Stephen F. Austin State University

SFA ScholarWorks

Electronic Theses and Dissertations

Summer 8-15-2018

Self-Regulation Abilities of Low-Income Mothers in Community Based, Expanded Food and Nutrition Education Program

Alyssa Abreu
abreuam@jacks.sfasu.edu

Follow this and additional works at: https://scholarworks.sfasu.edu/etds

Part of the Community Health and Preventive Medicine Commons, Other Nutrition Commons, and the Women's Health Commons

Tell us how this article helped you.

Repository Citation

Self-Regulation Abilities of Low-Income Mothers in Community Based, Expanded Food and Nutrition Education Program

Creative Commons License

SELF-REGULATION ABILITIES OF LOW-INCOME MOTHERS IN COMMUNITY
BASED, EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM

By

ALYSSA MARIE ABREU, Bachelor of Science

Presented to the Faculty of the Graduate School of
Stephen F. Austin State University

In Partial Fulfillment

Of the Requirements

For the Degree of

Master of Science

STEPHEN F. AUSTIN STATE UNIVERSITY

August 2018

SELF-REGULATION ABILITIES OF LOW-INCOME MOTHERS IN COMMUNITY

BASED, EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM

By

ALYSSA MARIE ABREU, Bachelor of Science

APPROVED:

_____
Eric Jones, Ph.D., Thesis Director

_____
Dustin Joubert, Ph.D., Committee Member

_____
Mark D. Faries, Ph.D., Committee Member

_____
Emmerentie Oliphant, Ph.D., Committee Member

_____
Pauline M. Sampson, Ph.D.
Dean of Research and Graduate Studies

ABSTRACT

Diet is strongly associated with many risk factors for chronic disease. Educational programs such as the Expanded Food and Nutrition Education Program (EFNEP) are designed to improve dietary behaviors among low-income populations. Although EFNEP has seen improvements, they are not yet up to recommendations. Previous studies have been successful in eliciting behavior change when improving self-regulation in conjunction with dietary education. Thus, the purpose of this study was to examine self-regulation in EFNEP participants and its relationship to participants change in dietary behavior. All participants were currently enrolled in an EFNEP program and were asked to complete an additional self-regulation survey. This survey included five questions, which were averaged to assess overall self-regulation capacity on the first and last day of the program. On average, the participants started and ended with low self-regulation capacity. There was also minimal change in dietary behaviors, similar to previous studies. From these results, we can conclude that training the educators to improve self-regulation capacity of their participants may be necessary to see improvements in dietary behavior.

Key words: EFNEP, eating behavior, self-regulation, fruit and vegetable, low-income

i

TABLE OF CONTENTS

iii

LIST OF TABLES

SELF-REGULATION ABILITIES OF LOW-INCOME MOTHERS IN COMMUNITY BASED, EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM

Introduction

The United States Department of Agriculture estimates that 12.3% of the U.S. had food insecurity in 2016 (15.6 million households, or 41.2 million individuals).[1] Food insecurity is defined as a family having difficulty providing enough food at some point in the past year. Due to this, 59% of Americans reported being on at least one food assistant program as of 2015 (Supplemental Nutrition Assistance Program [SNAP], Women, infants, children [WIC], or National School Lunch Program).[2] SNAP, alone, helps about 47 million low-income Americans afford food, which is about 1 in 7 Americans.[3] While a goal of these programs is to ensure food security, they could also play a crucial role in the nutritional and dietary predictors of chronic disease.

Diet is often the first line of treatment when patients are told they are on the border of having risk factors for chronic disease. Having the appropriate education on how to properly lose weight and eat healthier is needed, especially in low-income populations where seeing a physician or dietician is a low possibility. To support the process of moving away from modifiable diseases, nutrition education programs are becomingly widely available. The Expanded Food and Nutrition Education Program (EFNEP) is one of these programs that is

1

educating low-income families on improving their health through diet. However,

what researchers have found is education alone may not be enough to see the

necessary long-term changes and must be supplemented

Research Questions

RQ 1: What is the starting level of self-regulation of EFNEP participants?

RQ 2: Does self-perceived self-regulation capacity of EFNEP participants change

from week one to week eight?

RQ 3: Is there a relationship (linear correlation) between mean self-regulatory

capacity and behavioral outcomes? (i.e. attendance, FV intake, meals planned)

<center>**Review of Literature**</center>

Diet and Disease

According the Center for Disease Control (CDC), 7 of the 10 leading causes of death in the U.S. are chronic diseases.[4] In 2015, CDC's top 10 risk factors for mortality had dietary risks as number one, now surpassing tobacco use.[4] In fact, the CDC states that the following risk factors are modifiable with lifestyle, with 4 out of the 6 being affected and preventable by diet: high blood pressure, high cholesterol, diabetes, tobacco use, obesity, and physical inactivity.[4,6,7,8] Research also indicates that a healthy, dietary intake of predominantly whole food diets are strongly associated with weight loss, lower risk of ischemic heart disease, and lower cancer risk, including a 35% decrease in prostate cancer risk.[6,9,10,11]

Supplemental Nutrition Assistance Program

SNAP provides food support for low-income families and is the largest federal food program in the nation.[12] Benefits are provided according to need, with poorer households receiving larger benefits. SNAP reduced the prevalence of very low food security from 14% to 12.3% in 2014 to 2016.[1] In 2016, the federal government spent approximately $73 billion on SNAP, with 93% going directly to food benefits.[1] SNAP has minimal restrictions on the food that can be

purchased on the program, with restrictions being limited to alcohol, tobacco, non-food items (such as house-hold supplies), ready-to-eat foods, and dietary supplements.[13] Subsequently, studies have shown that those participating in this program might be at higher risk for chronic disease.

For example, one study found limited differences among *quantity* of food (caloric intake) between SNAP participants versus eligible, non-participants, but did find significant differences on the *quality* of diet.[14] More specifically, the SNAP participants had higher intake of sugar-sweetened beverages (SSB), and a lower intake of some vitamins and minerals, as well as nationally scoring lower on the Healthy Eating Index, than SNAP-eligible, non-participants. Generally, food insecure families tend to be underweight due to missed meals. However, with the help of SNAP, food insecurity has lowered and obesity has risen. Researchers have found a positive and significant relationship between SNAP participants and obesity,[15,16,17,18] with one study showing SNAP participation doubling the odds of being classified as obese, compared to eligible, non-participants.[19] Conrad et al. found that SNAP participants exhibited the highest risk for all-cause and cardiometabolic mortality, followed by SNAP-eligible non-participants, compared to those not eligible.[20] More specifically, SNAP participants had a 3-fold higher risk for mortality from diabetes, and 100% higher all-cause mortality risk. These findings were consistent with other studies, showing SNAP participants having

higher rates of metabolic risk factors[21] and all-cause mortality than non-participants.[22] SNAP participants also had 1.55 times more intake of SSB, with SNAP spending $4 billion in soft drinks per year.[23,24] In another study, SNAP participants consumed significantly fewer fruits, vegetables, and plant proteins than eligible non-participants.[25]

