: Concept Testing Focus Groups/Group Interviews |

| If major revisions are needed after the initial pilot test and/or the expert review, additional pilot tests and observation with the development team acting as the educator(s) must be conducted. | 3.4: Development Team Pilot(s) with Process evaluation via Observations |
|                                                                | 3.5: Curriculum Development: Lessons with Step-by-Step instructions |
|                                                                | 3.6: Development Team Pilot(s) with Process evaluation via Observations |
|                                                                | 3.7: Conduct Expert Review |
|                                                                | 3.8: Curriculum Revisions, As Needed |

| Phase 4: Educator Pilot Testing                               | 4.1: Train the Educators (See Phase 4 Note) |
| [Process Evaluation]                                          | 4.2: Educator Pilot Test |
| If possible, it may be advisable to repeat pilot rounds with various educator groups, starting with the group with highest level experience and expertise with the target audience, as issues faced by less experienced employees may differ from issues faced by more experienced educators. | 4.3: Conduct Audience, Educator, and Site Contact Interviews, When Appropriate |
|                                                               | 4.4: Analyze Interview Data |
|                                                               | 4.5: Curriculum Revisions, As Needed |
|                                                               | 4.6: Selection or Modification of Curriculum Evaluation Tools For Field Test |

| Phase 5: Outcome Evaluation                                   | 5.1: Identify Intervention and Control Sites If Possible |
| [Field Testing]                                               | 5.2: Train the educators |
| Note: If a control group cannot be recruited, the use of pre-intervention data or data from a similar group from previous years may be used to compare intervention data against. | 5.3: Conduct the Intervention and Collect Impact Data |
|                                                               | 5.4: Analyze the data |
|                                                               | 5.5: Create professional publications and disseminate the curriculum |
This is particularly important when developing curricula for diverse audiences, as the recommendations in these documents tend to be created for the “general public.” For example, the DGAs\(^9\) defines a moderately active lifestyle as one that “includes PA equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour, in addition to the activities of independent living.” This recommendation would need to be changed since many immigrants have labor intensive jobs requiring a great deal of walking that may lead them to believe they live a moderately active lifestyle when, in fact, their activity does not rise to the intensity levels necessary to be considered aerobic activity. Further, in most countries distance is measured in kilometers, so translation might be required.

In Step 3, CNPs may wish to explore audience-tested educational strategies that have been designed for use in the type of settings in which they plan to work. While these educational strategies do not dictate what approaches must be employed, they do suggest whether a strategy remains untested in similar interventions and, thus, require concept testing prior to, or in the early phases of, the curriculum’s adoption. For example, two educational strategies required concept testing prior to RIU’s development. These were: (1) increasing teens’ PA via dance, and (2) using social media as a curricular component. Research had shown that dance interventions supported teens’ daily moderate to vigorous PA (MVPA), particularly among girls.\(^{10,11}\) Since PA engagement is most problematic among low-income, Black girls,\(^{12}\) who comprised a substantial portion of low-income teens, this strategy seemed promising. Social media, such as Facebook, Twitter, Instagram, etc., had been gaining a lot of traction among low-income teens,\(^{13,14}\) and PEW
research center reported upward trends in the use of cellular phones, tablets, and computers among low-income populations\textsuperscript{15} and teens.\textsuperscript{16} Thus, we considered these strategies’ viability as teaching strategies for RIU. Findings from their concept testing is discussed below in Phase 2.

Based on steps 1-3, CNPs can establish criteria for what should be taught and valid approaches for doing so, while also accounting for any additional programmatic criteria or funding mandates. Thereafter, CNPs may use these criteria to: 1) evaluate existing curricula for acceptability, or (Step 5), 2) determine if a new curriculum is needed, and if so 3) to guide the development of a new curricula. If evidence-based curricula that meet established criteria exist, CNPs are advised to adopt them, rather than spending valuable time and resources in the creation of new ones. In the case where CNPs discover the need for a new curriculum, and if they desire to incorporate novel teaching strategies, they can move on to Phase 2. If an existing practice-based curriculum (i.e., a curriculum that has proven its effectiveness via repeated use without having undergone formal research with randomized control trials) meets most of the criteria, but the curriculum: 1) needs to cover a few additional topics by adding lessons or activities, 2) has not been tested in the setting targeted for the intervention, 3) has been tested with a close match to the population targeted for the intervention but not the target audience ever tested with the one it will be used with e.g., it was created for low-income adults but never assessed with a racially diverse audience), or 4) is not evidence-based, then the CNPs could skip Phase 2 and move on to Phase 3.
Phase 2: Concept Testing. CNPs should engage in Phase 2, if: (1) they wish to use novel nutrition education teaching strategies; (2) proposed teaching strategies have either not been used, or sufficiently validated, with the specific type of audience with whom CNPs intend to work, or (3) the types of activities to be employed have never been used in the setting in which the curriculum will be used. Phase 2 steps are stated in the figure.

Once the CNP has developed activities to test the intended strategies’ viability they should be implemented with a small, representative group of participants. Assessment may need to be largely qualitative to: (1) provide detailed insight on the participants’ thoughts and opinions, (2) account for the fact that quantitative change may not have occurred since only certain activities, and not the entire intervention, have been taught.

As mentioned in Phase 1, while developing RIU, we tested dancing and the use of social media to increase MVPA. While in-class dancing yielded positive results and PA engagement, the use of social media did not perform well. Since it is widely recognized that teens enjoy competition, we had included a social media challenge during which teens were invited to publish a “post” of themselves doing PA based weekly challenges for each of the 6 weeks during which concept testing took place. Educators assigned each group a unique hashtag and tracked their posts. The group with the most posts were declared winners of that week’s challenge. However, very few teens participated. Post-intervention focus group findings revealed the teens: (1) viewed personal social media account use for the competition as an invasion of their privacy, (2) did not want others seeing them doing the kinds of activities they were asked to do for the competition, and
(3) preferred to spend their time on social media in other ways. Thus, we successfully identified one strategy that worked, and one that did not (despite evidence-based inferences).

**Phase 3: Development Team Pilot Testing and Expert Review.** Prior to initiating curriculum development, CNPs should select a theoretical framework to guide the curriculum’s development and evaluation. The importance of using theoretical frameworks in nutrition education has been recognized as far back as 1995, when a special issue of the Journal of Nutrition Education was commissioned to identify effective nutrition education strategies. Dr. Isobel Contento reviewed 271 publications across all age groups and concluded, “… the more effective programs are those that are behaviorally focused and based on appropriate theory and prior research.”

The selection of evaluation tools will be discussed below. However, it is noteworthy that an evaluation tool based on the same theoretical framework as the curriculum may better assess the curriculum’s impacts. The assessment of behavioral precursors identified in models may be important to evaluating a curriculum’s effectiveness in cases when the duration of the teaching series is not long enough to elicit actual behavior changes. For example, teens participating in RIU are taught food safety practices using “cookouts” or “tailgating” as examples of situations when food safety mistakes can occur. When RIU was implemented during the Fall semester, the behavioral assessments performed immediately afterwards showed no changes. However, interviews held in the Spring revealed that the teens had retained what they had learned and changed their behaviors,
but not until the Spring. Had the post-education survey assessed behavioral precursors or knowledge gains, RIU’s impact may have been more apparent.

Early in the curriculum development stage, CNPs should brainstorm ideas, sketch out lesson plan ideas and prepare the necessary materials. The activity’s 1st lesson pilot may be premature to create a detailed written lesson plan. The pilot conducted in this phase should be taught by the CNPs involved in creating the lessons due to the potential need for lesson improvisation if things go awry, and to allow the CNP to experience, first-hand, any major issues, to take accountability for them, and to make changes afterwards to redeem the lesson or activities if they were otherwise acceptable. Site contacts/representatives should also be made acutely aware of the fact that something new is being tested and their feedback is welcomed.

One example of the need for a pivot in plans occurred when RIU was first piloted. The lesson plan indicated the teens should be asked to break themselves into 4 groups. The process of allowing the teens to self-select their groups took too long. The experienced educator, who knew this time lag would prohibit the activity’s completion, quickly changed to directing the teens into the groups, after which all enjoyed the activity. A good example wherein it was important for the CNP to take full accountability, followed by needed adaptations occurred during the development of JSYB, when students did an experiment for which they left two bones in a vinegar solution for several days so they could compare the deterioration of a less dense chicken bone to that of a denser beef bone. When the CNP returned the following week, the teacher shared that he had tossed
the bones out because his classroom had stunk so badly within a few days that it could barely be inhabited. Clearly, the CNP, and not another educator, needed to be held accountable. Upon reviewing the activity’s instructions, the CNP discovered she had failed to note the bones needed to be cleaned well to avoid this issue.

Prior to the 2nd pilot CNPs may want to write-out a detailed, step-by-step lesson plan. At this point lesson modifications should have been made based on having previously experienced the necessary preparations for the lesson activities, the previous lesson testing experience, and observations of participants’ reactions, and consequent discussions with site contacts. If a team of CNPs is developing the curriculum, one team member may wish to teach during the 2nd pilot while another, perhaps a trained volunteer, observes. The observer should take notes regarding places in the lesson plan where the educator deviates from what is written. This is important in that, sometimes, experienced educators (like the CNP lesson creators) tend to do things without realizing they are doing them, thus failing to include details in the lesson plan that may be needed. In the development of the MP-Saurus pre-school curriculum, one instruction in the lesson indicated the educator should cut up 6 apples for the children. The next written step jumped to the apple slices’ distribution. In reality, cutting 6 apples took a bit of time, during which the CNP chatted with the children and questioned them about apples. Less seasoned nutrition educators may have been at a loss of what to say while cutting the apples, or worse yet, would have said nothing and completely lost the children’s attention and the flow of the lesson. Fortunately, because the observer noticed the successful
dialogue, these instructions were added prior to the curriculum being passed on to be
tested by others.

Simultaneous to the curriculum pilots, other professionals with expertise in the nutrition
topic and target audience, should be asked to review the curriculum’s written lesson
plans. This can be done either by collecting reactions to the entire curriculum at once or
by having the lessons reviewed one at a time (e.g., upon completion of the first lesson’s
review, the experts can be sent the next lesson and asked to complete a similar
evaluation). An advantage of the latter process is that if any global changes are revealed
after 1-2 lesson having been reviewed, they can be made on consequent lessons, such that
the reviewer(s) need not make the same comment(s) repeatedly. Another advantage of
this technique is that the review of one lesson always seems less onerous than the
prospect of reviewing an entire curriculum. In our experience, recruiting reviewers when
only 1 lesson needed be reviewed every week or 2 was less cumbersome. Both qualitative
comments and quantitative ratings can lend valuable insights to the curriculum
developers. If major changes are required, it may be necessary to re-pilot the curriculum
before progressing onto the next phase.

**Phase 4: Nutrition Educator Pilot Testing.** This 4-step phase (figure 4.1) represents the
final curriculum development step prior to its field testing. Thus, it may be quintessential
for the lessons to be taught “by” the intended educators “to” the intended audience “in”
the intended setting. Staff training should mimic final expectations. For example, if a
curriculum is to be used without training, no training should be provided; or, if
supervisors are to attend a workshop to learn the curriculum and afterwards train their staff to use it, this is how this phase should be conducted.

