2018

Improving Nutrition among Supplemental Nutrition Assistance Program Recipients Using a Monetary Incentive Model

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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2018

Abstract

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MPH, National University, 2015

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Doctoral Study Submitted in Partial Fulfillment

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Doctor of Public Health

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Abstract

The Supplemental Nutrition Assistance Program (SNAP) is the United States' largest government assistance program that aims to alleviate food insecurity. The SNAP program allows low-income individuals and families the ability to purchase nutritious foods through a monthly benefit. However, the current body of literature presents evidence of the program's counterproductive effect. The purpose of this study was to determine whether incentivizing SNAP recipients to purchase additional fruits and vegetables was beneficial in increasing such purchases. Social cognitive theory was used as a theoretical framework to address research questions associated with shopping patterns and attitudes and beliefs. This quantitative study used a randomized controlled trial to study differences between incentivized and control groups. The Healthy Incentives Pilot Program (HIP) used a stratified sampling of 55,095 SNAP households receiving benefits between July, 2011, and December, 2012. Statistical analyses (*t* test, Pearson correlation, and multiple regression analysis) were conducted to identify changes in food shopping patterns and eating behaviors associated with the HIP intervention. Results indicated that (a) incentivizing SNAP recipients leads to an increase in fruit and vegetable purchase, and (b) a correlation exists between fruit and vegetable purchase and attitudes and beliefs. No correlation was found between the intervention and changes in food shopping patterns. Positive social change implications include the improvement of health outcomes in over 43 million people currently enrolled in the SNAP program on a national level.

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Dedication

I dedicate this doctoral study to my family who has been supportive through all these years of my academic journey. To my brother (Ernest) who inspired me to keep reaching for the stars despite any obstacles. I still remember his first words to me in 2001 after his life-threatening car accident. After weeks of being in a coma and intensive care, he opened his eyes and asked me "How's school?" To my brother and sisters (Manny, Patty and Adriana) for cheering on their little sister as she reached every milestone. To my parents for always supporting me since day 1 when I decided to return to school as a single parent. Their undying support and being the best parents and grandparents is what kept me afloat through even the most challenging days of juggling work, school and parenthood. To my partner in life (Cesar) who is proud to support and walk beside (not in front or behind) a strong and ambitious woman with big dreams and big goals. Finally, I dedicate this study to my children. To my oldest daughter (Alessandra) who has been by mommy's side since 1 year old when mommy decided to go back to school. Mommy promised you the world and my hope is that you will see how you can attain it through hard work and dedication. To my Tesla and Niko who have been my God sent blessings these past two years. I love you all. Lastly, to all those struggling to maintain a healthy diet and lifestyle with limited income:

"If you think the pursuit of good health is expensive and time consuming, try illness." ~Lee Swanson

Acknowledgments

I am thankful to God for all his blessings and for giving me the strength to push through across the finish line even on the days my faith was questioned. I also want to express my sincerest gratitude to my dissertation chair, Dr. Aimee Ferraro. Thank you for being an amazing support system. Your kindness, guidance, support, and constructive feedback contributed to the finalization of this study in such a short time. To my committee chair, Dr. Mary Lou Gutierrez. Thank you for such valuable feedback and for holding me to such high standards through my revisions.

A special thank you to Unidos Por La Musica, a non-profit organization I hold near and dear to my heart. Your dedication to providing food security through healthy options to those in need regardless of race, age, and income or immigration status is making a difference in your communities. I look forward to many more years of partnership and collaboration.

Lastly, I want to acknowledge my family and friends who sacrificed spending less time with me so that I could finish this study. I've missed vacations, family trips, holidays and gatherings throughout the years because of my dedication to this study. This did not go unnoticed and I owe all of you a big vacation!