SNAP, previously known as Food Stamps, was changed in 2008 as part of the Farm Bill to include a new purpose: for families to not only have access to more food, but to obtain a more nutritious diet.[26] However, since 2008, there has been no changed or added policies as to what food is considered eligible. Policymakers and public health organizations have proposed pilot studies with purchase restrictions, such as restricting the purchase of SSB, yet USDA has rejected these. For example, the State of New York requested permission from USDA to start a 2-year pilot study to remove SSB from the allowable list through SNAP.[27] Nine other states have also requested permission. USDA stated the following reasons for rejecting purchasing restrictions: (1) it would pose administrative challenges, (2) there is little evidence that retailers are prepared to operationalize the change, (3) designating foods as "luxurious" or non-nutritious would be administratively costly and difficult, (4) there are no clear standards to define foods as healthy or not, and (5) participants could still purchase the food with their own money leading to little change.[27,28,29]

Thus, although SNAP is decreasing food insecurity, chronic disease risk factors appear to be in higher prevalence among SNAP participants compared to their eligible SNAP non-participant counterparts.[15,16,19] Since states have not been successful in changing policies to restrict specific purchases through SNAP, many states have gone to nutrition education, in hopes that educating them on healthy food choices may decrease unhealthy purchases without having restrictions. Expanded Food and Nutrition Education program (EFNEP) was created for this purpose.

Expanded Food and Nutrition Education Program

EFNEP was started in 1969 with the goal of improving nutrition and physical activity behaviors of low income families, particularly with children. EFNEP is within communities and is hands-on led by paraprofessionals. The program has four primary goals: diet quality and physical activity, food resource management, food safety, and food security.[30] It is administered through a series of eight lessons over eight weeks, with each class being between 60 and 90 minutes. Classes can be taught at homes, community centers, churches, as well as other locations that may be beneficial for that community. Those who are eligible for food assistant programs, such as WIC, SNAP, or Head Start, are eligible to participate. EFNEP reaches over a half-million low-income families each year, with ~80% living at or below poverty level, and 74% minority.

Participants are recruited by paraprofessionals, former participants, community organizations and agencies, and referred by physicians.[30]

According to USDA's EFNEP 2016 Impacts report, 84% of adults improved their food resource management, 89% of adults improved their nutrition practices, and 65% of adults improved their food safety practices.[30] However, these findings are deceptive, as they do not explain what the improvement was specifically. According to this report, participants decreased their grain intake from 5.8 to 5.5 ounces, increased vegetables from 1.5 to 1.7 cups, and increased fruit intake from 0.9 to 1.3 cups. Although vegetables and fruit consumption increased after the program, it is not known if these changes are significant, nor did they improve greatly or to MyPlate recommendations (2.5 and 1.5 cups, respectively).

Statewide data from 2016-2017 in Texas illustrates these discrepancies. Of the 2,491 respondents, 90% showed improvement in one or more nutrition practices. However, only 3% achieved 5 or more servings of vegetables per day (an increase from 2%), and 49% were either unchanged or decreased their meals planned. An intake of 3 and 4 cups of vegetables slightly increased (5% to 8% and 4% to 5%, respectively). While there were positive outcomes within the EFNEP program, a detailed analysis of results with the Texas data reveals that there are still difficulties in changing health dietary behaviors in low-income

populations. Because EFNEP is specific to low-income families, it is important to look at what factors may affect this population to enhance the effectiveness of this program.

Low-Income Mothers

Over 80% of EFNEP participants are mothers below the poverty line, earning less than $24,300 a year for a family of 4. Differences in socioeconomic status (SES) come with health disparities, with an inverse correlation between SES and morbidity and mortality.[31] Such disparities continue to exist, despite the advances in our understanding of the environmental, social, cultural, and biological determinants. Low-income mothers have high rates of obesity, chronic diseases, such as diabetes and cardiovascular disease, as well as lower overall health status.[32,33] In addition, lower SES children tend to have general lower health status,[34] highlighting the translation of poor health within the mother into the children.

Mothers must often juggle multiple roles, such as mother, wife, caregiver, and employee. They face many challenging barriers that they have to overcome in order to maintain a healthy lifestyle, such as unsafe community environments, work schedules, lack of transportation, lack of knowledge, and the microenvironments of their homes[35,36] In addition, personal factors also facilitate or undermine healthy eating efforts in this population, such as self-efficacy,[37]

goals related to healthy eating,[38] self-monitoring,[39] and health literacy.[40] Subsequently, they are less likely to meet dietary guidelines, often feeding themselves and their children what is quickest, cheapest, and easiest, which tends to be calorically dense, low-nutritious meals.

Thus, additional help may be needed to assist in adopting healthier eating habits along with education. A possible explanation for the increase prevalence of unhealthy risk factors in low-income families, especially those on federal food program assistance, is the difficulties in self-regulation of their dietary behavior.

Self-Regulation

Self-regulation is a complex process of guiding thoughts, feelings, and behaviors to stay in line with perceived goals. More simply, it is the processes by which behavior happens.[41] Common examples of self-regulatory abilities include self-monitoring, emotional regulation, flexible thinking, delayed gratification, action/coping planning, and goal setting, in addition to more fundamental executive functions, such attentional control, inhibiting impulses, and problem solving.

Among those whom desire a healthy diet and have access to healthy food, diets will be determined largely by how well they set goals, plan, and monitor (self-regulate) what they buy and eat.[42] There have been many theories and models of health behavior change, as well as intervention strategies used to

promote adoption of healthy dietary behaviors. Self-regulation, specifically, is of

interest in this study due to the success of previous research when applied to

dietary behaviors, and bridging the gap between intention and behavior.

Self-regulation has been positively associated with healthy eating,

including fruit and vegetable consumption.[43,44,45] Training in self-regulation might

help develop the necessary abilities to assist individuals in maintaining their

behavior change following an intervention. For example, Stadler & Oettinge

found similar short-term changes in fruit and vegetable intake following an

intervention only (health education leaflet, a knowledge self-check phase, and a

discussion phase) versus intervention plus self-regulatory strategies.[46] However,

after two years, the group trained in self-regulation strategies maintained higher

intake than the intervention only group. Schnoll and Zimmerman evaluated the

effectiveness of self-regulation abilities (goal setting and self-monitoring) into a

nutrition education class and had similar results.[44] Those who received strategies

for both goal setting and self-monitoring together had significantly greater

increases on dietary fiber.

However, self-regulation failure is common, such as losing awareness,

not having a clear goal, inability to transcend the difficulties of the situation or

delayed gratification, low self-control, ego-depletion, or the inability to handle

stress and/or negative thoughts.[47,48,49] Even in cases where there is intention to

eat healthier, self-regulation has been shown to moderate the relationship between intention and behavior.[50] Thus, active self-regulation is required for the regularity of health behaviors and avoidance of risk behaviors, especially for those behaviors that do not give immediate benefits.