The curriculum development CNPs should maintain an active role in observing the teaching, when possible. Doing so may reveal that additional instructions are needed for the lesson to be taught, as intended. Notes on lesson implementation impressions or concerns should be discussed at meetings held between the educator(s) and the CNPs. If the need for additional instructions is excessive, a second pilot with a different group of educators may be necessary. Also, if educators with widely varying degrees of experience (e.g., a seasoned nutritionist vs. a student volunteer) will be using the curriculum, CNPs may wish to repeat rounds of pilot testing for each, beginning with the most experienced educators and ending with those with the least (e.g., new paraprofessionals or volunteers), as the instructional needs of less seasoned employees may be greater. For example, again, with regards to the previously described bone experiment, the classroom teacher shared that he loved the experiment when the CNP taught it, but that during the next pilot, when he taught it himself, he found that obtaining and cleaning the 72 bones needed for his 6 classes’ lab groups was too onerous to practically be done. As such, he suggested that the activity be kept, but as a demonstration rather than as a lab. Had this issue not been identified through such testing, odds are that after implementing it once, most classroom teachers would have refrained from ever teaching this very popular and impactful lesson again.
One important, and often underestimated curriculum development step, is qualitative impact assessment. When possible, this should be conducted with the educator(s), the participants, and the site contact. The importance of this action was illustrated during the development of RIU. RIU instructions originally recommended a meeting with classroom teachers, prior to its implementation, during which the nutrition educator provided the teacher with a list of the lessons and a description of what role the teacher would be asked to play in each. Post intervention interviews with the teachers repeatedly suggested that instead of providing the instructions prior to RIU implementation, that the information for each lesson be emailed to the teachers several days prior to the next lesson – so instructions would not be lost or forgotten.

Qualitative data also provides direction for the field test’s quantitative evaluation. For example, the generation of behavior change was RIU’s primary aim. Thus, initially, the EFNEP Youth evaluation tool, which assessed behavior change pre- and post-intervention, was used to evaluate it. While some behavior changes were consistently reported (e.g., drinking more water and fewer soft drinks), others were not (e.g., increased vegetable intake and increased PA). A subsequent qualitative assessment revealed reported knowledge and attitude changes, and reduced barriers, suggesting that the curriculum had, indeed, elicited impacts, but that the evaluation was not sensitive to them. In fact, the curriculum’s theoretical framework was the Theory of Planned Behavior, and the changes the curriculum elicited suggested that, given time, behaviors would likely change. The assessment of behavioral precursors (i.e., based on the same
theoretical framework used in the curriculum’s development) may better reflect a curriculum’s value.

**Phase 5: Field Test.** The field test is the final curriculum evaluation. To calculate the number of sites needed for its evaluation, CNPs may want to consult a statistician and use a power calculation to establish the sample size necessary to ensure the validity of the field test results. Field testing site recruitment tends to be very time consuming, so this calculation cannot be done too early! CNPs may want to include a control group, if possible, while controlling the effects of as many confounding variables as possible.\(^{19}\) The purpose of a control group is to establish the effects of the intervention sans all other factors that could affect behavior change. Control groups must be comprised of participants who are like the intervention participants (i.e., similar audience demographics, environmental factors, etc.). A systematic review on factors affecting the efficacy of nutrition education interventions suggests that randomized control trials (RCT) are the most robust study design.\(^{22}\) If having a control group is not possible, “pre-tests” can be used to treat participants as their own controls. When necessary, we have also used data from previous years as the “control” for intervention data comparisons to yield sufficiently reliable findings. The same review also highlights the importance of fidelity in peer-led interventions, as it has direct and significant impacts on the intervention’s impacts and the validity of results.\(^ {19}\) To ensure curriculum fidelity CNPs are encouraged to occasionally observe the educators while they teach. CNPs may want to visit each educator, unannounced, at least once, to assess lesson plan adherence, and to provide any feedback to the educator, if deemed necessary.
In cases where curriculum training is expected to be provided to the educators, CNPs should do so prior to the field testing. If the CNPs determine that curriculum implementation does not require training, it is advisable to at least provide field test training to eliminate outcomes variances due to variations in educators’ assessment delivery techniques. In addition to curriculum training, the field test training can include: 1) a review of the intervention protocol (explained in layman’s terms); 2) information addressing the importance of “sticking to the script”; and 3) time for practicing the administration of the assessment tools (if the educators will be conducting the assessment). Training session recordings can be useful for educators who miss the training, while a second training is more advisable. Post-training protocols regarding how educators and CNPs can touch base and discuss any concerns should also be put into place to ensure the field test will be a success. For example, during RIU’s testing, a paraprofessional educator learned days prior to one of his lessons that the Smartboard in the room in which he would be teaching was malfunctioning. RIU’s implementation is heavily reliant on technology. Since a communication protocol had been put into place, the educator was able to share this issue, and a large-screened laptop with speakers was made available for the educator’s use.

It is important for the CNPs to do their best to include only educators who demonstrate they will teach the curriculum “as written.” This does not mean that only the best educators should be included. In fact, the real test of a curriculum’s strength lies with it being tested by all who can/will teach it, as written. If educators cannot, or refuse to,
deliver the curriculum as written (e.g., someone who likes to improvise and get creative),
their improvisations, not the curriculum, are being tested. It is very important to drive this
home with all.

**Implications Of Research and Practice**

This step-by-step guidance illustrated by best practices examples from several curricula
development experiences can serve as examples for CNPs who plan to embark on
curriculum development projects. Undertaking the creation of evidence-based lessons
may require a time commitment of several years, and resources needed to fully develop
and test new curricula. In our experience, curriculum development takes a minimum of 5
years. While the authors of this manuscript recommend when developing a culturally
appropriate, evidence-based curriculum, CNPs adhere to as many steps of the model as
possible they are aware that this may not always be feasible due to time restrictions,
program guidelines, or budget limitations.
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CHAPTER 5: REV IT UP! CURRICULUM - FINDINGS FROM A QUALITATIVE IMPACT ASSESSMENT CONDUCTED WITH LIMITED-RESOURCE, URBAN, OLDER ADOLESCENTS

Abstract

Objective: To assess the impact of an EFNEP nutrition and physical activity (PA) curriculum on low-income, high school teens.

Study Design: A cross-sectional study with semi-structured, face to face post-intervention interviews.

Setting and Participants: A purposive, convenience sample of 24 teens (9th graders) from two high schools in NJ were interviewed at their high schools.

Intervention(s): A 10-week PA and nutrition curriculum - Rev It Up! (RIU).

Main Outcome Measure(s) and Analysis: Two independent coders performed a thematic analysis of interview transcripts using the Theory of Planned Behavior. Findings were discussed until both researchers reached consensus.

Results: Participants were 61% female, 39% Hispanics, and 79% Black. Most teens reported ≥1 behavior change and changed their behaviors in an average of three topic areas. The attributed 68 different types of behavior changes, 10 behavioral intention changes, 19 attitude changes, 16 social norm changes, and 16 PBC changes to their RIU attendance, RIU also resulted in increased knowledge and changes in: attitude, mainly with PA and adoption of plant-based diets; perceived behavior control predominantly with PA and healthy snacking behaviors; and social environment that supported the healthy behaviors.
**Conclusions and Implications:** RIU! curriculum implementation changed both teens’ behaviors and behavioral antecedents. Findings from this study may be used to guide the adoption or creation of a suitable, quantitative curriculum assessment tool. Additionally, findings of this study may serve as the basis for the modification of the existing EFNEP youth evaluation tool.

This chapter was written according to the author guidelines for submission to the Journal of Nutrition Education and Behavior (JNEB) which publishes research related to nutrition education and dietary/physical activity behaviors.
Introduction

The teenage years are critical, as nutritional needs are high due to increased growth and developmental changes.\textsuperscript{1} With their growing sense of independence and personal identity, teens’ responsibilities, including food selection, shift away from parents/guardians, and more towards themselves.\textsuperscript{2,3}

As these shifts occur, teens tend to exhibit poor physical activity (PA) and eating habits, and PA levels dwindle as children approach adolescence.\textsuperscript{4,5} Less than one in four teens engage in daily regular moderate to vigorous PA for $\geq 60$ minutes.\textsuperscript{6,8} Similarly, as children approach adolescence, they engage in a myriad of unhealthy behaviors, such as high rates of sugar-sweetened beverage (SSB)\textsuperscript{7} and fast-food\textsuperscript{8} consumption. Teens’ sub-optimal intakes of seafood, fruit, red and orange and dark green vegetables, whole grains, legumes, and dairy, and consequently, decreasing Healthy Eating Index (HEI) scores have been reported.\textsuperscript{9} Clearly, teens are an audience who may benefit from nutrition education. The Expanded Food and Nutrition Education Program (EFNEP) is a federally funded program that provides nutrition education to low-income families and youth.\textsuperscript{1} While EFNEP serves youth in grades K-12,\textsuperscript{10} its outreach has been notably skewed towards youth in the earlier grades. Annual reports from federal fiscal years 2015 to 2020 showed that of the total youth participants reached by EFNEP nationally, only a small percentage (approximately 4\%) were high school-aged teens.\textsuperscript{11}
Having noted a paucity of curricula appropriate for use with low-income teens, NJ EFNEP researchers began the development of the Rev It Up! (RIU) nutrition and PA education curriculum in 2015. RIU has been designed to address teens’ dietary and PA needs using age-appropriate educational strategies. The curriculum’s underlying theoretical framework is the Theory of Planned Behavior (TPB). Each of RIU’s 10 lessons engage teens in game-based nutrition education activities, most of which are combined with either 15-minute, indoor walking video segments or popular dance routines. RIU was designed to be used in high school classrooms to provides education on: 1) MyPlate, 2) increasing PA, 3) portion size control, 4) decreasing SSBs consumption, 5) adoption of a more plant-based diet, 6) healthy snacking, 7) decreasing fast food (FF) intake, 8) food safety, 9) food resource management, and, 10) ancillary or other nutrition behaviors, (e.g., advantages of cooking, label reading, energy balance, whole grain foods, and low-fat dairy). The number of lessons that reinforce each topic area are offered roughly in proportion with the degree to which each was found to be an issue among teens, with the heaviest emphasis placed on PA, adoption of a more plant-based diet, portion size control, healthy snacking, decreasing FF and SSB consumption (Table 5.1).

During its pilot testing, RIU’s evaluation was done quantitatively using the 14-item 9th to 12th grade EFNEP Youth Evaluation Questionnaire, which assesses teens’ vegetable, SSB, other beverage, whole grain and FF intakes, their PA and sedentary behaviors, and their food safety practices and food security statuses. Pre- and post-intervention data showed no statistically significant behavior changes among the participating teens, but
the authors had anecdotal evidence from the RIU EFNEP educators that teens were making behavioral changes due to the lesson. Thus, after RIU’s next round of implementation, the authors conducted open-ended interviews with the teens to capture RIU’s impact qualitatively. This paper presents the results of this qualitative investigation.
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<thead>
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<td>Portion Control Portion Control</td>
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<td>Total number of teens who reported behavior change(s)</td>
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<td>Total number of times topic is reinforced</td>
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<td>My Planet, My Food, My Choice</td>
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<td>4</td>
<td>6</td>
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<td>10</td>
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<td>Mission Possible!</td>
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<td>Picnic and Tailgating Safely</td>
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<td>Portion Distortion</td>
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<td>Veg Out and Walk!</td>
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<td>My Planet, My Food, My Choice</td>
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<td>Drink For Your Health</td>
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<td>My Planet Family Fed</td>
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<td>Can I Stop Me Now</td>
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</tbody>
</table>
Methods

Study Design

This study employed a cross-sectional qualitative study design. Semi-structured, one-on-one, face-to-face interviews were conducted to qualitatively assess RIUs impact, as well as to gain an understanding of teens’ opinions regarding the curriculum. The research took place at two ‘Title I’ schools, Charles E. Brimm Medical Arts High School in Camden, NJ and the Health and Related Professions (HARP) Academy in Paterson, NJ, during the Fall of 2018 and 2019 academic years, where NJ EFNEP professional and paraprofessional staff were conducting regular NJ EFNEP programming. The study protocol was approved by the Institutional Review Board of Rutgers University (Pro2019000822).

Interviewer Training

The research team (the author, her faculty advisor, another graduate student, and an EFNEP professional staff member), all of whom were CITI-certified, had previously been trained by the faculty advisor to effectively conduct interviews. Researchers also received a single session training specific to the research protocol, and they individually practiced the interview guide to gain fluency.
Participants and Recruitment

The research team sought to recruit a purposive sample of teens who had attended at least 80% of the lessons, and who they believed would freely express their opinions regarding the curriculum. Classroom teachers assisted in the identification of these teens. Parent consent forms were sent home with interested teens from among those who had been identified. Teens also provided written consent prior to the interview. All interviews with teens, who returned completed parent consent forms, took place in school during school hours.