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Section 1: Foundation of the Study and Literature Review

Introduction

The effects of poverty on health outcomes have garnered extensive research, though it remains understudied how poverty affects children and adults independently. Research has shown that chronic and sustained poverty can lead to a multitude of negative health outcomes in children as well as the establishment of unhealthy eating behaviors, which become more difficult to change over time (Béatrice, Lise, Victoria, & Louise, 2012). Low-income children on the Supplemental Nutrition Assistance Program (SNAP) eat fewer fruits and vegetables than children not on the government assistance program (Baum, 2011). Similarly, adults in the SNAP program are linked to a higher rate of chronic diseases such as obesity and diabetes (Gregory, 2013). Increasing fruit and vegetable intake is one of several leading strategies recommended by U.S. public health authorities to improve dietary quality as well as reduce negative health outcomes (U.S. Dept of Agriculture [USDA] & U.S. Dept. of Health and Human Services, 2015.

The Healthy Incentives Pilot Program (HIP) was developed to incentivize SNAP recipients for purchasing fruits and vegetables. A preliminary review of the literature identified a knowledge gap on how the establishment of food security by using Food Stamp (SNAP) benefits contributes to positive health outcomes. With this study I aimed to help fill the gap between current consumption and the *Healthy People 2020* objectives for total fruit and vegetable intake (USDA, 2011). Positive outcomes in the study can encourage social change if legislative efforts to restructure the SNAP program are consistent with the study's proposed incentive structure.

Background

The food stamp program was established in 1939 as a way to generate more income for farmers while distributing food to the needy during the Great Depression. Essentially, the program was known as "the cornerstone of the nation's nutrition safety net" (Landers, 2007). Since the inception of the program, several modifications have ensued. Originally, the program required that food voucher stamps be purchased to obtain additional stamps. Today, no purchase is required, and the program awards benefits based on income below the 130% poverty level threshold (California Department of Social Services, 2017). The Food Stamp program was renamed the Supplemental Nutrition Assistance Program with the intent of promoting the purchase of nutritious food in accordance with USDA guidelines, though few limitations on qualifying purchases exist.

The USDA estimated that in 2015, 12.7% of U.S households and 7.8% of children were food insecure (USDA, 2016a). The ramifications to food insecurity include negative health outcomes and a diminished quality of food intake. Policy interventions throughout the years have developed additional programs to tackle child food insecurity such as the Women, Infants, and Children Program (WIC), which serves children up to the age of 5 who are at nutritional risk. In addition, the SNAP program has been restructured to allow the redemption of benefits through an electronic benefits card that is intended to reduce the stigma associated with the use of Food Stamp vouchers (Landers, 2007).

Despite modifications to the program, there remains a gap between the establishment of food security, which the program provides to low-income individuals, and the improvement of health outcomes, which is expected to occur once someone is no

longer faced with food insecurity and malnutrition. A recent study has generated data that associates SNAP participation with higher body mass index (BMI) and obesity (Leung & Villamor, 2011). The USDA counted over 43.1 million people on Food Stamps in November, 2016, with an estimated 44% of participants being children aged 18 or younger (USDA, 2016a). Comprehensive review of the literature has established some findings to suggest a correlation between adults on the SNAP program and obesity, though there is little evidence showing a positive association between children on the SNAP program and BMI (Roy, Millimet, & Tchernis, 2012). The literature's limitations can be explained by the lack of long-term studies conducted on children under the SNAP program. The Healthy Incentives Pilot (HIP) Program examined the fundamental assumption that changing a child's eating behaviors by increasing fruit and vegetable intake improves long-term outcomes through adulthood while also targeting fruit and vegetable intake in adults.

The HIP study was necessary to determine whether modifications to fruit and vegetable intake in children can lead to long-term changes as children become adults. In addition, the increase in fruit and vegetable intake among adults in the household can serve as a learned observation in children based on the social cognitive theory where the environment plays a role in learned behaviors (Wise, 2002). These learned behaviors can transcend through previously established negative eating behaviors and sustained into adulthood, lowering the risk of the long-term effects of poverty. This doctoral study involved an evaluation of the HIP data that were collected from November, 2011, until January, 2012, on fruit and vegetable intake.