A possibility of self-regulation failure in the low-income population, is having limited capacity or abilities to begin with. In support, research has shown that low-income adults and children have lower self-regulation abilities, including lower inhibitory control and trouble with delayed gratification.[51,52] In addition, those classified as obese can have lower executive function.[53,54] Children of lower SES also appear to be affected, as their self-regulatory abilities or executive capacity have been found to be lower than age-matched counterparts.[55] This may be related to parental factors, such as maternal depressive symptoms or substance abuse,[56,57] parenting effort and practices,[56,58] or household instability.[59] Thus, educational programs should attempt to improve participants' abilities to self-regulate their dietary behavior in difficult environments and situations that they live.[60]

Needed Research

To date, however, no known research has examined the role of self-regulation in federally-assisted food education programs. More specifically, it is unknown if low-income mothers in the EFNEP program (1) begin with low self-

regulatory abilities, as hypothesized from the limited aforementioned literature, (2) improve their perceived self-regulatory abilities, and (3) if such improvement relates to dietary behavior changes. Knowing that diet is strongly correlated with disease, it is important to target this population (low income, mothers) who may be at risk. Understanding how to better reach and educate our target population could significantly improve the programs' effectiveness, thus improving the participants' health. The significance of such findings will help better clarify how EFNEP can improve its program effectiveness, by focusing on the population and their needs to have a successful behavior change. Thus, the purpose of this study is to examine pre- and post-program self-regulation in EFNEP participants across 12, 8-week programs in 3 Texas counties, and its relationship to participants change in dietary behaviors.

Methods

Procedure

The study received Institutional Review Board approval at Stephen F. Austin State University before any data collection took place. Participants were recruited from 12 different classes across the 3 participating counties. Recruitment included word of mouth, physicians, and agencies. More specifically, an educator in each county participated, and oversaw the delivery of the Self-Regulation of Eating Behavior Questionnaire (SREBQ) week one (pre) and week eight (post) of the program. Each educator was given a short training on how to give the surveys to the participants, which included a script to read to the participants for SREBQ instructions. Questions related to these instructions were directed back to the principal investigator.

On day one, every participant filled out an enrollment form. The educators had a script for each portion of the session, and let the participants know their answers are kept private, and to answer as honest as they can. All participants were kept on the same page until everyone finished, in which the next script was read. Once the enrollment forms were completed, the participants were shown an example of a food recall survey, and asked to fill out theirs accordingly. Next, they wrote out each item they listed in as much detail as possible (what brand,

how much). Once everyone finished, the educator read the script for the SREBQ. All forms were then collected by the educator and the session began.

The program included eight sessions which are between 60 and 90 minutes long, with each session having a theme (see session breakdown in Appendix A). If a participant was to miss a session, they were offered a make-up, one-on-one lesson for the missed session. The participants were required to meet for six of the eight lessons to be considered a graduate

Participant Descriptives

105-female, low-income mothers (≥ 18 years of age) of all ethnicities in Hidalgo, Cameron, and Harris counties were asked to participate in the present study. Exclusion criteria included those that were either not mothers or pregnant, males, and those meeting <six of the eight lessons. This resulted in a final sample size of 63. All participants were currently enrolled in an EFNEP program between January and March 2018. Each EFNEP participant was informed of the study, asked to sign an informed consent, and to complete the proposed self-regulation measure. The average age was 37.9 years. 57% were Hispanic/Latino, 33% White, Not Hispanic/Latino, and 1.6% Black. While the majority chose not to disclose their monthly income, 12% were between $880-1500, 7.9% between $1500-2000, and 4.8% between $2000-2500. Three percent were pregnant at the time of the study.

Self-Regulation Measure

The 5-item Self-Regulation of Eating Behavior Questionnaire (SREBQ) was used to assess one's overall self-regulatory capacity.[61] More specifically, the 5 items assess the main processes of self-regulation:

1. Ability to control behavior, thoughts, feelings, attention and eat in accordance with intentions to regulate eating behavior.

2. Ability to stick to your eating intentions and continuously work toward them/long-term capacity to self-regulate eating behaviors.

3. Ability to control thoughts and attention and keep your eating goals in mind.

4. Ability to monitor and be aware of your actual eating behavior.

5. Ability to compare your actual behavior to your eating intentions and make adjustments when necessary to achieve your intentions.

The educators read aloud 5 statements, and asked the participants to choose the most appropriate response for each statement on a 5-point Likert scale, ranging from 1 (never) to 5 (always). Examples of these questions are, "I give up too easily on my eating intentions," "I'm good at resisting tempting food," and "If I am not eating in the way I intend, I make changes," (see Appendix B). Question 1 and 3 (I give up too easily on my eating intentions, and I easily get distracted from the way I intend to eat, respectively) were reversed scored. The

items were averaged, with a higher score representing higher self-perceived self-regulation capacity. The final averaged score was used in all analyses. Kliemann and colleagues found the SREBQ to be both valid and have adequate internal reliability ($\alpha = 0.75$).[61]

The SREBQ also included 3 screening questions to assess participant intention, which are used for descriptive purposes. Question 1 asked if participants find certain foods tempting, such as chocolate, cakes, or ice cream. The wording of responses were changed to "Americanize" the options (original study done in the UK). For example, Chips was changed from Crisps, Soda was changed from Fizzy drinks, Cookies was changed from Biscuits, Candy was changed from Sweets, and French Fries was changed from Chips. Question 2 asked if the participant intends to eat too much of these tempting foods with a yes/no response. Question 3 asked if the participant intends to have a healthy diet, also with a yes/no response. The SREBQ was translated into Spanish by an EFNEP educator to accommodate any non-English speaking participants.

Dietary Behavior Measure

Changes in pre-post dietary behavior were assessed with the measure currently used by the EFNEP program. The following questions were asked:

1. How many times a day do you eat fruit?
2. How many times a day do you eat vegetables?

3. How often do you plan your meals before you shop for groceries?

The answer choices available for each question were: less than 1 time a day, 1 time a day, 2 times a day, 3 times a day, or 4 or more times a day. The data will be analyzed by grouping these categories into <4 times a day and ≥4 times a day.

Fruit and Vegetable Intake Measure

Changes in fruit and vegetable intake were measured via a food recall currently used by EFNEP. The participants were asked to write out what they ate for breakfast, snacks, lunch, and dinner on a provided sheet. A column to write out how many cups per each food item is also provided on the same sheet, with assistance given by the educators. After the program, the educator assessed how many fruits and vegetables were eaten based on the food recall and entered into their data system. For this study, I compared how many fruits and vegetables were eaten pre and post program to assess behavior change.

Attendance

Attendance was measured by the number of lessons attended. If a group session was missed, one-on-one education was available with the EFNEP educator. Attendance was therefore not measured by number of sessions, but rather the number of lessons attended. Per EFNEP guidelines, one is not

considered a graduate unless participated in six of the eight lessons. Therefore, those who did not meet these guidelines were excluded from the data.