Procedures

The teens completed demographic surveys, which queried their grades, genders, races, and ethnicities. During the audio-taped interviews the teens were asked: 1) to rate the overall curriculum and each lesson on a scale from 1-5, where 1 meant “Very Bad” and 5 meant “Very Good,” and to justify their ratings. They were also asked to reflect on RIU’s impacts in terms of:

- Any changes they had made (behaviors) or planned to make (intentions).
- If they felt differently about healthy eating and PA (attitudes).
- If they had shared what they learned with anyone, with probes that explored if any normative behaviors had altered for them as a result (social norms). And,
- If they believed they had better control over their dietary or PA behaviors (perceived behavioral control; also referred to as PBC).
Data Analysis

The first author and her advisor, Dr. Debra Palmer-Keenan (DPK), conducted the interviews’ content analyses using the Halcomb and Davison’s 6-step data management method. These steps were: (1) audiotaping of interview and concurrent note taking, (2) reflective journaling immediately post-interview, (3) listening to the audiotape and amending/revision of field notes and observations, (4) preliminary content analysis (done by the first author), (5) secondary content analysis (done by DPK), and (6) the thematic review. The researchers made one deviation from these analysis steps in that, in addition to thematic coding of the data, they performed a deductive, data-driven exploration of the findings using the TPB theoretic framework. For this portion of the analyses, reported changes were charted under the appropriate theoretical constructs. Any discrepancies were resolved through consensus. Congruent with qualitative data analysis processes, the interview analyses were not linear; the transcripts were revisited several times before the analyses were finalized.

While qualitative data are not typically quantified, to better examine the teens’ changes, the researchers counted: the number of different behavioral or TPB antecedent changes the teens named, the number of teens that engaged in these changes, and the total number of changes made by each teen. Descriptive statistics (e.g., frequencies, percentages, means) were used to analyze some of the counts (e.g., average number of behavior changes), participants’ demographic data, and their ratings of the lessons and the
Results

Participant Demographic Characteristics

Twenty-three 9th graders from Charles E. Brimm Medical Arts High School in Camden, NJ and one 9th grader from the Health and Related Professions (HARP) Academy in Paterson, NJ participated in the study. Of these, 61% (n = 14) were female; 39% (n = 10) identified as Hispanic; 79.2% (n = 19) of teens identified their race as Black and 12.5% (n = 3) identified as White.

The teens’ mean rating of the curriculum was 4.1± 0.8; individual lesson ratings ranged from a mean of 3.4 ± 1.2 to 4.6 ± 0.7. When asked about the lessons’ strengths and weaknesses to justify their ratings, the teens indicated that they thought the RIU lessons were both “fun” and “educational.” They liked the attributes of RIU lessons, such as game-based activities, working in teams with their classmates, and the competitions. They were also fond of in-class PA and dancing. Teens expressed dislikes for situations where classroom management was poorly executed or difficulties with technology occurred.
**Reported Shifts Due to RUI**

Teens reported more behavior changes regarding the primary topics that were reinforced more frequently throughout the curriculum (Table 5.1). As such, a greater number of teens reported changing their behaviors regarding SSBs intake (13 teens), PA, adoption of plant-based diets, and portion size control (10 teens each) than reported changes in food resource management and food safety. Teens attributed a total of 68 different types of behavior changes, 10 behavioral intention changes, 19 attitude changes, 16 social norm changes, and 16 PBC changes (Tables 5.2-5.7) to having participated in RIU. Although increased knowledge is not included in TPB, the teens reported 65 distinct knowledge changes, and they frequently indicated that knowledge changes had been responsible for changing their behaviors or one of TPB’s behavioral antecedents. Thus, knowledge gain is included in Tables 5.2-5.7, and recognized in quotes by a “*” denotation.
Table 5.2: EFNEP Teen Participants' Reported PA Changes After Attending RIU Lessons

Number in parentheses indicates how many teens (when n > 1 teens) reported the same change.

PA = Physical Activity; MVPA = Moderate to Vigorous Physical Activity; RIU = Rev It UP!

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Intentions</th>
<th>Attitudes</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Has decreased sedentary behaviors (3)</td>
<td>- To get a Head Start - With friends (2) - With family (2) - When school is out (2)</td>
<td>- Can do PA despite body conditions - Can control distractions, e.g., phone - Can exercise without weather or equipment or - Can watch TV and do PA - Can overcame barriers to exercise and behaviors, - Can find time for PA</td>
</tr>
<tr>
<td>- Plays with younger children at home - Variables moving around (2) - Part of daily routines - Increased increased movement as - Has increased exercise routine in - Plays outside (2) - Plays games (2)</td>
<td>- Physical Behavioral Control - Perceived Behavioral Control - Family and Friends to DDP together (2)</td>
<td>- Exercise can be considered to be - Many things learn together do the same - How to exercise in different ways - MVPA exercise (4) without equipment (4) - How to do workouts at home</td>
</tr>
<tr>
<td>- Includes new strength training exercises - Includes increased exercise routine in - Fees (2) - Plays outside (2) - Plays games (2) - Plays sport (2) - Plays friends (2) - Plays family (2) - Plays school (2) - Plays at home (2)</td>
<td>- Helps move - Favors PA - Helps PA - Helps PA - Helps PA</td>
<td>- Works out - Off-road recreation walks - Run laps - Workouts at home - Works out - Works out at DDP</td>
</tr>
</tbody>
</table>

Note: Teenagers who believe they can do PA are more likely to engage in PA. Teenagers who believe it is important to exercise are more likely to engage in PA. Teenagers who believe it is important to exercise are more likely to engage in PA.
Table 5.3: ENFP Teen Participants' Reported Decrease in SSBs Consumption After Attending RIU Lessons

SSBs = Sugar-Sweetened Beverages; RIU = Rev It Up; N = # in the curriculum

Number in parentheses indicates how many teens (when n > 1 teens) reported the same change.

Legend:
- R = Recommend
- S = Suggest
- E = Encourage
- A = Advise
- I = Inform

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased SSB consumption</td>
<td>Decreased SSB consumption</td>
</tr>
<tr>
<td>I (6)</td>
<td>(c)</td>
</tr>
<tr>
<td>Has replaced most SSBs</td>
<td>Has replaced most SSBs</td>
</tr>
<tr>
<td>Drinks more water</td>
<td>Drinks more water</td>
</tr>
<tr>
<td>Decreases SSB consumption</td>
<td>Decreases SSB consumption</td>
</tr>
</tbody>
</table>

Behavioral Changes:
- Buys less (or none) pre-made snacks or meals.
- Can control how much sugar is in labels.
- Can read and interpret nutrition information.

Table 5.3: ENFP Teen Participants' Reported Decrease in SSBs Consumption After Attending RIU Lessons

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<td>I (6)</td>
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<tr>
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<td>Has replaced most SSBs</td>
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<tr>
<td>Drinks more water</td>
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<tr>
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Behavioral Changes:
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- Can control how much sugar is in labels.
- Can read and interpret nutrition information.

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<tr>
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<td>Has replaced most SSBs</td>
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<tr>
<td>Drinks more water</td>
<td>Drinks more water</td>
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<tr>
<td>Decreases SSB consumption</td>
<td>Decreases SSB consumption</td>
</tr>
</tbody>
</table>

Behavioral Changes:
- Buys less (or none) pre-made snacks or meals.
- Can control how much sugar is in labels.
- Can read and interpret nutrition information.

Table 5.3: ENFP Teen Participants' Reported Decrease in SSBs Consumption After Attending RIU Lessons
Table 5.4: EFNEP Teen Participants' Reported Adoption of a More Plant-based Diet After Attending RIU Lessons

<table>
<thead>
<tr>
<th>Decreased Fast Food Intake</th>
<th>Decreased Fat Food Intake</th>
<th>Increased Fat Food Intake</th>
<th>Decreased Fat Food Intake</th>
<th>Increased Fat Food Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hes decreased PF consumption (2)</td>
<td>Has decreased PF intake (2)</td>
<td>Has increased PF intake (3)</td>
<td>Has increased PF intake (4)</td>
<td>Has increased PF intake (5)</td>
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<tr>
<td>Decreased Fat Food Intake</td>
<td>Increased Fat Food Intake</td>
<td>Decreased Fat Food Intake</td>
<td>Increased Fat Food Intake</td>
<td>Decreased Fat Food Intake</td>
</tr>
<tr>
<td>Has decreased fat foods (2)</td>
<td>Has increased fat foods (3)</td>
<td>Has increased fat foods (4)</td>
<td>Has increased fat foods (5)</td>
<td>Has increased fat foods (6)</td>
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<tr>
<td>Decreased Fat Food Intake</td>
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<td>Decreased Fat Food Intake</td>
<td>Increased Fat Food Intake</td>
<td>Decreased Fat Food Intake</td>
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<tr>
<td>Has decreased fat foods (2)</td>
<td>Has increased fat foods (3)</td>
<td>Has increased fat foods (4)</td>
<td>Has increased fat foods (5)</td>
<td>Has increased fat foods (6)</td>
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<td>Decreased Fat Food Intake</td>
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<td>Has increased fat foods (3)</td>
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<td>Has increased fat foods (6)</td>
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<td>Decreased Fat Food Intake</td>
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<tr>
<td>Has decreased fat foods (2)</td>
<td>Has increased fat foods (3)</td>
<td>Has increased fat foods (4)</td>
<td>Has increased fat foods (5)</td>
<td>Has increased fat foods (6)</td>
</tr>
</tbody>
</table>

Number in parentheses indicates how many teens (when n > 1 teens) reported the same change.
Table 5.5: EFNEP Teen Participants’ Reported Healthy Snacking and Portion Size Control After Attending RIU Lessons

<table>
<thead>
<tr>
<th>Portion Size Control</th>
<th>Healthy Snacking</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Nutrient, Energy Dense (LNED) = Rev It Up!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy Snacking: Increase Healthy Snacks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portion Size Control: Can control portion sizes better</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy Snacking: Decrease unhealthy snacks</td>
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<td></td>
</tr>
<tr>
<td>Portion Size Control: Can control eating of smaller portions of food</td>
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<td></td>
</tr>
<tr>
<td>Healthy Snacking: Decrease intake of unhealthy snacks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portion Size Control: Can control LNED foods &amp; snacks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy Snacking: Increase healthy choices</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number in parenthesis indicates how many teens (when n ≥ 1 teens) reported the same change.
Table 5.6: EFNEP Teen Participants' Reported MyPlate and Ancillary Nutrition Behaviors After Attending RIU Lessons

<table>
<thead>
<tr>
<th>Number in parenthesis indicates how many teens (when n ≥ 1 teens) reported the same change; RIU = Rev It Up!</th>
<th>RIU = Rev It Up!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MyPlate</strong></td>
<td><strong>MyPlate</strong></td>
</tr>
<tr>
<td>Expected Behavioral Change</td>
<td>Actual Nutrition Behaviors</td>
</tr>
<tr>
<td><em>Can control what and how much to eat</em></td>
<td><em>Change in MyPlate transitions</em></td>
</tr>
<tr>
<td><em>More balanced</em></td>
<td><em>Since teens changed their eating habits</em></td>
</tr>
<tr>
<td><em>Health and body</em> (3)</td>
<td><em>More</em></td>
</tr>
<tr>
<td><em>Foods in the kitchen</em> (2)</td>
<td><em>More</em></td>
</tr>
<tr>
<td><em>Expect to grow</em> (3)</td>
<td><em>More</em></td>
</tr>
<tr>
<td><em>Other</em></td>
<td><em>More</em></td>
</tr>
<tr>
<td><em>Reads labels</em></td>
<td><em>More</em></td>
</tr>
<tr>
<td><em>Puts focus on fruits and vegetables</em> (2)</td>
<td><em>More</em></td>
</tr>
<tr>
<td><em>Eats less fat</em> (2)</td>
<td><em>More</em></td>
</tr>
<tr>
<td><em>Comes in time</em></td>
<td><em>More</em></td>
</tr>
</tbody>
</table>

**Knowledge**:
- MyPlate - More balanced and health and body (2)

**Attitude**:
- MyPlate - Felt an increased concern regarding health and body, expected to grow in the future, and more balanced (4)

**Social Norms**
- MyPlate - More balanced (2)

**Expected Behavioral Change**
- MyPlate - More balanced (2)

**Actual Nutrition Behaviors**
- MyPlate - More balanced (2)

**RIU**
- MyPlate - More balanced (2)
Table 5.7: ENFEP Teen Participants' Reported (1) Food Safety, and (2) Food Resource Management After Attending RIU Lessons

RIU = Rev It Up!