Problem Statement

The SNAP is the United States' largest government assistance program, which aims to alleviate the disparities caused by food insecurity (Nguyen, Shuval, Bertmann, & Yaroch, 2015). The USDA defines food insecurity as the report of reduced quality, variety, or desirability of diet with multiple indications of disrupted eating patterns and reduced food intake (USDA, 2016b). Food insecurity can lead to diminished quality of food intake, which is a precursor to the development of chronic diseases such as diabetes, obesity, and hypertension as well as increased stress levels and reduced overall well-being (Nguyen et al. 2015). Almost 50 million people in the United States face food insecurity and are at risk for negative health outcomes (Gundersen & Ziliac, 2015).

Currently, the SNAP program allows program recipients the ability to purchase nutritious fresh, canned, and packaged foods in an effort to prevent or reduce negative health outcomes associated with food insecurity. However, the literature presents evidence of the program's counterproductive effect on improving outcomes by providing food security. Previous research data obtained by the National Health and Nutrition Examination Surveys is consistent with findings that suggest that SNAP recipients have an increased likelihood of obesity, and lower dietary quality (Nguyen, Shuval, Njike, & Katz, 2014).

Results of the 2007 California Health Interview Survey showed that obesity was 30% higher among SNAP recipients than nonrecipients (Leung & Villamor, 2011), and results of the 2009 Community Health Patient survey conducted among federally qualified health center patients indicated that almost a third (32%) of patients under the

SNAP program reported fair or poor health status (Alvarez, Lantz, Sharac, & Shin, 2015). Results from a separate quantitative study conducted by the USDA showed that SNAP recipients had less healthy overall diets than low-income nonrecipients (Gregory, 2013). The long-term effects of the SNAP program have been further substantiated by the results of the 1968–2005 Panel Study of Income Dynamics, which examined the long-term effects of childhood SNAP participation, neighborhood conditions, and the interaction of these two, on adult BMI. The findings were consistent with negative outcomes related to obesity and self-reported health (Vartanian & Houser, 2012).

The Panel Study of Income Dynamics findings suggest the SNAP program may have a counter effect on the improvement of health outcomes among those suffering from food insecurity (Leung & Villamor, 2010). Low-income populations such as SNAP recipients are disproportionately affected by chronic disease and other disparities that can be alleviated with better diet and nutrition intake (Basu, Seligman, Gardner, & Bhattacharya, 2014). Policymakers have proposed two possible modifications for the SNAP program: a ban on sugary drinks, and an incentive for purchasing additional fruits and vegetables (Basu, et al., 2014). There is compelling evidence that shows an association between the increased consumption of sugary drinks and the development of diabetes and obesity (Gregg & Albright, 2015). However, interventions designed to reduce the consumption of sugary beverages focused only on the reduction in obesity incidence and not diabetes outcome (Gregg & Albright, 2015). Thus, no researchers have conducted a comprehensive review of the effect of a reduction in sugary drink consumption on overall negative health outcomes. In addition, banning the purchase of

sugary drinks using SNAP benefits would not account for possibilities of private purchase. Further research should be considered to evaluate the effectiveness of providing incentives to SNAP recipients and whether these incentives will lead to an increase in fruit and vegetable intake and a change in long-term dietary intake behaviors. Improvements in dietary intake of fruits and vegetables among low-income groups can fill the gap on the current counterproductive effect of the SNAP program by implementing policy interventions that can be used on a nationwide level.

Purpose of the Study

The USDA's HIP Pilot Program used a randomized controlled design between the experimental (incentivized group) and control group (Bartlett, et al., 2014). I conducted secondary analysis of these data to analyze differences between groups regarding fruit and vegetable intake at baseline and follow-up. I ran descriptive bivariate and multivariate analyses to determine any statistical significance and improvement in outcomes. I observed independent demographic variables such as age, gender, ethnicity, language, income, household composition, and monthly SNAP benefit amount when studying the effect of program's incentive benefit (independent variable) to food purchases and targeted fruit and vegetable intake (TFV; dependent variable). In addition, I closely observed confounding variables such as predetermined attitudes and beliefs about fruits and vegetables and personal food preferences as covariates to increase the validity of the data and reduce any bias. A positive relationship between the intervention and its outcomes could address the current knowledge gap between the establishment of food security and an increase in negative health outcomes among SNAP recipients.