Statistical Analysis

Mean and standard deviation were calculated from SREBQ before and after the program. Low self-regulation capacity will be considered as < 2.8, medium self-regulation capacity will be considered 2.8-3.6, and high self-regulation capacity will be considered > 3.6. These cutoffs were used by Kliemann in his SREBQ validation study.[61] A paired-samples, dependent t-test was used to assess changes in mean SREBQ scores before and after the 8-week program. Similarly, the paired-samples t-test was used to assess changes in mean intake of fruit and vegetables (cups). For dietary behavior, categories of responses were created, and the frequency (%) of those answering 'yes' for each of the three questions were calculated. Pearson correlation was used to determine any linear relationships of mean SREBQ score (i.e., self-regulatory capacity) with each behavioral outcome. An alpha criterion of ($\alpha \leq 0.05$) was used for all analyses. The statistical analyses were performed with IBM SPSS Statistics Software (v. 24)

Results

Self-Regulation

Kliemann recommended grouping self-regulation capacity in 3 groups: low

capacity with scores below 2.8, moderate with scores between 2.8 and 3.6, and

high with scores above 3.6.[61] On average, the participants had low levels of self-

regulation before the intervention (2.74 ± 0.71) and low self-regulation abilities

after the intervention (2.59 ± 0.78), with no significant main effect of time ($t(62) =$

1.69, $p > 0.05$, $d = 0.22$). The percentages within each of the aforementioned

groups are shown in Table 2. In summary, only 11% of participants ($n = 7$ of 63)

were classified as 'high' in their self-regulatory abilities, with the majority falling

into the 'low' category (46%). At the end of the program, the majority still

remained in the 'low' category (56%), and minority in the 'high' category (13%).

Vegetable and Fruit Consumption

On average, participants self-reported 1.51 ± 1.36 cups per day of

vegetables at baseline. There was no statistically significant change at the post-

test (1.42 ± 1.32 cups; $t(62) = 0.43$, $p > 0.05$). Participants self-reported 0.86 ±

0.94 cups per day of fruit at baseline, followed by a statistically significant

increase to 1.39 ± 1.39 cups at the post-test ($t(62) = -3.32$, $p < 0.01$, $d = 0.44$).

MyPlate recommends having 2.50 and 1.50 cups of vegetables and fruit per day,

respectively. For this study, 19% of participants met the recommended vegetable consumption before the program, and only 13% at the end of the program. For fruit consumption, participants who met the recommended cups at baseline was 25%, with 33% meeting the recommendation at the end of the program. Consumption data is summarized in Table 3.

Dietary Behavior Changes

Results for dietary behavior are shown in Table 4. For the question, 'How many times a day do you eat fruit,' the majority of participants consumed less than 4 times per day at both the pre- (97%) and the post-test (95%). The same question, but for vegetables, yielded similar results, with the majority of participants consuming them less than 4 times per day at both the pre- (95%) and the post-test (94%). For the question, 'How often do you plan your meals before you grocery shop,' the participants that answered either 'often' or 'always' increased from 60% to 82%, as opposed to never or sometimes.

Overall, there was no significant relationship between the change in self-regulation capacity and behaviors. Results are shown in Table 5.

20

Discussion and Conclusion

EFNEP was designed to improve health behaviors of low-income families. Due to the population involved and the effect that self-regulation has on eliciting the corresponding behaviors, the purpose of this study was to find if participants in this program have self-regulation, if their self-regulation improves after the program, and if there is a relationship between their change in self-regulation capacity and their behavior changes. Understanding this relationship could potentially improve EFNEP effectiveness, improving the health of their participants.

Self-Regulation

Based on previous studies, our hypothesis that participants would have low self-regulation capacity at the beginning of the program was supported. Specifically, the participants' mean self-regulation capacity, as measured by the SREBQ, was 2.74 ± 0.71, or in the low-self regulation category. This hypothesis was based on previous research findings of low-income mothers having lower self-regulation abilities, such as delayed gratification, inhibitory control, and self-monitoring.[51,62,39]

The mean self-regulation score post-program was 2.59 ± 0.78 ($p > 0.05$), indicating no significant change. There was also a 10% increase in those scoring

in the low self-regulation category. EFNEP was unlikely the cause, as it teaches aspects of self-regulation improvement (self-monitoring and goal setting). Beyond natural variation in responses, a possible reason is the awareness brought to the participants during the program, allowing them to answer more correctly on their abilities. In addition, due to low-income families having minimal health knowledge,[40] there may have been bias leading the participants to think higher of their abilities before truly trying them in practice.

The population at hand are low-income mothers. As mentioned, this population tends to have to overcome many challenging barriers to support a healthy lifestyle for them and their family, such as unsafe community environments, work schedules, lack of transportation, lack of knowledge, and the microenvironments of their homes.[35,36] This is one possible explanation for low-income families having low self-regulation capacity.[51,52] Having a higher self-regulation capacity would teach them how to overcome these obstacles and navigate unfavorable environments to stay in line with their goals. The lack of change in self-regulatory capacity brings many implications for these participants' in their ability to produce a behavior change.

Possible techniques that could increase self-regulation include: self-monitoring, goal setting, delayed gratification, self-reinforcement, action planning, standard setting, and more.[63] Among these techniques, EFNEP does set weekly

goals for their participants (see Appendix A) and promotes action planning.

However, the results of this study indicated no change in their capacity,

suggesting need for improvement. Specifically, EFNEP does not currently have a

structured aspect purposely designed to increase their self-regulation capacity.

Using evidence based methods on these specific behaviors may be beneficial for

future programs.

According to a meta-analysis of goal-setting for dietary behavior change,

goal setting should be difficult yet attainable, specific, proximal, and should

include feedback and rewards.[64] An example goal made by EFNEP was to eat

more vegetables, fruits, and low-fat dairy foods each day. This goal was not

specific, and may lead to various interpretations.

Action and coping planning has been shown to increase fruit and

vegetable intake, specifically mediating intention and fruit and vegetable

intake.[65,66,67] EFNEP promotes planning meals before grocery shopping, and the

effectiveness was tested by asking how often they are doing so, which was found

to increase from 60-82%. A limitation to this question is the possible

interpretations. One may make a grocery list of food items needed before going

to the store. However, this does not mean that they are consciously thinking

about what food items should be bought to stay in line of their goals, but rather

the food items that are missing in which they normally buy. Future programs may

want to incorporate action planning techniques in which the participants learn

how to use the knowledge they are gaining on healthy dietary behaviors, and

action plan accordingly.

In a previously mentioned study, Stadler et al. incorporated mental

contrasting and implementation efforts.[46] Mental contrasting uses motivational

variables and incentives to help regulate goals by identifying a goal, imagining

the final positive outcome of reaching that goal, and identifying the obstacle that

might create a barrier. Implementation intentions address when, where, and how

one will act upon different situations (i.e., *if…then* statements). These results

indicate that as time goes on and tasks become difficult, these self-regulation

techniques can be useful in maintaining goal behaviors such as fruit and

vegetable consumption. Due to this success, this is a possible technique that can

be taught throughout EFNEP in addition to promotion of planning meals.