Number in parenthesis indicates how many teens (when n > 1 teens) reported the same change.

Lessons

RIU = Rev It Up!

Food Resource Management

Food Safety

Attitude

Knowledge

Food is ready prepared

Handle food safely

Plan to stop washing chicken

What is cross-contamination?

How to properly wash hands in the kitchen

How to store foods can be

Peers shared the lesson

Feedback Behavioral Control

more than 2 hours

Foods should not be left out for

People's hands have a lot of germs

How fast/germs spread

need and ventilation

Safe cooking temperature

What is cross-contamination?

Foods

Rev It Up!

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none

none
Attitude changes. Of all the topic areas addressed in the curriculum, PA and consumption of a more plant-based diet elicited the largest number of attitude shifts.

“It's actually fun to participate in a lot of things (PA) once you like, you get in the spirit of doing that. Like in different activities any type of sports and stuff like that.”

“I used to think physical activity was like stupid, cause no matter how much I ate somehow I stay skinny...my parents are like jealous of me. So, I wasn’t interested in staying fit, but now I am.”

*I’m a big person with the whole climate change thing and trying to save the planet. So, I usually don’t eat a lot of meat now. I try not to. And (I) eat more like chicken instead of like beef cause when I heard that cows release methane and they’re like overfeeding cows, it kind of like hurts a little. It’s like what they feed the cows don’t really help them cause cows need like actual greens, like grass...and they’re given corn which makes them gassy and over-bloated and when they release it they’re releasing methane and CO2 into the atmosphere and everything and that’s makin’ the world hot and everything. It’s scary! So, I try not to eat a lot of meat now.*

Although only a couple shifts were found regarding SSBs, comments in this and other model constricts made it clear that the SSB lesson had made an impression on the teens.

*“at first I was like it can't be so much sugar in these drinks. But then after seeing how many sugar packets, I was like, “this is actually how much sugar I’m putting into my body!” So, it was like bit disgusting at first. Like that's too much sugar.”

Social norms changes. While social norms may not typically be altered by interventions aimed at teaching behavior change to individuals, in this work it appears that some did.
Ten of the teens reported that because they shared their knowledge at home, their family members started purchasing healthier foods and engaging in healthier cooking practices. For example, after telling her aunt that, “oil can up your cholesterol” and that there were ways they could make foods that were “kind of the same thing, but it’s like healthier,” a teen reported that her aunt bought an air fryer and started using it to the degree that she was offered healthier meals regularly. Another commented that she was eating better because more of her meals were made at home.

“I told her about it and my mom made like, like healthier stuff instead of going out all the time. Like she usually go out all the time cause she really didn’t like to cook a lot but now she cooks more after I told her.”

Being engaged in the lessons along with classmates also seemed to alter social norms.

“What stopped me before was that I was doing it on my own, and like I said before, I didn’t want to do it on my own. So now that the whole class was doing it, so that motivated me to do it….I think that because I did it with my friends, my peers, I think like that, that helped a little bit because, um, I don’t like doing things on my own. Like I don’t want to feel like I’m the only one doing something….that was more of a motivation for me…everyone’s doing it. It’s a good thing.”

**PBC changes.** Seventeen distinct PBC were named by the teens, with most of them being applicable to PA and snacking (Tables 5.2-5.7).
“You don’t have to do weights...uh, use weights to work out. Cause that’s what I usually, how I was working out...but you don’t have to have this, that, and the third but you don’t need it anymore, so I guess there’s no excuse to use.”

“Now it’s like I can control a lot of things like if I finish...like if I just ate and I see something good I say I want that but then I think like, nah, I can’t have that...I can’t...that’ll make me gain weight.”

“Before the lessons, I was having a snack like every time I would have it like after dinner, before dinner, after lunch, before lunch. But now I don’t have snacks anymore. Or sometimes I’ll like rarely to have it after dinner. So, I feel like I have more self-control over what I eat and what I drink now”

“Sometimes when I’m at home I be hungry and I want to get a snack but like I look in the cabinet, but then like, I kind of stop myself, and...and usually there’s like a fruit basket right next to the cabinet, so I close the cabinet and get like a fruit instead. We have bananas.”

**Intention Changes.** Teens reported very few intention changes. In most cases it seemed that if the teens were going to make a change, they just did (Tables 5.2-5.7). Of the few behavioral intentions expressed, most were about PA (Table 5.2).
“Ever since the last lesson, me, and my friends we have been planning to like exercise together, so now like, like next year we’re going to start doing like every week we’re going to go to like the gym. And we’re going to get memberships, and we’re just going to work out together there.”

**Behavior Changes.** Teens reported impacts relating to nine of the 10 topic areas taught (i.e., all but food resource management [Tables 5.2-5.7]). Twenty of the 24 teens attributed at least one behavior change to RIU. The average number of topic areas in which changes occurred was 2.8 ± 2.0, and the mean number of reported changes per teen was 7.8 ± 4.1. Notably, more of the teens made changes in the topic areas that were reinforced most frequently, such as PA (n=10), adoption of plant-based diets (n=10), portion size control (n=10), healthy snacking (n=7) and decreasing FF (n=4). The exception was decreasing SSB consumption, which was only reinforced three times, yet resulted in 13 teens adopting associated behaviors (Table 5.1).

“That workout video that you showed us; it got me active and stuff… I kind of bought some weights after that video; after we did that. And sometimes when I’m bored sometimes, when I’m bored and I have nothing else to do at home, I kind of like use them to like work out and stuff. And sometimes, I don’t know why, just because I’m bored, I run around the house.”

“My parents were like surprised that I like eat more vegetables now. Cause usually I would just like, if we had like vegetables on the plate, I would like move them to the side
and try not to eat them. And I would like try to give it to my sister because I know she likes to eat them, but now I eat them. So, they’re like surprised that I don’t like give it to someone else to eat. They were very surprised. They said, where did (her name) go?”

*“(I learned that) fries, which are like my favorite, had the most calories…it’s like, upsetting, but it’s cool…it’s all good.... (Now) usually I order a smaller size than getting the large. I like the ‘large,’ but I’ll be like, the medium or the small.”

*“It made me give up some snacks because I’m like, ‘One bag of chips is equivalent to all these vegetables. Why eat this tiny thing when I can have all that? ’Like, so it really DID help a lot with me at home. Like cause, I, I did not know that fruit and vegetables can have WAY less calories than a regular tiny snack or something. So that did help a lot!”

“Yeah, I know some of the stuff I used to drink. I didn’t know it had so much sugar in it.” now I drink a lot of water; like I just drink bottles of water. Cause like, I can visualize all that sugar in all that coke, and it’s a LOT.”

There were very few behavior changes in the topic areas regarding food safety (Table 5.7); and no changes relating to food resource management (Table 5.7).

One positive, unintended consequence of the lessons was behavior changes made by family members of the participants.
“...nobody, like nobody in my family but me and some of my sisters would just eat vegetables. Nobody. My dad doesn’t eat vegetables. I never seen him eat a vegetable in my life. Now he does! Cause I convinced him. It took me...like a couple hours to convince him, but I convinced him to be healthy. I told him I want to see you see me grow up!”
Discussion

A qualitative assessment of RIU’s impact revealed a far more effective intervention among teens than what the quantitative EFNEP questionnaire from the pilot study had suggested previously. In this qualitative assessment, most teens were impacted by the curriculum’s implementation, and with most of the reported changes aligned with the curriculum’s key topic areas, such as PA, SSBs, adoption of a plant-based diet, portion size control, healthy snacking, and decreasing fast food intake. In addition to the behavioral changes made, this study also found teens had made multiple changes in the behavioral antecedents used in the TBP framework that may predict any behavior changes made later. RIU had equally impacted teens’ attitude, social norm and home environment, and PBC regarding the targeted behaviors.

As such, why did previous quantitative assessment fail to reveal significant results? We offer two potential explanations. First, the frequencies of behaviors that quantitative questionnaires capture may be valuable in some cases, but it may not always be the most effective way to measure intervention impacts that offer multiple behavioral strategies to improve dietary intake. For instance, the EFNEP Youth Questionnaire inquires only the frequency of SSB intake on a given day. In RIU lessons, in addition to drinking fewer soft drinks daily, teens were taught other strategies for reducing SSB consumption, including consuming smaller portions of SSBs, checking labels, drinking lower sugar options, diluting juice with water, making iced tea at home to control the amount of sugar they consume. Out of the 15 teens who modified their SSB intake (Table 5.3), five
employed strategies that would not have resulted in frequency changes (e.g., smaller portion sizes, diluting juice with water), and some of them, who reduced intake, may not have demonstrated change since the survey assessed only a single day.

Secondly, the qualitative results seen in this study suggest that, in addition to behaviors changes, RIU impacted teens’ attitudes, social norms, PBC, and behavioral intentions. Research suggests that nutrition interventions based on behavior change theories yield greater impacts than those not guided by theory.\textsuperscript{14,15} However, since some interventions may be too short for participants to make positive behavioral changes during the study, capturing changes in behavioral antecedents may be important.

An interesting finding from the RIU qualitative interviews was the frequency with which teens reported knowledge gains, despite no queries along those lines. This suggests that the role of knowledge may be understated as an antecedent to changes. In fact, teens indicated knowledge likely impacting all TPB constructs. These findings are similar to those stated by Ajzen on the role of knowledge in the TPB model. While knowledge may not be sufficient to impact behavior change decisions, it is an important factor that helps participants make subjective decisions regarding attitudes, beliefs, and control factors; such provision of direction may lead them to desired behavioral outcomes.\textsuperscript{16} Knowledge was especially impactful, when the information was compounded by a lesson activity that elicited an emotional reaction, shock or surprise, (e.g., actually seeing the sugar that would be consumed when drinking a high-sugar beverage or how many gallons of water it took to support the production of one pound of beef), immediately drove them to quit!
Another noteworthy study finding was the four ancillary changes the teens reported that were unrelated to material included in the curriculum. This may have been due to the teens’ own derivation from lesson activities; for example, one teen ceased her dairy intake after attending the sustainability lesson and learning about the effects of cattle rearing on the planet. It may also be possible that the teens’ heard this information outside the classroom (i.e., elsewhere) during the curriculum implementation’s timeframe or that educators shared information that was not mentioned in the lesson plan. If further observations reveal that the latter is the case, this may require additional attention.

EFNEP employs the “paraprofessional educator model,” wherein paraprofessional educators, “indigenous” to the community, are trained to provide nutrition education.1 Poor fidelity of implementation (FOI), such as paraprofessional educators sharing with target audiences their own experiences and knowledge, which is not included in the lesson plan, may lead to poor program results,17 or inaccurate attribution of the cause of results.18 Curriculum developers should be mindful of the potential impacts of low FOI, train their educators to maintain lesson plan fidelity, and enforce that expectation.

A notable finding from this study was the fairly large number of times the teens indicated they had influenced their families’ behaviors. Several research studies have reported the importance of parental influence on children’s dietary and PA behaviors,19-20 and in EFNEP, it has been an ongoing expectation that the education provided to parents and caregivers will cause a multi-generational effect on health behaviors.10 However, this study is among the first to suggest that teen interventions may also yield similar results in changing their family members’ behaviors, and consequently their home environments.
Strengths and Limitations

A strength of this study is that it employed qualitative methods that provided a deep insight into the number and types of changes made by participants. Although quantitative methods, like descriptive statistics, are not typically used in qualitative analyses, the use of some data quantification provided a more comprehensive view of the results in this study. For example, we were able to highlight the behaviors adopted by more teens or in relationship to the topics that were reinforced more often.