Therefore, the purpose of this dissertation study was to determine whether incentivizing SNAP recipients to purchase additional fruits and vegetables is beneficial in increasing purchase and consumption.

Research Questions and Hypotheses

The secondary analysis of the research study aimed to address the following research questions:

RQ1: Do incentivized SNAP recipients purchase and consume more fruits and vegetables than nonincentivized recipients after controlling for demographic variables such as age, gender, ethnicity, and household composition?

$H_0$1: Incentivized SNAP recipients do not purchase more fruits and vegetables than nonincentivized recipients.

H_a1: Incentivized SNAP recipients purchase more fruits and vegetables than nonincentivized recipients.

RQ2: Does the increase in fruit and vegetable intake contribute to changes in attitudes and beliefs about fruits and vegetables?

$H_0$2: The increase in fruit and vegetable intake does not have an effect on attitudes and beliefs.

H_a2: The increase in fruit and vegetable intake contributes to a change on attitudes and beliefs about fruits and vegetables.

RQ3: Were there changes in SNAP recipient food shopping patterns (reduction in sugary drink purchase or increase in fruit and vegetable purchase) as a result of the HIP study?

$H_0$3: The USDA's HIP study had no effect on food shopping patterns among incentivized recipients.

H_a3: The USDA's HIP study had an effect on food shopping patterns among incentivized recipients.

Theoretical Foundation for the Study

My evaluation of this study used the social cognitive theory (Bandura, 1986) as a theoretical framework to identify changes in behavior using a reciprocal model with underlying constructs in personal factors, environmental influences, and behavioral interactions as they relate to HIP data collected. Focus groups were conducted in which participants were asked about their experiences with the program and unexpected health outcomes. As a result, the environmental interaction could be an influencing factor in fruit and vegetable purchasing behavior. Key constructs relevant to this behavior change include observational learning, reinforcement, self-control, and self-efficacy (Bandura, 1986). These constructs relate to potential changes in eating behaviors and food shopping behaviors as a result of the study's incentive model. The application of constructs has the potential to establish self-efficacy and lead to long-term behavior changes. The social cognitive theory will be described in further detail in Section 2.

Nature of the Study

The USDA's HIP Pilot Program used a randomized controlled design between the experimental (incentivized group) and control group (nonincentivized). I conducted a quantitative research design using secondary analysis of these data to analyze differences between groups regarding fruit and vegetable intake at baseline and follow-up. I ran

descriptive bivariate and multivariate analyses to determine any statistical significance and improvement in outcomes. A relationship between the intervention and its outcomes can address the current knowledge gap between the establishment of food security and an increase in negative health outcomes among SNAP recipients.

Literature Search Strategy

I conducted a comprehensive literature review to reference the current empirical evidence related to SNAP, food insecurity, dietary guidelines, and barriers to fruit and vegetable guideline adherence. I referenced the following key terms in a thorough search of several databases: *fruit and vegetable guidelines, U.S national food stamp program, malnutrition, EBT transactions, SNAP recipient health outcomes, SNAP policy interventions, and SNAP fruit and vegetable consumption.* These terms provided the basis of key components included in this literature review.

A broad search was initiated relative to fruit and vegetable guidelines and differences in adherence by demographic variables followed by a narrow search to identify trends in fruit and vegetable intake among SNAP recipients and health outcomes. There was a special focus on previous studies that had analyzed the effects of educational and policy interventions to the SNAP program and whether these interventions resulted in any significant changes to diet patterns.