Fruit and Vegetable Consumption

Fruit and vegetable intake was looked at specifically due to the effects it

has on health and prevention for many chronic diseases.[68,69,70] According to

WHO, insufficient fruit and vegetable intake was estimated to cause 14%

gastrointestinal cancer deaths, 11% ischemic heart disease deaths, and 9% of

stroke deaths.[71]

The most recent published results (2016) from EFNEP programs showed an average increase of 1.50 cups to 1.70 cups of vegetables a day, and an average increase of 0.90 cups to 1.30 cups of fruit a day from pre- to post-program. In this study, we found no statistically significant change in vegetable consumption from 1.51 to 1.42 cups per day, but a slight, average increase of 8% in fruit consumption from 0.86 to 1.39 cups per day ($p < 0.01$, $d = 0.44$).

Anderson et al. found that diets will be largely determined by how well they can set goals, plan, and monitor their habits, (i.e., self-regulate).[42] The participants SREBQ scores were low throughout the program; thus, not being able to set goals and monitor their dietary behavior. Although there was a decrease in vegetables, it was not significant and it may be difficult to self-report a difference of 1.51 and 1.42 cups of vegetables when serving a meal, essentially having no mean change in vegetable consumption. Future programs should encourage their participants to increase their vegetable intake as a goal on its own, rather than increasing their fruit and vegetable intake together, with fruit showing to be the easier of the two to increase.

Dietary Behaviors

Three questions assessed self-reported dietary behavior. Two questions asked how many times each participant ate fruit or vegetables a day. Participants maintained between 2 and 3 times a day for each, with the majority (≥ 94%)

eating less than 4 times per day at both the pre- and post-test. Changing one's fruit and vegetable intake behavior within only eight weeks appears difficult, which has been highlighted by previous research of programs directed at low-income mothers.

The third question analyzed was a self-reported behavior that was an example of a self-regulation technique called 'action planning'. EFNEP promotes this technique by teaching them how to plan their meals before grocery shopping, in hopes of using planning to keep them accountable to their original goal while shopping, while easing the variability of purchasing behavior. This appeared to be effective, as participants self-reported an improvement of 22% from answering either 'never' or 'sometimes', to answering 'often' or 'always'. However, despite this increase in a specific self-regulation technique or ability, their overall self-reported self-regulation capacity did not improve significantly (via SREBQ). Other studies have shown that a combination of self-regulation abilities yielded the best results; therefore, there is a possibility that one self-regulation ability may not be sufficient.[44] Although action planning is important, other abilities, such as delayed gratification, inhibiting impulses, and attentional control might also be necessary when grocery shopping to facilitate implementation of the action plan.

EFNEP is a voluntary program, allowing the assumption that the participants have a desire to change their behaviors. Additionally, all participants

in this study had high intention to change, as indicated by the SBREQ, yet did not

see relative changes in their dietary behavior – indicating an intention-behavior

gap.[72] Hall & Fong found that self-regulation has been found to moderate the

relationship between intention and the regularity of health behaviors.[50] Thus, the

lack of change in self-regulation capacity in the present sample could account for

why participants with high intention did not follow-through with their intention to

the fullest extent.

Regarding the change in self-regulation capacity and the looked at

behaviors (attendance, fruit and vegetable intake, and meals planned), there was

no significant relationship. This may be due to the lack of change in self-

regulation capacity, assuming that a significant change would lead to a positive

correlation with the respected behaviors. Additionally, the educators in this

program are not trained on increasing self-regulation, as it is not a goal of the

program. It would be beneficial to incorporate evidence based methods within the

program that are targeted at specifically increasing self-regulation capacity.

There are many techniques that contribute to one having self-regulation.

However, merely having a technique does not assure the capacity to stay in line

with goals, especially when normalcy is interrupted and barriers arise.[50] Training

the participants to increase their capacity, must be done so correctly and in a

way that elicits a lifestyle change. Although adding a self-regulation component

to their program (i.e. self-monitoring and action planning) may prompt these

behavior changes, to see long-term changes may require training with the

educators.

In conclusion, self-regulation has been found to bridge the gap between

intention and behavior. EFNEP is an education program, that although

incorporates self-regulation techniques, the participants' capacity was not

changed. These results allow us to understand what is lacking within the program

and potential future changes that could elicit more effective behavior changes

within their participants.

Limitations

Due to the specific nature of this study, there were many requirements

that needed to be met to consider the data, and thus left us with a small sample

size of 63 participants. Due to the diet-recall being self-reported, it is possible

that the accuracy is limited for various reasons among forgetting an item,

purposefully not reporting or self-reporting an item despite it not being eaten. In

addition, studies have found that under- and over-reporting dietary intake are

common.[73] Another limitation is the diet-recall being over a 1-day period, on the

first and last day of the program. Due to the limited data received, this may not

be indicative of their actual diet. The educators were responsible for calculating

how many cups of fruit and vegetables they consumed based off their self-

reported sheet. This may be difficult, allowing room for over- and under-reporting

based on difficult assumptions from the educators. Finally, because of the

educational nature of this program and the paraprofessionals assisting with the

surveys, it is possible that the participants answered questions on the basis of

what they believe *should* be the right answer, versus how they truly behave.

Future research should consider these limitations to more accurately assess the

self-regulatory abilities of low-income mothers and their dietary behaviors.

Future Research

As of now, there are many theories and methods, yet no clear research

indicating the most effective interventions for behavior changes for low-income

mothers. Because there was no change in self-regulation in this study, it is

difficult to assume the results were due to the lack of self-regulation. Future

research should include a randomized study design, with one program receiving

a self-regulation component, and a comparison group that does not to better

indicate if the change is related to their self-regulation abilities. Studies could also

examine various groups receiving different self-regulatory trainings to determine

which abilities are most productive for healthy dietary change and maintenance.

All of the mentioned self-regulation techniques (self-monitoring, goal-

setting, mental contrasting, and implementation intentions) can be taught in one

session, as mentioned by the authors. Therefore, adding one session to EFNEP

may be beneficial to the program. However, these studies did not look at the

same population. Thus, incorporating these techniques into an EFNEP program

could give insight on how to elicit behavior changes in low-income mothers, and

profitable for future research and modification of such federal assistance

programs with goal of improving nutrition and physical activity behaviors of low

income families.

References

1. 2010 Impacts: the expanded Food and nutrition education program (EFNEP). https://nifa.usda.gov/sites/default/files/resource/2010%20Impact%20Report_0.pdf Accessed October, 2017.

2. World Hunger Statistics. Worldhunger.org https://www.worldhunger.org Accessed November, 2017.

3. SNAP to Health. SNAP: frequently asked questions. Who uses SNAP? www.snaptohealth.org/snap/ snap-frequently-asked-questions/. Accessed November, 2017.