On the other hand, this study was not without limitations. A small, convenience sample of teens were interviewed to collect intervention impacts. Therefore, the statements of participants may be different from those who were not willing to participate. Because most of the interviews were conducted with teens from the same school, who were racially similar, the results may not be generalizable to the other populations. Also, some teens were interviewed immediately after the intervention and others were interviewed 6-months after. While this sheds some light on the curriculum’s long-term impacts, it can also complicate the interpretation of the results.
Implications For Research and Practice

This study’s findings suggest that RIU was successful in impacting EFNEP teen participants’ behaviors and TPB behavior change antecedents. Since the findings indicate that RIU may impact teens dietary and PA behaviors, professionals working with a similar demographic may consider adopting the RIU curriculum. An additional implication that emerged from this study was the importance of two unrecognized behavior change antecedents. Based on these results, knowledge, particularly that which generates an emotional reaction, should be considered as an important antecedent to behavioral change. Further, this study suggests that nutrition educators should increase their outreach to teens, as doing so may not only impact their own behaviors, but also those of their family members. Further research to examine the role of knowledge change, as well as the magnitude of family level effects through teen education is warranted.

The qualitative data collection protocol used in this investigation enabled researchers to capture the changes that would be missed by quantitative evaluation tools, as well as to portray the curriculum’s impacts on behavioral antecedents, which may lead to behavior changes in the long term. These impacts may not have been captured by quantitative assessment tools. Professionals may consider using or developing alternate assessment tools that query changes that are more in line with educational impacts detected via qualitative means. Future research to investigate RIU curriculum’s impacts, using a better suited evaluation tool and a diverse, larger audience, is also needed and is underway.
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CHAPTER 6: CONCLUSION

The purpose of this study was to conduct and describe a portion of the formative and process assessment done in support of the development of a teen nutrition and PA curriculum, i.e., the Rev It Up! (RIU) curriculum. A qualitative assessment was also conducted to examine teen participants’ behavior changes, subsequent to the curriculum’s pilot test. Findings for each of these activities were presented in this dissertation. This chapter will briefly summarize the dissertation’s aims #1 and #2, which are more comprehensively addressed in the two manuscripts (Chapters 4 and 5). The majority of this chapter, however, will be dedicated to addressing this dissertation’s third aim, i.e., to determine teachers’ and nutrition educators’ recommendations regarding to the curriculum revisions.

The first aim of the dissertation was to provide a detailed framework compiling the formative research, process evaluations, and outcome analysis steps for creating an evidence-based nutrition curriculum. In Chapter 4, the author described a model which provides researchers and professionals with comprehensive stepwise guidance for doing so. This model is a culmination of RIU’s researchers’ previous experiences and lessons learned while developing other evidence-based nutrition lessons. In addition to the guidance provided, the manuscript offers considerations for those professionals with limited funding or program restrictions, and advice on how to create an evidence-base for a curriculum previously recognized as “practice-based.”
The second aim of this dissertation was to assess the qualitative impacts of the RIU teen nutrition and PA curriculum among limited-resource, diverse, high school teens. The qualitative outcome assessment, which was conducted via post-intervention semi-structured, face-to-face interviews with the teen participants, provided evidence that RIU was effective in facilitating behavior changes. Interview findings suggested the use of behavior frequency questionnaires, such as the EFNEP 9th to 12th Grade Youth Evaluation Questionnaire, may not accurately reflect interventions’ impacts. Teen participants adopted various strategies discussed during the RIU classes (e.g., controlling portions rather than reducing the number of times something is consumed) that frequency questionnaires, measuring behavior engagement in ‘number of days’ or ‘number of times per day,’ would fail to capture. The interview findings also revealed additional RIU impacts on behavioral antecedents such as attitudes, social norms, perceived control, and knowledge regarding the key topics covered in the curriculum. The Theory of Planned Behavior suggests these antecedents predict behavior change, which further suggests these findings should not be overlooked since teens may not have had an opportunity to change their behaviors within the measurement timeframe.

During phase 4, the information needed to determine teachers’ and nutrition educators’ recommendations regarding the curriculum, the dissertation’s third aim, was collected via in-person, face-to-face, semi-structured interviews with: (a) nine EFNEP educators who taught the lessons, and (b) six high school teachers, who assisted in the implementation of the lessons. Most comments made were regarding strategies to: teens’ enhance knowledge retention, improve classroom management and maintain discipline, increase
educators’ communication with teachers, and manage activity timings during class periods. Several suggestions were also made regarding specific lessons.

Overall, the curriculum was well received by the teachers and the EFNEP educators. They frequently described RIU lessons as a “fun” and “interactive” lesson series. Both groups liked the use of games-based activities, describing them as “very competitive,” and as having encouraged “strong interactions and teamwork” among teens. However, because the games elicited high levels of engagement and competition, EFNEP educators and classroom teachers indicating they thought the teens often focused on winning the game instead of learning the information, as intended.

A strategy suggested by the EFNEP educators to reinforce the information taught was the provision of homework assignments.

“...if there’s homework, they actually have to pay attention so that they can do the homework.”

One educator reported that she had observed higher knowledge retention among teens whose teacher reinforced RIU’s information by creating graded assignments:

“I taught 2 classes...in 1 of them, the teacher was super supportive and would give extra credit, and a project at the end....it helps them to remember. The other one was good, he helped, but there was none of that.”
While this strategy has the potential to be beneficial, teachers will incorporate RIU content in their syllabus at their own discretion. Further, several classroom teachers reported low confidence in the teens completing homework assignments. Instead, teachers suggested two strategies they indicated they regularly employed in their work. Firstly, a few teachers suggested reinforcing the lesson objectives at the beginning and ending of each class, using “SWBAT,” (i.e., Students Will Be Able To…) format. The second strategy teachers recommended using was what they called the “Stop-n-Jot” method.

“[To keep the teens anchored] we stop periodically, and they jot to “fill in a blank” or write a response.”

As suggested above, this method requires having a worksheet for each lesson that students need to complete before the end of class. For them to do so, they are encouraged to “Stop-n-Jot” down the information in the worksheets when key concepts are presented.

If possible, RIU lessons should be modified to better emphasize each lesson’s objectives and to include in-class assignments.

Classroom management issues were brought up, again, by both the EFNEP educators and the classroom teachers.
In NJ EFNEP paraprofessional staff are counseled that the responsibility discipline lays on the classroom teacher. Further, since the teachers know their students well and have their own classroom policies, teachers are more adept at handling classroom management issues. Several educators reported that when teachers assumed a more hands-on approach during the lessons, teens were well-behaved and class participation increased.

“There were certain things she did to help out which were really important, ‘cause otherwise, you know, kids are all over the place, and not really listening.”

Teachers believed the EFNEP educators, who were better skilled in classroom management were more effective. Of a less skilled educator one teacher said:

“I don’t think at the beginning she understood the management piece...and she didn’t understand that, like, you kind of have to like wait until they are silent, and you have to kind of demand that before you start talking or else it gets like really frustrating because everyone is talking. I did pull her to the side one day and told her...you shouldn’t start until they are all silent and you need to let them know ‘I’m going to wait.’ Otherwise, some of them don’t even know what they are doing, and it gets confusing and some really want to hear what’s being said (and can’t)”

Yet, when describing an educator better skilled in classroom management, a teacher commented:

“She was able to get them back from getting too excited......she shared in their excitement, but she was able to bring them back, like ‘I know this is so much fun, but wait till you see the next part.””
Teachers also discussed observations of educators who were both well-prepared and able to capture and maintain the teens’ attention, resulting in the teens being more disciplined and engaged.

“One of our concerns whenever someone comes in to teach our classes is...well for one you’ve got to be prepared...and the second thing we look for is someone who is going to be entertaining or dynamic...that you can capture the students’ attention...”

Additional training is recommended so educators may be more apt at working with high school teens.

One facet of the RIU curriculum implementation that was brought up by multiple teachers was that they were not provided with adequate information regarding their expectations for aiding the educators, and thus, described the experience as “rough at the beginning.” One explained that if the teachers were informed that teens were going to engage in in-class PA, they may have prepared the classroom by moving the desks accordingly.

While the RIU’s developers had anticipated a need to provide such information to the teachers, the curriculum instructed the EFNEP educators to provide teachers with a handout, that had been included in the curriculum, the first time they met. The handout included a list of the lessons, a short description of each, and the teacher’s expected role
in each lesson. However, multiple teachers revealed that they had misplaced this printed information.

“If I get it at the beginning of the series, it’s gone.”

The teachers stated they preferred weekly communications, via email that included: 1) what was expected of them prior to and their roles during the lesson, 2) a copy of any handouts or recipes, and 3) any other pertinent information. It is recommended that RIU lessons be modified to provide sample emails corresponding with each lesson that educators are instructed to email to each teacher several days before each lesson, in addition to the initially distributed handout that is to be reviewed with the teacher at the first meeting.

RIU lessons were designed to be administered in high school classrooms that meet for 40 to 50 minutes. However, multiple educators mentioned that the lessons’ lengths sometimes exceeded the available teaching time that was available.

“By the time the kids get in and settled, if you have 35 minutes, you’re lucky... It’s just real difficult to squeeze it [lesson content] all in.”

The educators revealed that they were able to teach the majority of the content for the 4 lessons that exclusively addressed either nutrition or physical activity. However, for the other 6 lessons, in which they taught both nutrition and physical activity, some of the lessons’ content had been “left out.” Educators may not have 40-50 minutes available to
complete the nutrition activity as written in the lesson plan. It may be wise for the RIU lessons to be modified to instruct the educators to engage in the PA component at the end of the class period, after informing the class that they may not finish the 15-minute DVD segment. Since the teens are provided with a copy of the DVD to take home, educators should be instructed to encourage the teens to finish the PA DVD segment at home.

With regards to specific lesson suggestions, several were made. While most RIU lessons were designed to ensure that examples of foods referenced are specific to the food environment found among each group of teens (e.g., snacks available in their high school’s vending machine), the “Fast-Food Jeopardy” lesson, which educates teens about the healthier options available at fast food restaurants, had not been adequately tailored for locations in New Jersey.

“My only issue, even though the kids knew a lot of the information about this restaurant, I would change KFC to Chick-Fil-A, because Chick-Fil-A is the number one chicken spot today, especially here in New Jersey.”

The teachers and educators in South Jersey both suggested modifications to ensure that local fast-food establishments were used in this lesson. As such, this lesson should be modified to include instructions on how educators can tailor it.

Similarly, in another lesson intended to increase teens’ knowledge regarding food safety practices, educators expressed concerns about the use of a picnic or tailgate scenario to
display safe behaviors. Educators were concerned that, since teens rarely prepare food in such situations, that the messaging in this lesson would not translate into action. However, since teens reported change their own and their family’s food handling practices, there may not be a need to modify the lesson.

Several props are required for this lesson’s implementation. Some educators reported teaching multiple, consecutive classes, that reportedly made the lessons repeated set up cumbersome and time consuming. To avoid this, lesson instructions should instruct educators to request additional assistance from the teachers.

Another lesson, “RIU! at the Olympics,” was a well-received lesson in which teens engage in several rounds of strength training exercises, elicited feedback from multiple educators. While they expressed their fondness for the lesson, some were concerned about the risk of the teens employing incorrect postures while doing the recommended weight bearing exercises.

“I think whoever’s teaching that lesson [Rev It Up! at the Olympics] should also encourage (good) posture. That’s very important because you can get injured, easily injured, especially depends on the body type, everyone is different. Everybody’s bone structure is different…We must reinforce, ’this is the proper way, you need to have your back straight’ for example. I think that should be more reinforced, just to avoid any injuries.”