Databases used for reference included ProQuest Central, MEDLINE, and EBSCO Host. Moreover, the USDA website was the gateway to yearly reports on the Food and Nutritional Services (FNS) and its SNAP program. I filtered databases to only provide peer-reviewed literature between the years 2008-2017. The only exemption from this

timeframe was the review of Food Stamp Program historical information relevant to the study findings. The following literature review was a cumulative analysis of all scholarly articles and national reports obtained by the aforementioned databases and sites to reflect the subject findings of this study.

Literature Review Related to Key Variables/Concepts

Review of Theoretical Framework

Though the current body of knowledge entails multiple conceptual frameworks that explain eating behaviors, this study focused on the social cognitive theory and its ability to influence a change in fruit and vegetable intake among SNAP recipients. Jean Piaget (1950) inferred that an individual's actions are best determined by the reciprocating effects between environments and personal experiences. Thus, a person can be influenced to change eating behaviors when they observe others doing so, or when they have experienced positive results from the implemented change. This theory is further substantiated in the study by using the constructivism paradigm learning theory to explain that individuals display greater learning capabilities from personal experiences rather than informational lecture. In other words, participants who do not have a high degree of knowledge on dietary guidelines will increase their knowledge base from active participation in the HIP study. The following literature review is consistent with multiple findings that concur with this learning effect.

One of the most recent studies applying the social cognitive theory in changing dietary behaviors is a 2015 randomized controlled study conducted on Japanese adults from a low socioeconomic status (Nakamura, Inayama, & Arao, 2017). The

recommended daily intake amount of vegetables in Japan is 350g in order to prevent a plethora of lifestyle-related diseases (Nakamura et al. 2017). However, it is estimated that over two thirds of Japanese low-income citizens do not meet the daily recommendations (Nakamura et al. 2017). A web-based application tool was used as the primary intervention for a total of 5 weeks. A notable strength of this study was the inclusion of different health literacy levels in the development and application of the web-based tool. This increased the sample group's response and the effect of the intervention. In addition, the use of a web-based tool reduces frequent barriers typically present among low-income groups such as time and transportation. The use of the social cognitive theory allowed for participants to receive social support and recognition for achieving milestones and meeting daily requirements. Overall, the study showed a positive effect on the increase of vegetable intake among low-income groups, a vital demographic variable in the current HIP study.

Although the analysis of the 2015 randomized controlled trial provided some evidence on the use of an intervention to increase fruit and vegetable intake, a 2013 systemic review of multiple studies also validated the effect of using the social cognitive theory to change dietary behaviors. Ten randomized trials were thoroughly reviewed in their ability to promote self-efficacy among a combined total of 12,414 participants. Overall, the review found that three of the studies showed an increase in fruit consumption of 0.25 (0.01 to 0.49) servings per day, with an increase in vegetable consumption of 0.25 (0.06 to 0.44) servings per day. An additional three studies reported on fruit and vegetable consumption together showed an increment of 0.50 (0.13 to 0.87)

servings per day. The pooled effect on consumption of dietary fiber from four studies was estimated to be 1.97 (0.43 to 3.52) gm fiber per day. Data from five studies showed a mean decrease in total fat intake of 5.2% of total energy (1.5 to 8.8%). Data from three other studies showed a mean decrease in serum cholesterol of 0.10 (−0.19 to 0.00) mmol/L (Bhattarai et al., 2013). Most notably, it was the social cognitive theory-based studies that showed a greater positive effect on dietary change by the use of social-based models to encourage behavior replication.

The use of the social cognitive theory in public health practice among diverse populations has enabled researchers to identify the role and influence of reciprocal determinism in shaping individual's dietary behaviors. Whereas older studies are limited to small groups and communities, as society moves towards a more technologically advanced society, future studies can expand their reach through the use of web-based interventions. At present, the current structure of the SNAP program can benefit from social cognitive theory-based interventions to encourage positive replicated determinism among low-income groups through the use of incentive models.