4. Chronic diseases and health promotion. cdc.gov. http://www.cdc.gov/chronicdisease/overview/index.htm. Accessed October, 2017.

5. Mokdad AH, Marks JS, Stroup DF, & Gerberding JL. Correction: actual causes of death in the United States, 2000. *Journal of American Medical Association.* 2005;3:293-294.

6. Melina V, Craig W, & Levin S. Position of the Academy of Nutrition and Dietetics: vegetarian diets. *Journal of the Academy of Nutrition and Dietetics.* 2016;116:1970-1980.

7. Barnard ND, Katcher HI, Jenkins DJ, Cohen J, Turner-McGrievy G. Vegetarian and vegan diets in type 2 diabetes management. *Nutrition Review.* 2009. 67:255-263.

8. Wang F, Zheng J, Yang B, Jiang J, Fu Y, & Li D. Effects of vegetarian diets on blood lipids: a systematic review and meta-analysis of randomized controlled trials. *Journal of American Heart Association.* 2015;4

9. Crowe FL, Appleby PN, Travis RC, & Key TJ. Risk of hospitalization or death from ischemic heart disease among British vegetarians and non-vegetarians: results from the EPIC-Oxford cohort study. *The American Journal of Clinical Nutrition.* 2013;97:597

10. Tantamango-Bartley Y, Jaceldo-Siegl K, Fan J, Fraser GE. Vegetarian diets and the incidence of cancer in a low-risk population. *Cancer Epidemiology and Prevention Biomarkers*. 2013;22:286-294.

11. Tantamango-Bartley Y, Knutsen SF, Knutsen R, Jacobsen BK, Fan J, Beeson W L, ... & Herring P. Are strict vegetarians protected against prostate cancer? *The American Journal of Clinical Nutrition*. 2016;103:153-160.

12. Leung CW, Musicus AA, Willett WC, Rimm EB. Improving the nutritional impact of the Supplemental Nutrition Assistance Program: perspectives from the participants. *American Journal of Preventive Medicine*. 2017;52:193-198

13. Food Stamp Program Definitions, 7 U.S.C. § 2012. https://www.law.cornell.edu/uscode/text/7/2012. Accessed October, 2017.

14. Andreyeva T, Tripp AS, Schwartz MB. Dietary quality of Americans by Supplemental Nutrition Assistance Program participation status: a systematic review. *American Journal of Preventive Medicine*. 2015;49:594–604. http://dx.doi. org/10.1016/j.amepre.2015.04.035.

15. DeBono NL, Ross NA, Berrang-Ford L. Does the food stamp program cause obesity? A realist review and a call for place-based research. *Health & Place*. 2012;18:747–756.

16. Gibson D. Food stamp program participation is positively related to obesity in low income women. *The Journal of Nutrition*. 2003;133:2225-2231.

17. Nguyen BT, Shuval K, Bertmann F, Yaroch AL. The Supplemental Nutrition Assistance Program, food in- security, dietary quality, and obesity among US adults. *American Journal of Public Health*. 2015;105:1453–1459.

18. Townsend M, Peerso J, Love B, Achterberg C, & Murphy S. Food insecurity is positively related to overweight in women. *Journal of Nutrition*. 2001;131:1738 –1745.

19. Chaparro MP, Harrison GG, Wang MC, Seto EY, & Pebley AR. The unhealthy food environment does not modify the association between obesity and participation in the Supplemental Nutrition Assistance Program (SNAP) in Los Angeles County. *BMC Public Health.* 2017;17:81.

20. Conrad Z, Rehm CD, Wilde P, & Mozaffarian D. Cardiometabolic mortality by Supplemental Nutrition Assistance Program participation and eligibility in the United States. *American Journal of Public Health.* 2017;107:466-474.

21. Leung CW, Willett WC, Ding EL. Low-income Supplemental Nutrition Assistance Program participation is related to adiposity and metabolic risk factors. *American Journal of Clinical Nutrition.* 2012;95:17–24.

22. Krueger PM, Rogers RG, Ridao-Cano C, Hummer RA. To help or to harm? Food stamp receipt and mortality risk prior to the 1996 Welfare Reform Act. *Social Forces.* 2004;82:1573–1599.

23. Park J, Lin HC, & Peng CY. The Supplemental Nutrition Assistance Program and frequency of sugar-sweetened soft drink consumption among low-income adults in the US. Nutrition and Health. 2017;23:147-157.

24. Shenkin JD, & Jacobson MF. Using the Food Stamp Program and other methods to promote healthy diets for low-income consumers. *American Journal of Public Health.* 2010;100(9):1562-1564

25. Nguyen BT, Shuval K, Njike VY, Katz DL. The Supplemental Nutrition Assistance Program and dietary quality among U.S. adults: findings from a nationally representative survey. *Mayo Clinic Proceedings.* 2014;89:1211–1219. http://dx.doi.org/10.1016/j.mayocp.2014.05.010.

26. Declaration of Policy, 7 U.S.C. § 2011. https://www.law.cornell.edu/uscode/text/7/2011. Accessed October, 2017

27. Kansagra SM, Kennelly MO, Nonas CA, Curtis CJ, Van Wye G, Goodman A, & Farley TA. Reducing sugary drink consumption: New York City's approach. *American Journal of Public Health.* 2015;105:61-64.

28.   Brownell KD, & Ludwig DS. The Supplemental Nutrition Assistance Program, soda, and USDA policy: who benefits?. *Jama*. 2011;306:1370-1371.

29.   Klerman JA, Collins AM, Olsho LE. Improving nutrition by limiting choice in the Supplemental Nutrition Assistance Program. *American Journal of Preventive Medicine.* 2017;52:171-178.

30.   US Department of Agriculture. Expanded Food and nutrition education program (EFNEP). 2017.

31.   Racial/ethnic and socioeconomic disparities in multiple risk factors for heart disease and stroke. Cdc.org http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5405a1.htm Accessed October, 2017.

32.   Everson SA, Maty SC, Lynch JW, & Kaplan GA. Epidemiologic evidence for the relation between socioeconomic status and depression, obesity, and diabetes. *Journal of Psychosomatic Research.* 2002;53:891-895.

33.   Howard G, Anderson RT, Russell G, Howard VJ, & Burke GL. Race, socioeconomic status, and cause-specific mortality. *Annals of Epidemiology.* 2000;10:214-223.

34.   Starfield B, Robertson J, & Riley AW. Social class gradients and health in childhood. *Ambulatory Pediatrics.*2002;2:238-246.

35.   Rhoades L, Auld G, & Baker S. Environmental Barriers to Healthful Dietary and Physical Activity Behaviors in the EFNEP Participant Population. *Journal of Nutrition Education and Behavior.*2017;49:45.

36.   Wiig Dammann K, & Smith C. Factors Affecting Low-income Women's Food Choices and the Perceived Impact of Dietary Intake and Socioeconomic Status on Their Health and Weight. *Journal of Nutrition Education and Behavior.* 2009;41:242-253.