Moreover, the lesson uses images to aid the educator in demonstrating the correct form, however, since it is 2-dimensional, the image can be misleading.
“The pictures are kind of weird… they were weird cartoon people, but they’re like 2-dimensional so like the one girl is holding milk jugs like this [raises arms in front of herself], but you’re supposed to be back. So, like the perspective was off… the pullback, I think, every single kid was doing it wrong.”

Modification of this RIU lesson to include better educator training on demonstrating correct postures and supervising and adjusting teens’ postures during the exercises may be warranted.

Lastly, educators mentioned that the teens’ initial engagement in the DVD was sometimes difficult, and they did not feel confident that the teens would increase their activity levels having used the “Walk Indoors! With Leslie Sansone” DVD in 6 of the curriculum’s lessons. This DVD was developed for low-income, diverse adult populations with a cast representing its intended audience. However, teen interviews revealed that the DVD had impacted their activity levels. While some appreciated the low-intensity activity during class, others simply learned from it that equipment or gym memberships were not required to be physically active. Seeing an adult cast on the DVD prompted some teens to use the DVD with family members. Therefore, no immediate need for any modification is needed. When funding is available, RIU researchers may consider creating a teen-appropriate PA DVD.

In conclusion, teachers and educators expressed positive impressions of the RIU curriculum. They enjoyed the game-based activities employed in the lessons. Both groups
provided feedback and advice on strategies to improve RIU to increase effectiveness. Warranted modifications included strategies on increasing teens’ knowledge acquisition and retention and ways to improve classroom management and discipline. Teachers also expressed the need for more frequent communication so they may better prepare for the lessons and aid the educators. Meanwhile, educators protested the length of RIU’s lessons as they had a hard time completing some lessons during class periods. Alternate plans were discussed to remedy the matter. Lastly, teachers and educators also discussed lesson-specific modifications for four lessons.

Overall, process evaluation interview findings from those done with teachers and educators portrayed their preference for the use of the RIU curriculum. However, paraprofessional staff members likely require additional classroom management training if they are going to work in high schools. Future testing of the curriculum will be necessary to ensure that modifications made truly enhance the RIU lessons.
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APPENDIX A: CONSENT FORMS

Adolescent Interview Consent Form
with Audio/Visual Recording

Thank you for showing interest in being in this research study conducted by the Department of Nutritional Sciences at Rutgers University. The aim of this study is to gather your thoughts about the physical activity and nutrition education lesson EFNEP taught in your health or PE class.

If you choose to be in the study, we will ask you to fill out a short survey and then we will interview you. We will ask you questions like what you liked and disliked about the lessons you were taught and if you would change the lessons in any way. Please note that there is no right or wrong answer to these questions.

This interview is designed to take about 30 minutes. However, please feel free to expand on the topic or talk about related ideas. Also, if there are any questions you would rather not answer or that you do not feel comfortable answering, please say so and we will stop the interview or move on to the next question, whichever you prefer.

This research is confidential. Confidential means that the research records will include some information about you and this information will be stored in such a manner that some linkage between your identity and the response in the research exists. We will only ask you to initial this form as your agreement to participate in this study. Please note that we will keep this information confidential by limiting individual's access to the research data and keeping it in a secure location, either locked in a file cabinet or kept as password protected files on our computers. The data gathered in this study is confidential with respect to your personal identity unless you specify otherwise.

The research team and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated. All interviews will be transcribed within 30-days of the interview and destroyed afterwards. Transcripts may be kept indefinitely in the aforementioned secured location.

You are aware that your participation in this interview is voluntary. You understand the intent and purpose of this research study. If, for any reason, at any time, you wish to stop the interview, you may do so without having to give an explanation.

Participating in the interview poses no risks to you and the information discussed will be kept confidential. Information shared during the interview will be summarized and be presented only in combination with the information collected from others.

You may receive no direct benefit from taking part in this study, other than providing information that will help us develop better-informed education materials to help many teens like yourself across the country learn about exercise and healthy eating habits.

If you have any questions about the study or study procedures, you may contact myself at:
Het Desai-Shah
NJ EFNEP/Nutritional Sciences
26 Nichol Drive, 2nd floor,
New Brunswick, NJ 08901
If you have any questions about the study or study procedures, you may contact myself (see above). You may also contact my faculty advisor:

**Debra Palmer-Keenan**  
NJ EFNEP/Nutritional Sciences  
26 Nichol Drive, 2nd floor,  
New Brunswick, NJ 08901  
Ph: 848-932-9712  
Email: dpalmer@aesop.rutgers.edu

If you have any questions about your rights as a research participant, you can contact the Institutional Review Board at Rutgers (which is a committee that reviews research studies in order to protect research participants). The IRB Administrator at Rutgers can be reached at:

You will be offered a copy of this consent form that you may keep for your own reference.

Once you have read the above form and, with the understanding that you can withdraw at any time and for whatever reason, you need to let me know your decision to participate in today’s interview.

Your signature on this form grants the investigator named above permission to record you as described above during participation in the above-referenced study. The investigator will not use the recording(s) for any other reason than that/those stated in the consent form without your written permission.

**Subject (Print ) ___________________________________________**

**Subject Signature ____________________________ Date __________________**

**Principal Investigator Signature _____________________ Date ______________**

You will be given a copy of this consent form for your records. By participating in the above stated procedures, then you agree to participation in this study.
CONSENT TO AUDIO

AGREEMENT TO BE AUDIO RECORDED

Subject Name
(Print):______________________________________________________________

Subject Signature ________________________________   Date ______________________

Investigator/Person Obtaining Consent Name
(Printed):___________________________________

Signature ________________________________________ Date ______________________

AGREEMENT TO BE VIDEO RECORDED

Subject Name
(Print):______________________________________________________________

Subject Signature ________________________________   Date ______________________

Investigator/Person Obtaining Consent Name
(Printed):___________________________________

Signature ________________________________________ Date ______________________
Parental Permission to Permit Child to Take Part In Research

**TITLE OF STUDY:** Formative Evaluation of a Physical Activity and Nutrition Education Curriculum for Teens  
**Principal Investigator:** Het Desai-Shah

This permission form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want your child to take part in this study. It is your choice for him/her to take part or not. After all of your questions have been answered and you wish your child to take part in the research study, you will be asked to sign this permission form. You will be given a copy of the signed form to keep. Your child’s alternative to taking part in the research is not to take part in it.

Your child is invited to take part in a research study that is being conducted by Het Desai-Shah, who is a student in the Department of Nutritional Sciences at Rutgers University. The purpose of the research is to see if your child liked or disliked the new exercise and nutrition lessons, we have developed for high school teens.

Het Desai-Shah may be reached at 732-912-8622 or 26 Nichol Drive, 2nd floor, New Brunswick, NJ 08901.

We anticipate approximately 120 children will take part in the research. Your child will be asked to fill out a survey form about his or her age, grade, race, ethnicity, and asked a few questions about their views on the lessons, what they would like to change what they were taught, and if there are any other topics they would like us to teach. Your child will be required to participate in an audiotaped interview one time for about 30 minutes.

We do not foresee risks to a child’s participation in this study. The information discussed in the interview will be kept private. It will only be presented combined with the information collected from others.

Your child may receive no direct benefit from taking part in this study. However, the benefits of taking part in this study may be providing us with information that will help us develop better-informed education materials to deal with teens’ physical activity and dietary issues and that may help you in your work.

Your child will receive no compensation for being in the study.

This research is confidential. Confidential means that the research records will include some information about your child and this information will be stored in such a manner that some linkage between their identity and the response in the research exists. Please note that we will keep this information confidential by limiting people’s access to the
research data. We will keep it in a secure location, either locked in a file cabinet or kept as password protected files on our computers. The data gathered in this study is confidential with respect to your child’s personal identity unless you specify otherwise. Study data will be kept for no more than 5 years after study completion, after which all information will be destroyed.

After the study is over the information collected for this research will not be used or distributed to investigators for other research.

The research team and the Institutional Review Board at Rutgers University are the only parties that may see the data, except as may be required by law. If the findings of this research are professionally presented or published, only group results will be stated.

It is your choice whether your child takes part in the research. You may choose to have your child take part, not to take part or you may change your mind and withdraw your child from the study at any time. If you do not want your child to enter the study or decide to stop taking part, their relationship with the study staff will not change, and your child may do so without penalty and without loss of benefits to which s/he is otherwise entitled. You may also withdraw your permission for the use of data already collected about your child, but you must do this in writing to Het Desai-Shah at 26 Nichol Drive, 2nd Floor, New Brunswick, NJ 08901.

If you have questions about your child taking part in this study, you may contact me Het Desai-Shah; het@scarletmail.rutgers.edu; 732-912-8622. You may also contact my faculty advisor Dr. Debra Palmer Keenan; dkeenan@njaes.rutgers.edu; 26 Nichol Drive, New Brunswick, NJ 08901; 848-932-9712.

If you have questions about your child’s rights as a research subject, you can call the IRB Director at New Brunswick/Piscataway ArtSci IRB (732) 235-2866 or the Rutgers Human Subjects Protection Program at (973) 972-1149.
PARENTAL PERMISSION FOR CHILD

I have read this entire form, or it has been read to me, and I believe that I understand what has been discussed. All of my questions about this form or this study have been answered.

I am the [ ] parent or [ ] legal guardian of ______________ (name of child) and I permit my child to take part in this audio-recorded interview study.

Subject/Child’s Name: ________________________________________________

Parent’s Signature: _____________________________ Date: __________

Signature of Investigator/Individual Obtaining Consent:

To the best of my ability, I have explained and discussed the full contents of the study including all of the information contained in this consent form. All questions of the research subject and those of his/her parent or legal guardian have been answered.

Investigator/Person Obtaining Consent: ________________________________

Signature: _____________________________ Date: ______________________
**Educator Interview Consent Form with Audio/Visual Recording**

Thank you for showing interest in participating in this research study conducted by the Department of Nutritional Sciences at Rutgers University. The aim of this study is to gather your thoughts and impressions on the physical activity and nutrition education curriculum that you recently taught in high schools.

For this study, we will conduct an interview. We will ask you questions like what you liked and disliked about the lessons that you taught to the high school teens and if you would change anything about the lessons. Please note that there is no right or wrong answer to these questions. This interview is designed to take about 30 minutes. However, please feel free to expand on the topic or talk about related ideas. Also, if there are any questions you would rather not answer or that you do not feel comfortable answering, please say so and we will stop the interview or move on to the next question, whichever you prefer.

This research is confidential. Confidential means that the research records will include some information about you and this information will be stored in such a manner that some linkage between your identity and the response in the research exists. We will only ask you to initial this form as your agreement to participate in this study. However, please feel free to expand on the topic or talk about related ideas. Also, if there are any questions you would rather not answer or that you do not feel comfortable answering, please say so and we will stop the interview or move on to the next question, whichever you prefer.

The principle investigator (myself) and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated. All interviews will be transcribed within 30-days of the interview, and destroyed afterwards. Transcripts may be kept indefinitely in the aforementioned secured location.

You are aware that your participation in this interview is voluntary. You understand the intent and purpose of this research study. If, for any reason, at any time, you wish to stop the interview, you may do so without having to give an explanation.

Participating in the interview poses no risks to you and the information discussed will be kept confidential. Information shared during the interview will be summarized and presented only in combination with the information collected from others. You may receive no direct benefit from taking part in this study, other than providing information that will help us develop better-informed education materials to deal with teens’ physical activity and dietary issues and that may help you in your work.

With your permission, I would like to record today’s interview. Recording the interview will allow me to focus better on what you are saying. No one else will hear the recording. All information you provide will be presented to the rest of the research staff as a summary of all educators’ interviews.

The recording(s) will include only the information you share with me during the interview. If you say anything that you believe at a later point may be hurtful and/or damage your or anyone else’s reputation, then you can ask me to rewind the recording and record over such information OR you can ask that certain text be removed from the dataset/transcripts. Please note, that if you accidentally mention yours or any teens’ names, I will back up the recording and erase that section before we move forward with the interview.