History of the Supplemental Nutrition Assistance Program

The Food Stamp Program. The effort to reduce or eradicate food insecurity can be traced back to the post-Great Depression era when an increase in unemployment caused a lack of food purchasing power. As a result of Franklin Delano Roosevelt's New Deal, congress passed the Agricultural and Adjustment Act of 1933, the goal of which was to give farmers additional income by distributing more food to the needy (Landers, 2007). The year 1939 marked the inception of the Food Stamp Program in New York,

where by 1943, over 4 million recipients participated in the program (USDA, 2014). The Food Stamp program allowed recipients to obtain orange stamps by the purchase of normal food expenditures and receive blue stamps, free of cost, for surplus food items (USDA, 2014). The program was heavily monitored during the first 20 years to evaluate its effect on farm income. It was during this time that the first modifications to the program were proposed, which are still seen in the program today. Administrative and policy changes such as only offering one kind of stamp, eliminating provisions to only purchasing surplus foods, and making uniform eligibility and program recertification guidelines are still in effect today.

Efforts to eliminate the effects of poverty have increased greatly since the program's beginnings to include nutrition education. In 1992, only seven states had approved nutrition education plans. By 2007, all 50 states had approved and implemented nutrition education plans. As a result, the Food Stamp program is described as "the cornerstone of the nation's nutrition safety net" (Landers, 2007). The USDA currently offers several food assistance and nutrition programs targeting different populations. Eligibility is contingent on meeting inclusion guidelines based on age or risk level. Eligibility for the Food Stamp Program (now referred to as the SNAP) is based solely on income without regard to age. What began as a need-based program that eradicates hunger has now evolved to a need-based program that eradicates hunger while improving the negative health outcomes associated with its program participants.

Supplemental Nutrition Assistance Program. Though the Food Stamp Program was stopped and later permanently reenacted in 1964, it was initially proposed to exclude

the purchase of sugary beverages and luxury food items (Pomeranz & Chriqui, 2015). However, this House version of the bill did not pass the Senate and the final version of the bill allowed for the purchase of these items. The current SNAP received its new name from Congress after the passing of the 2008 Farm Bill. The purpose of the SNAP program was "to permit low-income households to obtain a more nutritious diet, to raise their levels of nutrition, and alleviate hunger and malnutrition" (Pomeranz & Chriqui, 2015, p. 428). However, there are no nutritional guidelines attached to the redemption of food benefits, which has many policymakers questioning whether it is fulfilling its purpose in raising nutrition levels. Presently, all 50 states have nutrition education guidelines attached to their food stamp programs. However, there are no restrictions on food benefit redemption as a result of these guidelines. Policymakers have proposed food restrictions to be made on the program that are aligned with the most current nutritional guidelines; however, the USDA has declared that doing so would pose drastic administrative challenges that would require each state to designate eligible foods for purchase.

Food Purchasing Restrictions. The SNAP program considers ineligible food items to be:

- beer, wine, liquor, cigarettes or tobacco;
- vitamins and medicines;
- food that will be eaten in the store;
- hot foods;
- any nonfood items, such as

- pet foods,
- soaps, paper products, or
- household supplies.

As an exception, many restaurant retailers are now authorized to accept SNAP benefits from qualified homeless, elderly, or disabled people in exchange for food that cannot be prepared in a home.

Electronic Benefits Transfer. The Food Stamp program initially delivered benefits for redemption through the use of stamps which could be redeemed for the purchase of food. The late 1990's and early 2000's marked a dramatic change to the program's administration, including a streamlined process for receiving and redeeming benefits. Electronic Benefits Transfer (EBT) cards were instituted to reduce program fraud, ensure ease of use of food benefits by program participants, and to reduce the stigma associated with using food stamps for purchases (SNAP to Health, 2017). The introduction of the EBT card also brought some changes to program eligibility requirements which included benefits to qualified immigrants and children under the age of 18 years old.