37.   Shriver L, & Buehler C. Efficacy perceptions of fruit and vegetable parenting practices in low-income diverse mothers of preschoolers. *The FASEB Journal.* 2015;29:S902-2.

38. Pesch MH, Miller AL, Appugliese DP, Kaciroti N, Rosenblum KL, & Lumeng JC. Low-income mothers' feeding goals predict observed home mealtime and child feeding practices. *Child: Care, Health, and Development*. 2016;42:934-940.

39. Germann JN, Kirschenbaum DS, & Rich BH. Child and parental self-monitoring as determinants of success in the treatment of morbid obesity in low-income minority children. *Journal of Pediatric Psychology*. 2006;32:111-121.

40. Yin HS, Dreyer BP, Vivar KL, MacFarland S, Van Schaick L, & Mendelsohn A L. Perceived barriers to care and attitudes towards shared decision-making among low socioeconomic status parents: role of health literacy. *Academic Pediatrics*. 2012;12:117-124.

41. Rasmussen HN, Wrosch C, Scheier MF, & Carver CS. Self-regulation processes and health: The importance of optimism and goal adjustment. *Journal of Personality*. 2006;74:1721-1748.

42. Anderson ES, Wojcik JR, Winett RA, & Williams DM. Social-cognitive determinants of physical activity: the influence of social support, self-efficacy, outcome expectations, and self-regulation among participants in a church-based health promotion study. *Health Psychology.* 2006;25:510.

43. Pelletier LG, Dion SC, Slovinec-D'Angleo M, Reid R. Why do you regulate what you eat? Relationships between forms of regulation, eating behaviors, sustained dietary behavior change, and psychological adjustment. *Motivation and Emotion.* 2004;28:245–277.

44. Schnoll R, Zimmerman BJ. Self-regulation training enhances dietary self-efficacy and dietary fiber consumption. *Journal of the American Dietetic Association.* 2001;101:1006–1011.

45. Ammerman AS, Lindquist CH, Lohr KN, Hersey J. Efficacy of behavioral interventions to modify dietary fat and fruit and vegetable intake: A review of the evidence. *Journal of Preventive Medicine*. 2002;35:25–41.

46. Stadler G, Oettingen G, & Gollwitzer PM. Intervention effects of information and self-regulation on eating fruits and vegetables over two years. *Health Psychology*. 2010;29:274-283.

47. Baumeister RF, & Heatherton TF. Self-regulation failure: An overview. *Psychological Inquiry*. 1996;7:1-15.

48. Kroese FM, & De Ridder DT. Health behaviour procrastination: A novel reasoned route towards self-regulatory failure. *Health Psychology Review*. 2016;10:313-325.

49. Steel P. The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin.* 2007;133:65-94.

50. Hall PA, & Fong GT. Temporal self-regulation theory: A model for individual health behavior. *Health Psychology Review*. 2007;1:6-52.

51. Evans GW, & Rosenbaum J. Self-regulation and the income-achievement gap. *Early Childhood Research Quarterly*. 2008;23:504-514.

52. Miech R, Essex MJ, & Goldsmith HH. Socioeconomic status and the adjustment to school: The role of self-regulation during early childhood. *Sociology of Education*. 2001;102-120

53. Cserjési R, Luminet O, Poncelet AS, & Lénárd L. Altered executive function in obesity. Exploration of the role of affective states on cognitive abilities. *Appetite*. 2009;52:535-539.

54. Gunstad J, Paul RH, Cohen RA, Tate DF, Spitznagel MB, & Gordon E. Elevated body mass index is associated with executive dysfunction in otherwise healthy adults. *Comprehensive Psychiatry*. 2007;48:57-61.

55. Johnson SE, Richeson JA, & Finkel EJ. Middle class and marginal? Socioeconomic status, stigma, and self-regulation at an elite university. *Journal of Personality and Social Psychology*. 2011;100:838-852.

56. Crossley IA, & Buckner JC. Maternal-related predictors of self-regulation among low-income youth. *Journal of Child and Family Studies.* 2012;21:217-227.

57. Gueron-Sela N, Camerota M, Willoughby MT, Vernon-Feagans L, & Cox MJ. Maternal depressive symptoms, mother-child interactions, and children's executive function. *Developmental Psychology.* 2017; *doi:* 10.1037/dev0000389

58. Zeytinoglu S, Calkins SD, Swingler MM, & Leerkes EM. Pathways from maternal effortful control to child self-regulation: The role of maternal emotional support. *Journal of Family Psychology.* 2017;31:170-180.

59. McCoy DC, & Raver CC. Household instability and self-regulation among poor children. *Journal of Children and Poverty.* 2014;20:131-152.

60. Miller AL, Gearhardt AN, Fredericks EM, Katz B, Shapiro LF, Holden K., ... & Lumeng JC. Targeting self-regulation to promote health behaviors in children. *Behaviour Research and Therapy.* 2017

61. Kliemann N, Beeken RJ, Wardle J, Johnson F. Development and Validation of the Self-Regulation of Eating Behaviour Questionnaire for Adults. *International Journal of Behavioral Nutrition and Physical Activity.* 2016;13:87.

62. Ursache A, Blair C, & Raver CC. The promotion of self-regulation as a means of enhancing school readiness and early achievement in children at risk for school failure. *Child Development Perspectives.* 2012;6:122-128.

63. Zimmerman BJ. Attaining self-regulation: A social cognitive perspective. In *Handbook of Self-Regulation.* 2000;13-39

64. Shilts MK, Horowitz M, & Townsend MS. Goal setting as a strategy for dietary and physical activity behavior change: a review of the literature. *American Journal of Health Promotion.* 2004;19:81-93.

65. Godinho CA, Alvarez MJ, Lima ML, & Schwarzer R. Will is not enough: Coping planning and action control as mediators in the prediction of

fruit and vegetable intake. *British Journal of Health Psychology*. 2014;19:856-870.

66. Kwasnicka D, Presseau J, White M, & Sniehotta FF. Does planning how to cope with anticipated barriers facilitate health-related behaviour change? A systematic review. *Health Psychology Review*. 2013;7:129-145.

67. Gholami M, Lange D, Luszczynska A, Knoll N, & Schwarzer R. A dietary planning intervention increases fruit consumption in Iranian women. *Appetite*. 2013;63:1–6.

68. Steinmetz KA & Potter JD. Vegetables, fruit, and cancer. I. Epidemiology. *Cancer Causes & Control*. 1991;*2*:325-357.

69. Ness AR & Powles JW. Fruit and vegetables, and cardiovascular disease: a review. *International Journal of Epidemiology*. 1997;*26*:1-13.

70. Bazzano L. The high cost of not consuming fruits and vegetables. *Journal of the American Dietetic Association*. 2006;106:1364-1368

71. World Health Organization. Global health risks. http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf. Accessed June, 2018

72. Faries MD, & Kephart WC. (in press). The Intention-Behavior Gap. In J. M. Rippe (Ed.). *Lifestyle Medicine*. CRC Press.