The recording(s) will be stored in a secured location, as mentioned earlier. As soon as the interview is
transcribed (which will be done within the next 30 days), the recording will be destroyed.

If you have any questions about the study or study procedures, you may contact myself at:

**Het Desai-Shah**  
NJ EFNEP/Nutritional Sciences  
26 Nichol Drive, 2nd floor, New Brunswick, NJ 08901  

Ph: 732-912-8622  
Email: het@scarletmail.rutgers.edu

If you have any questions about the study or study procedures, you may contact myself (see above). You may also contact my faculty advisor:

**Debra Palmer-Keenan**  
NJ EFNEP/Nutritional Sciences  
26 Nichol Drive, 2nd floor, New Brunswick, NJ 08901  

Ph: 848-932-9853  
Email: dkeenan@aesop.rutgers.edu

If you have any questions about your rights as a research participant, you can contact the Institutional Review Board at Rutgers (which is a committee that reviews research studies in order to protect research participants). The IRB Administrator at Rutgers can be reached at:

**Rutgers University**  
Institutional Review Board for the Protection of Human Subjects  
Office of Research and Sponsored Programs  
3 Rutgers Plaza  
New Brunswick, NJ 08901-8559  
Tel: 848-932-0150  
Email: humansubjects@orsp.rutgers.edu

You will be offered a copy of this consent form that you may keep for your own reference.

Once you have read the above form and, with the understanding that you can withdraw at any time and for whatever reason, you need to let me know your decision to participate in today's interview.

You will be given a copy of this consent form for your records. By participating in the above stated procedures, then you agree to participation in this study.
Teacher Interview Consent Form with Audio/Visual Recording

Thank you for showing interest in participating in this research study being conducted by the Department of Nutritional Sciences at Rutgers University. The aim of this study is to gather your thoughts and impressions on the physical activity and nutrition education curriculum that was taught in your XXX (e.g. health class or after-school program).

For this study, we will conduct a recorded interview. We will ask you questions like what you liked and disliked about the lessons that were taught by the EFNEP educator and if you would change anything about the lessons. Please note that there are no right or wrong answers to these questions. This interview is designed to take about 30 minutes. However, please you will be welcome to expand on the topic or talk about related ideas for longer if you like. Also, if there are any questions you would rather not answer or that you do not feel comfortable answering, please say so and I will stop the interview or move on to the next question, whichever you prefer.

This research is confidential. Confidential means that the research records will include some information about you and this information will be stored in such a manner that some linkage between your identity and the response in the research exists. We (the research team) will only ask you to initial this form as your agreement to participate in this study. Please note that we will keep this information confidential by limiting individuals’ access to the research data and keeping the data in a secure location, either locked room and/or kept in password protected files on our computers. The data gathered in this study is confidential with respect to your personal identity unless you specify otherwise.

The research team and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated. All interviews will be transcribed within 30-days of the interview and destroyed afterwards. Transcripts may be kept indefinitely in the aforementioned secured location.

You are aware that your participation in this interview is voluntary. You understand the intent and purpose of this research study. If, for any reason, at any time, you wish to stop the interview, you may do so without having to give an explanation.

Participating in the interview poses no risks to you and the information discussed will be kept confidential. Information shared during the interview will be summarized and be presented only in combination with the information collected from others.

You may receive no direct benefit from taking part in this study, other than providing information that will help us develop better-informed education materials to deal with teens’ physical activity and dietary issues and that may help you in your work.

The interview will be recorded to allow me to better focus on what you say. No one will hear the recording except for the research staff and/or the administrative staff member who will be asked to transcribe the interviews to be shared among the research staff.

The recording(s) will include only the information you share with me during the interview. If you say anything that you believe at a later point may be hurtful and/or damage your or anyone else’s reputation, then you can ask me to rewind the recording and record over such information OR you can ask that certain text be removed from the dataset/transcripts. Please note, that if you accidentally mention your or any teens’ names, I will back up the recording and erase that section before we move forward with the interview.
The recording(s) will be stored in a secured location, as mentioned earlier. As soon as the interview is transcribed (which will be done within the next 30 days), the recording will be destroyed.

If you have any questions about the study or study procedures, you may contact myself at:
Het Desai-Shah
NJ EFNEP/Nutritional Sciences
26 Nichol Drive, 2nd floor,
New Brunswick, NJ 08901
Ph: 732-912-8622
Email: het@scarletmail.rutgers.edu

If you have any questions about the study or study procedures, you may contact myself (see above). You may also contact my faculty advisor:

Debra Palmer-Keenan
NJ EFNEP/Nutritional Sciences
26 Nichol Drive, 2nd floor,
New Brunswick, NJ 08901
Ph: 848-932-9853
Email: dpalmer@aesop.rutgers.edu

If you have any questions about your rights as a research participant, you can contact the Institutional Review Board at Rutgers (which is a committee that reviews research studies in order to protect research participants). The IRB Administrator at Rutgers can be reached at: Rutgers University
Institutional Review Board for the Protection of Human Subjects
Office of Research and Sponsored Programs
3 Rutgers Plaza
New Brunswick, NJ 08901-8559
Tel: 848-932-0150
Email: humansubjects@orsp.rutgers.edu
You will be offered a copy of this consent form that you may keep for your own reference.

Once you have read the above form and, with the understanding that you can withdraw at any time and for whatever reason, you need to let me know your decision to participate in today's interview.

Your signature on this form grants the investigator named above permission to record you as described above during participation in the above-referenced study. The investigator will not use the recording(s) for any other reason than that/those stated in the consent form without your written permission.

Subject (Print) ____________________________________

Subject Signature ___________________________ Date __________________

Principal Investigator Signature ___________________ Date _______________
Thank you for showing interest in participating in this research study conducted by the Department of Nutritional Sciences at Rutgers University. The aim of this study is to gather your review and impressions on the physical activity and nutrition education lessons.

Each week, a lesson plan from the curriculum and a review survey will be emailed to you. You will be asked to review the lesson plan and complete the survey by either downloading or printing the survey, which you may send back by mail, or online on Qualtrics. Upon completion of the survey of the first lesson and consequent lessons, you will be emailed the next lesson. This will continue until you have completed all 10 lessons evaluation.

This research is confidential. Confidential means that the research records will include some information about you and this information will be stored in such a manner that some linkage between your identity and the response in the research exists. We will only ask you to initial this form as your agreement to participate in this study. Please note that we will keep this information confidential by limiting individual's access to the research data and keeping it in a secure location, either locked in a file cabinet or kept as password protected files on our computers. The data gathered in this study is confidential with respect to your personal identity unless you specify otherwise.

The research team and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated.

You are aware that your participation in this survey study is voluntary. You understand the intent and purpose of this research study. If, for any reason, at any time, you wish to stop your participation, you may do so without having to give an explanation.

Participating in the study poses no risks to you and the information discussed will be kept confidential. Information you share will be summarized and be presented only in combination with the information collected from others. You may receive no direct benefit from taking part in this study, other than providing information that will help us develop better-informed education materials to deal with teens' physical activity and dietary issues and that may help you in your work.

If you have any questions about the study or study procedures, you may contact myself at:
Het Desai-Shah  
NJ EFNEP/Nutritional Sciences  
26 Nichol Drive, 2nd floor, New Brunswick, NJ 08901  

Ph: 732-912-8622  
Email: het@scarletmail.rutgers.edu  

If you have any questions about the study or study procedures, you may contact myself (see above). You may also contact my faculty advisor:

Debra Palmer-Keenan  
NJ EFNEP/Nutritional Sciences  
26 Nichol Drive, 2nd floor, New Brunswick, NJ 08901  

Ph: 848-932-9853  
Email: dkeenan@aesop.rutgers.edu  

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You will be offered a copy of this consent form that you may keep for your own reference.  

Once you have read the above form and, with the understanding that you can withdraw at any time and for whatever reason, you need to let me know your decision to participate in the study.  

Your signature on this form grants the investigator named above permission to record you as described above during participation in the above-referenced study. The investigator will not use the recording(s) for any other reason than that/those stated in the consent form without your written permission.

Subject (Print ) ________________________________________

Subject Signature ____________________________   Date ______________________

Principal Investigator Signature _____________________ Date __________________

You will be given a copy of this consent form for your records. By participating in the above stated procedures, then you agree to participation in this study.
APPENDIX B – EXPERT REVIEW QUESTIONNAIRE

Rev It Up! Curriculum Review Tool

Assess the lesson by checking the column that most corresponds with your level of agreement with the statement at the left. Next, use the “Comments” column to explain or provide detail. You may attach additional pages for comments as needed. Also please mark up your copy of the lesson plan with comments and suggested changes. Flatter us by using your red pen freely!

Symbol Key:  **SA** = Strongly Agree  
**A** = Agree  
**N** = Neither Agree Nor Disagree  
**D** = Disagree  
**SD** = Strongly Disagree

*Note to the reviewer: collectively our reviewers include experts in content, theory, adult learning, program, and program evaluation. The initial letter requesting your participation indicated your identified expertise. Please review the curriculum and respond to each assessment item with that/those expertise in mind. If you feel that an assessment item is outside of that expertise, feel free to skip that item; however, please denote with N/A so we’ll know you skipped it on purpose.*

<table>
<thead>
<tr>
<th>Content of Lesson Plan</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content, Design, and Layout:</strong></td>
<td></td>
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</tr>
<tr>
<td>1. Lesson is based on Dietary Guidelines for Americans 2015-2020 and the 2017 Physical Activity Guidelines for Americans.</td>
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<td>2. Content of the lessons corresponds to tenants of the Theory of Planned Behavior</td>
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<td>3. Information is accurate, credible, current, based on research, and is free of sponsor/product bias.</td>
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<td>4. The lesson is logically sequenced to achieve the desired learning outcome.</td>
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<td>5. Essential topics are discussed in appropriate detail.</td>
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<tr>
<td>Content of Lesson Plan</td>
<td>SA</td>
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<tr>
<td>6. Lesson includes a variety of stimulating and interesting learning experiences, questions, projects, or suggestions for further action that involves the participant.</td>
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</table>

*Content, Design, and Layout, cont:*

| 7. Concrete examples rather than abstract concepts are used. |    |   |   |   |    |          |
| 8. The lesson incorporates visual, auditory and kinesthetic learning. |    |   |   |   |    |          |
| 9. The leader's speaking role will be limited; learning is designed to be more participant-oriented. |    |   |   |   |    |          |
| 10. Only 1 to 2 new concepts are introduced in one lesson. |    |   |   |   |    |          |

*Key Messages:*

| 11. The key messages (lesson objectives) are clearly stated. |    |   |   |   |    |          |
| 12. All main points relate back to the stated key messages. |    |   |   |   |    |          |
| 13. The key messages are introduced early and re-emphasized later. |    |   |   |   |    |          |
| 14. Messages clearly describe desired behavior changes and how to achieve them. |    |   |   |   |    |          |