Purchase transaction trends. Previous efforts to track and monitor EBT expenditures have produced many limitations and a gap in knowledge when trying to understand food shopping patterns among food stamp recipients. For example, Hastings & Washington (2010) observed cycles and differences in food shopping behaviors by food stamp recipients at different times of the month. Recipients were more likely to purchase more at the beginning of the month when their benefits were available, and also

purchase unhealthier food options consistent with a "feast day." Over time, recipients changed their food shopping behaviors where the increase in marginal utility becomes present. The effects of modifying the availability of EBT funds from full benefit availability at the beginning of the month to a weekly amount and the effect it could have on food shopping patterns should be explored.

The visibility of negative health outcomes present among SNAP program recipients has led policymakers to increase their research in food purchasing transactions to determine trends and patterns in food shopping behaviors that may contribute to these health outcomes. Prior to 2016, the Food and Nutrition Service obtained information about food and beverage transaction purchases only through the use of surveys which relied on recent recollection of food and beverages consumption by the program participants (Gregg & Albright, 2015). In 2011, the FNS implemented a grant-funded research study to collect Point-of-Sale grocery and supermarket store transaction data. Overall, the research collected shopping patterns from over 3.2 million SNAP program households on a monthly basis (USDA FNS, 2011). The results indicated that about 40 cents of every dollar of food expenditures by SNAP households were spent on basic items such as meat, fruits, vegetables, milk, eggs, and bread. Another 20 cents out of every dollar was spent on sweetened beverages, desserts, salty snacks, candy and sugar (USDA, 2016). The remaining 40 cents were spent on a variety of items such as cereal, prepared foods, dairy products, rice, and beans (USDA, 2016). There were several limitations to the FNS study. The study did not capture data from every SNAP-authorized retailer such as farmer's markets which could have contributed an increase in food and

vegetable purchases among food stamp recipients. Also, the categorization of food and beverage items made the data more broad than specific. An example is the absence of low-fat or fat-free categories which can make a difference when analyzing obesity outcomes.

The literature from the last ten years as well as data collected by the FNS in 2011 shows compelling evidence that sugary soft drinks are the number one purchase using SNAP benefits (Gregg & Albright, 2015). Heavy consumption of sugary soft drinks and other unhealthy food options have been linked to obesity, type 2 diabetes, and cardiovascular disease (Basu et al., 2014). The financial responsibility of the economic expenditures these chronic diseases collectively incur trickle down to the taxpayer since it is a federally funded program. Calls for the restructuring of the program have been heavily voiced by critics in support of reducing the program's negative health outcomes.

Fruit and Vegetable Intake

Dietary recommendations. Since 1980, the USDA has been drafting and producing dietary guidelines for Americans which include guidelines on dietary components such as grains, dairy, poultry and meat, fats, and fruits and vegetables. Dietary recommendations and guidelines for fruit and vegetable intake are subjective to pre-existing conditions and are updated every five years by the USDA. The most recent revision was made in 2015 and included new topics and recommendations on caffeine and low-calorie sweetener intake, as well as revisions to sodium intake. The purpose of these guidelines is to inform policymakers and health professionals about current guidelines and to be used as a valuable tool in helping Americans meet and maintain

these guidelines (USDA, 2015). These guidelines are also aligned with the Healthy People 2020 initiatives. USDA programs such as the Women, Infant, Children's Program; National School Lunch and Breakfast Programs, and the Health and Human Services' (HHS) Older Americans Act Nutrition Services programs use these adherence guidelines for its children and older adult participants. Unfortunately, the Supplemental Nutrition Assistance Program does not provide pre-packaged meals and as a result does not enforce these dietary guidelines (WIC, 2017).