73. Okubo H, Sasaki S, Rafamantanantsoa HH, Ishikawa-Takata K, Okazaki H, & Tabata I. Validation of self-reported energy intake by a self-administered diet history questionnaire using the doubly labeled water method in 140 Japanese adults. *European Journal of Clinical Nutrition*. 2008;62:1343.

Table 1. Participant Descriptives for Adults Enrolled in EFNEP

Characteristics	Mean (n = 63)	n (%)
Age	37.87 ± 8.40	
# of children	2.33 ± 1.03	
# of lessons attended	7.86 ± .50	
Gender (female)		63 (100%)
Ethnicity		
Hispanic		36 (57.1%)
Not Hispanic/Latino		25 (39.7%)
Pregnant		2 (3.2%)
Using a federal aid program[a]		46 (73%)
SNAP		20 (32%)
[a]Includes SNAP, WIC, head start, child nutrition, TANF, and TEFAP		

Table 2. Mean Self-Regulation Capacity Scores Pre- and Post-Program, and Distribution of SREBQ[a] Scores Across Categories. (n=63)

	Pre	Post	Δ
Mean	2.74 ± 0.71	2.59 ± 0.78	-0.15
SREBQ[a] Category			
Low (1 to <2.8)	46%	56%	10%
Medium (2.8 to <3.6)	43%	32%	-11%
High (>3.6)	11%	13%	2%

[a] Self-Regulation of Eating Behaviour Questionnaire (Kliemann et al., 2016)

Table 3. Vegetable and Fruit Consumed per Self-Reported Diet Recall (n=63)

	Cups	Pre	Post	Δ
Vegetables				
	Mean	1.51 ± 1.36	1.42 ± 1.32	-0.09
	<2.5	81%	87%	6%
	>2.5	19%	13%	-6%
Fruit				
	Mean	0.86 ± 0.94	1.39 ± 1.39	.53*
	<1.5	75%	67%	-8%
	>1.5	25%	33%	8%
*Statistically significant change from pre- to post-program ($p < 0.01$)				

Table 4. Dietary Behavior Responses, as the Frequency (%) Answering 'Yes' Across Categories. (n=63)

Question/Category	Pre	Post	Δ
'How many times a day do you eat fruit?'			
< 4 times/day	97%	95%	-2%
≥ 4 times/day	3%	5%	2%
'How many times a day do you eat vegetables?'			
< 4 times/day	95%	94%	-1%
≥ 4 times/day	5%	6%	1%
'How often do you plan your meals before you shop for groceries?'			
Never-Sometimes	40%	18%	-22%
Often-Always	60%	82%	22%

Table 5. Correlation between change in self-regulation capacity and the change in respected behaviors[a]

	Fruit	Vegetables	Meals planned	Attendance
Self Regulation Capacity	-0.08	-0.03	0.09	-0.17
[a] There were no statistically significant findings				

Appendix A

EFNEP Session Breakdown

Session 1: *Healthy Food, Healthy Families.*

Session goal: participants will learn about the mission of EFNEP, MyPlate, portion sizes, and the importance of physical activity for good health.

Participants goal: write down how much you eat and drink for one day, be physically active for at least 30 minutes each day.

Session 2: *Foods that Pack a Punch!*

Session goal: Participants will learn the key messages for each food group and learn to make healthy good choices from these groups.

Participants goal: write down how much you eat and drink for one day, and be physically active for at least 30 minutes each day.

Session 3: *Making the Most of MyPlate*

Session goal: Participants will learn the importance of vegetables, fruits, and dairy foods for improved diet quality and discuss ways to increase consumption of these foods.

Participants goal: Eat more vegetables, fruits, and low-fat dairy foods each day, and be physically active for at least 30 minutes each day.

Session 4: *The Power of Planning*

Session goal: Participants will learn to plan family meals, create a grocery list and compare brands when purchasing foods

Participants goal: Plan one week of meals for your family using the Weekly Menu Planner and make a grocery list, and be physically active for at least 30 minutes each day. They are encouraged to invite a friend or family member.

Session 5: *Setting Your Limits*

Session goal: Participants will learn to use the Nutrition Facts panel when purchasing

foods that are low in sodium, saturated and trans fat, and added sugar.

Participants goal: Prepare one meal without adding salt, and be physically active for at

least 30 minutes each day.

Session 6: *Plate it Safe!*

Session goal: Participants will learn strategies for keeping food safe and reducing their

family's risk of foodborne illness

Participants goal: Use the 4 simple steps to food safety taught to prepare a family meal,

and be physically active for at least 30 minutes each day.

Session 7: *Mealtime Miracles*

Session goal: Participants will learn the division of responsibility in feeding children,

appropriate child size portions, and discuss the benefits and barriers to family meals and

cooking together.

Participants goal: Plan a family meal this week, and be physically active for at least 30

minutes each day.

Session 8: *The Choice is Yours!*

Session goal: Participants will review concepts learned over the course of the series,

discuss weight management strategies, celebrate successes, and look to the future.

Appendix B

Self-Regulation of Eating Behaviour Questionnaire

1. Do you find any of these foods tempting (that is, do you want to eat more of them than you think you should)? (Tick those which apply)

☐ Chocolate	☐ Sodas	☐ Pizza
☐ Chips	☐ Cookies	☐ Fried foods
☐ Cakes	☐ Candy	☐ French Fries
☐ Ice cream	☐ Popcorn	☐ Other foods
☐ Bread/toast	☐ Pastries	☐ I don't find any food tempting

2. Do you intend NOT to eat too much of these foods you find tempting in the previous question?
☐ Yes
☐ No

3. Do you intend to have a healthy diet?
☐ Yes
☐ No

Self-Regulation of Eating Behaviour Questions:
4. Please read the following statements and tick the boxes most appropriate to you.
For the next few questions, please, understand that:
- 'Tempting foods' are any food you want to eat more of than you think you should.
- 'Eating intentions' refer to the way you are aiming to eat, for example you may intend to avoid tempting foods or eat healthy foods.

		Never	Rarely	Sometimes	Often	Always
1	I give up too easily on my eating intentions	☐	☐	☐	☐	☐
2	I'm good at resisting tempting food	☐	☐	☐	☐	☐
3	I easily get distracted from the way I intend to eat	☐	☐	☐	☐	☐
4	If I am not eating in the way I intend to I make changes	☐	☐	☐	☐	☐
5	I find it hard to remember what I have eaten throughout the day	☐	☐	☐	☐	☐

VITA

After completing high school in 2012, Alyssa Abreu completed core
classes at Lonestar Community college, and entered Stephen F. Austin State
University at Nacogdoches, Texas in 2014. She received the degree of Bachelor
of Science from Stephen F. Austin State University in May 2016. August 2016,
she entered the Graduate School of Stephen F. Austin State University within the
Department of Kinesiology, and received the degree of Master of Science in
August of 2018.

Permanent Address: 23931 Verngate Dr.
                    Spring, TX 77373

AMA

Thesis was typed by Alyssa Marie Abreu