*Target Audience and Desired Outcomes:*

<p>| 15. The lesson is written at an appropriate reading level for the participants. Any |    |   |   |   |    |          |</p>
<table>
<thead>
<tr>
<th>Content of Lesson Plan</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>potentially unfamiliar words are defined clearly.</td>
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<td>16. Information is appropriate to the age, ethnicity, socioeconomic status, and lifestyle of the target audience. Free of cultural bias and stereotyping.</td>
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<tr>
<td><strong>Target Audience and Desired Outcomes, cont:</strong></td>
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<tr>
<td>17. The content addresses target audience needs and concerns.</td>
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<td>18. The lesson asks participants to set goals based on new information learned.</td>
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<td>19. The lesson enhances participants’ decision-making capabilities with regard to the lesson topic.</td>
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<td>20. The lesson suggests potential outcomes as a result of the suggested behavior change discussed in the lesson.</td>
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<td>21. Participants are encouraged to reflect on and share personal experiences.</td>
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<tr>
<td>22. Lesson enhancements (free items participants receive) are designed to promote the desired outcome.</td>
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Use the space below to suggest ideas or critical concepts that are missing from this lesson plan. If you suggest additional content be added, please also suggest which of the existing content should be removed. Please keep in mind that deciding which specific aspects of content to include is always difficult as we are limited by the length of the lesson:
<table>
<thead>
<tr>
<th>Reading &amp; Comprehension Level of Lesson Plan (including the “For Your Information Section”)</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clear Purpose (a) – title of lesson conveys content of material and/or attracts reader’s attention.</td>
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<tr>
<td>2. Clear Purpose (b) – the introduction clearly provides purpose of the lesson.</td>
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<tr>
<td>3. Appropriate word usage – words are familiar and appropriate to the target audience. Words are short, usually two syllables or less. New words are clearly defined. Vocabulary is consistent.</td>
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<td>4. Appropriate sentence structure – Sentences are simple, short, specific, and use the active voice.</td>
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<td>5. Appropriate language – Material is free of grammatical and typographical errors.</td>
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<tr>
<td>6. Appropriate paragraph structure – Paragraphs are limited to a single message. Main ideas are clear and simply stated. Ideas flow smoothly and logically.</td>
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<tr>
<td>7. Appropriate overall organization – Appropriate number of concepts presented for the length of the lesson. Priority is given to key information and recommendations. Headings identify different topics or concepts. Headings are simple and located close to text. Key ideas are highlighted, repeated, and summarized.</td>
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### Reading & Comprehension Level of Lesson Plan (including the “For Your Information Section”)

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<thead>
<tr>
<th></th>
<th>SA</th>
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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. <strong>Appropriate tone</strong> – tone is personal, positive, and respectful. Uses personal pronouns and avoids gender bias.</td>
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</table>

### Appearance and Design of Lesson Plan

<table>
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<tr>
<th></th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Appropriate use of color</strong> – color is used to enhance the appeal of the material or to draw attention to key ideas. Print can be read easily.</td>
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<tr>
<td>2. <strong>Readable type size and style</strong> – Uses only one or two simple typefaces. Uses upper and lower case lettering. Bold, italic, or underlining used for emphasis only. Avoids condensed type, all uppercase, ornate, or novelty typefaces. Minimum of 10 to 12 point size.</td>
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<td>3. <strong>Appropriate illustrations</strong> – Illustrations are simple and realistic. Located next to ideas in the text. Serve to clarify, explain, or draw attention to main ideas in text, not to decorate. Provide a reasonable representation of a variety of low-income people and families (Ethnicity, ages, family types). Positive role models depicted.</td>
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<td>4. <strong>Appropriate tables, charts, and graphs</strong> – Clear and easy to read. Require no further calculation or background</td>
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5. **Organized, balanced layout** – Uncluttered layout balances white space, words, and illustrations. Uses ragged right margins to aid readability. Line length is neither too short nor too long for the type size.

### Activities

<table>
<thead>
<tr>
<th>Activities</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>1. There is an appropriate amount of time allotted for class interaction.</td>
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<td>2. The activities present specific, &quot;how-to&quot; information.</td>
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<td>3. The leader is prompted to emphasize that audience participation is voluntary -- participants should not feel put on the spot or called upon.</td>
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<td>4. Educators are reminded to praise participants’ activity or offer some kind of reward.</td>
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<td>5. The activities provide adequate behavioral role modeling by the educator or other participants.</td>
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<td>6. The activities allow participants to develop and practice adequate goal setting.</td>
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<td>7. The activities help identify self-monitoring opportunities for participants.</td>
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</table>
8. The activities allow participants to develop and practice decision-making capabilities.

9. Where appropriate, activities will address common misperceptions in order to help participants change their beliefs regarding the lesson being taught.

10. The activities should improve participants' confidence in their ability to perform the behavior.
<table>
<thead>
<tr>
<th>Visuals</th>
<th>SA</th>
<th>A</th>
<th>N</th>
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<th>SD</th>
<th>Comments</th>
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<tbody>
<tr>
<td>1. Visuals use real photographs rather than clipart.</td>
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<td>2. Images are familiar and reflect diversity.</td>
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<tr>
<td>3. Visuals are relevant to the lesson and topic.</td>
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<td>4. To ensure their use, visual images are appropriately located in the curriculum materials.</td>
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<td>5. Visual images and pictures have explanations or captions -- they do not stand alone.</td>
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<td>6. Illustrations and photographs are simple and free from clutter or distraction.</td>
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<td>7. Use of illustrations or cartoons is limited.</td>
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<td>8. Photographs depicting relevant/real life scenarios or foods are used whenever possible.</td>
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<tr>
<td><strong>Recipes</strong></td>
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<td><strong>Comments</strong></td>
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<td><strong>Introduction/General Information:</strong></td>
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<tr>
<td>1. Name gives a sufficient description of the major ingredient or preparation and is appealing.</td>
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<td>2. The recipes reinforce the key message(s) of the lesson.</td>
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<td>3. Number and size of servings are included.</td>
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<td>4. Temperatures are given for recipes requiring the oven.</td>
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<td>5. Cooking and preparation times are stated.</td>
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<td>6. Recipes are easy to read and do.</td>
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<td>7. Total preparation time is 30 minutes or less.</td>
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<tr>
<td><strong>Ingredients and Measurements:</strong></td>
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<td>8. Five or fewer ingredients are used.</td>
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<td>9. Complete description of ingredients included, e.g., cans drained, cheese shredded, vegetables chopped, etc.</td>
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<td>10. Brand names are avoided. Ex: “flour” instead of “Gold Medal flour” is used.</td>
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<tr>
<td>Recipes</td>
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<td>11. Low-cost, readily available, and culturally acceptable ingredients are used.</td>
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<td><strong>Ingredients and Measurements, cont:</strong></td>
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<td>12. All ingredients are listed, and are listed in the order in which they are used.</td>
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<td>13. Ingredients are listed as they are measured, i.e. words describing ingredients are in the correct place. Ex: cup chopped onion, not cup onion, chopped.</td>
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<td>14. Measurements are given in common fractions, e.g., 1/2 cup.</td>
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<td>15. Ingredients are listed in the easiest units of measure, e.g., 1/4 cup instead of 4 tablespoons.</td>
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<td>16. All measurements are spelled out, not abbreviated. Ex: cup, teaspoon, size can, etc. (e.g., 4-ounce can).</td>
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<td>17. Weights instead of measures are used when helpful, as for uncooked meat, poultry, fish, cheese, etc.</td>
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<td>18. Sizes of cans or boxes are specified, e.g., 2 packages (10 ounces each) of frozen green beans instead of 2 boxes.</td>
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### Recipes

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<tr>
<td>19.</td>
<td>Recipes are flexible, accommodate fresh, frozen, or canned foods and give suggestions for substitutions.</td>
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### Instructions/Directions

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<tr>
<td>20.</td>
<td>Clear instructions are used for every step of combining and cooking the ingredients. Short sentences and simple words are used.</td>
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<td>21.</td>
<td>Size of pans or containers is stated, e.g., 9-inch round layer pans.</td>
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<td>22.</td>
<td>Only basic equipment and appliances are used.</td>
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### Additional Questions:

1) What is missing from this lesson?

2) Do the goals and objectives of the lesson match the content of the lesson?

3) What additional feedback do you have on this lesson?
APPENDIX C – QUALITATIVE INTERVIEW GUIDE

Teen Interview Guide

Thanks for agreeing to do this interview! I want to discuss the lessons (educator’s name) taught you a few months ago.

1) On a scale on 1 to 5, where 1 means, “bad,” 3 means, “OK,” and 5 means, “great,” overall, how would you rate the lessons (educator’s name) taught you?

2) This paper has a brief description to help jog your memory about each lesson. If you need additional help remembering a lesson let me know and I’ll do my best to describe it better. Let’s go down the list and I want you to rate each lesson and tell me what you thought about it. Remember, 1 means, “bad,” 3 means, “OK,” and 5 means, “great.”

Review each lesson with the teen.

- Get the rating:

- Ask: What did you think about it?

- Ask: Do you remember learning anything new? If so: What? (and) Have you used the information in any way? If so: How?

[Behavior change]

3) Have you done anything differently with your activity or exercise because of the classes?

- If yes, what?

- If not yet, do you plan to?
4) Have you done anything differently with how and what you eat because of things you may have learned in class?
   • If yes, what?
   • If not yet, do you plan to?

5) Did you share anything you learned during the lessons with anyone else? **If yes:**
   • What?
   • Do you believe it made any difference? **If yes:** In what way?

   [Attitude]

6) Has the way you feel about healthy eating changed since before you participated in the classes? **If yes:** Can you give me any examples?

7) What about physical activity?

   [Social Norms]

8) Did the experience of taking the class with your classmates influence your plans or actions to eat better or do more activity in any way? **If yes:** How?

9) **If the teen responded “Yes” (i.e., shared information) to #5:** Do you think having shared (whatever s/he said s/he shared) with (whoever s/he said s/he shared it with) has influenced what you do or anything you plan to do? **If yes:** How?

   [Perceived Behavior Control]

10) As a result of the lessons, do you feel you have better control over your ability to eat better? **If yes:** Why?

11) Do you feel like you have better control over your ability to become more active? **If yes:** Why?
12) Were there any things you wished we had taught that we didn’t or was there anything you wish we had gone into more depth about? **If yes:** What?

13) During the course of our discussion did you remember anything else you would like to tell me before we quit?

We’re done! Thanks!
Teacher/Community Agency Site Leader Interview Guide

Script: (Specify when, e.g., “last fall”) a Rutgers EFNEP educator taught a new physical activity and nutrition education curriculum in your health class(es). As you know, I want to ask you a bit about it.

Let me start by asking:

1) On a scale of 1-5, where 1 means “it’s bad”, 3 means “OK” and 5 means “great”, how would you rate the lessons? Why?

2) Did you note the teens in your classes doing anything differently with regards to their activity and dietary habits as a result of the class? If so, what did changes did you observe?

3) For the next part of the interview I’m going to give you this piece of paper that has a list of all the lessons and a brief description of each. Please go down the list and tell me what you thought about each one if you can remember it. You don’t have to repeat anything you already told me about the lessons we just discussed.

4) How did you feel about the EFNEP educators quality of education provided?

5) You were asked to assist the educator while they delivered the lesson so they class ran seamlessly. Is there anything we could do differently to better aide your role as the assistant?

6) Are there any activities you would modify or additional important topics you would like us to cover in this curriculum that we might have missed?

7) Did you give any homework assignments in conjunction with the lessons, and if so, can you share them with me?
8) In your opinion, how should we market the lessons to other people who teach teens and/or is there anything you think we could do to make the lessons more effective?
EFNEP Educator Interview Guide

Script: (Specify when, e.g., “last fall”) you delivered an exercise and nutrition curriculum at a local high school/community center in your county. As you know, I want to ask you a bit about it. The goal of this interview is to determine how, if necessary, we can modify the lessons so they delivery is seamless next time you (or others) may teach it.

Part 1: Let me start by asking:

1) On a scale of 1-5, where 1 means “it’s bad”, 3 means “OK” and 5 means “great”, how would you rate the lessons? Why?

2) Did you note the teens in your classes doing anything differently with regards to their activity and dietary habits as a result of the class? If so, what did changes did you observe?

3) For the next part of the interview, I’m going to give you this piece of paper that has a list of all the lessons and a brief description of each. Please go down the list and tell me what you thought about each one if you can remember it. You don’t have to repeat anything you already told me about the lessons we just discussed.

4) What difficulties did you experience in implementing the curriculum?

5) How might we improve upon each of these aspects of the curriculum? (get their thoughts for each problem previously mentioned).

6) What variations to the lesson plan did you have to make while delivering the lesson?

7) Are there any activities you would modify and/or additional important topics you would like us to cover in this curriculum that we might have missed?

8) In your opinion, how should we market the lessons to people who teach teens and/or is there anything you think we could do to make the lessons more effective?