The 2015 published Dietary Guidelines for Americans (US HHS, 2015-2020) includes the MyPlate symbol to depict recommendations on all five dietary components. Key terms in the Dietary Guidelines are intended to operationalize its principles and recommendations and link their relationship to life span and health status. Special emphasis is made on specific nutrient-rich foods in each category such as dark-green leafy vegetables or lean proteins. Although the SNAP program promotes, but not enforces the USDA's most recent dietary guidelines, the literature shows empirical evidence to suggest that food stamp recipients are not purchasing 50% of fruits and vegetables with their benefits as the guidelines recommend (Bartlett et al., 2014). Based on the literature and the USDA's comprehensive EBT Point-of-Sale research study, SNAP participants are spending approximately 40% of their benefits on meat, fruits and vegetables, milk, eggs, and bread. 20% is spent on sugary beverages, and an additional 40% of benefits are spent on other processed grains and cereals, and prepared foods (Nguyen et al. 2015; Travis, 2012; USDA, 2016). The percent of EBT benefits spent on recommended food groups does not match the USDA recommended limits. The myPlate

illustration (Figure 1) was established in 2011 to replace the myPyramid guide (USDA, 2016) and better illustrate the daily recommended limits of staple food groups.

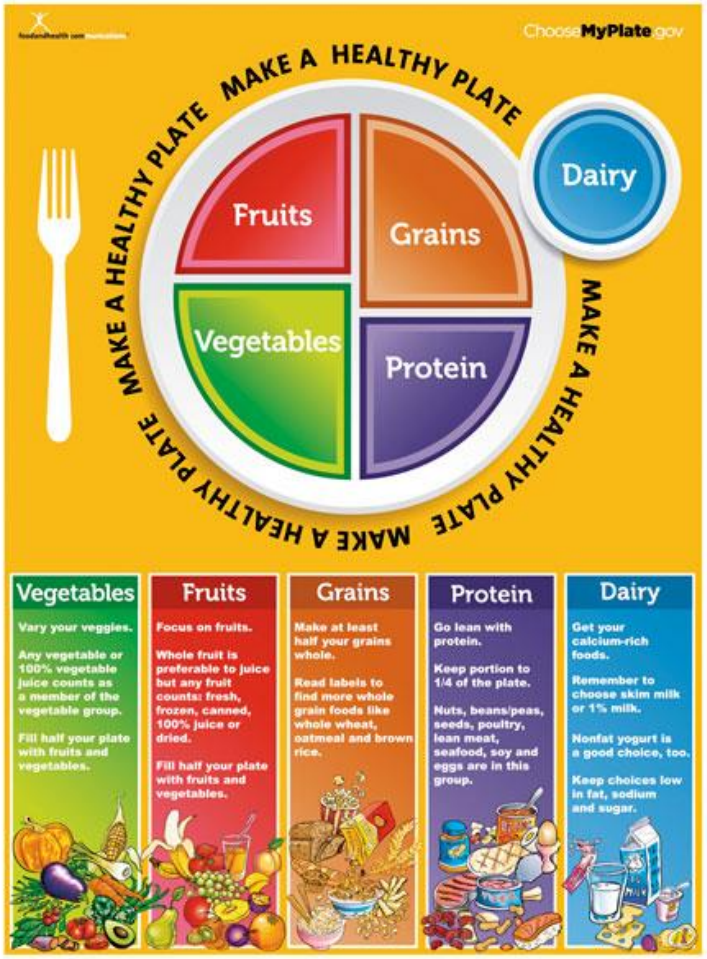

Figure 1. MyPlate illustrates the five food groups that are the building blocks of a healthy diet (MyPlate.gov).

Fruit and vegetable intake trends. The USDA's Point-of-Sale Research Study did not find significant differences in food shopping patterns between food stamp recipients and income-eligible non-participants (USDA, 2016). As an example, expenditures on basic or staple foods (meat/poultry/seafood, fruits, vegetables, milk, eggs and bread/crackers) comprised over 40 cents of every food purchase dollar for both

SNAP and non-SNAP households (41 and 44 cents/dollar, respectively). Another 20 cents per dollar was spent on less healthy foods such as sweetened beverages, prepared desserts, salty snacks, candy and sugars by both household groups (SNAP households – 23 cents; non-SNAP households – 20 cents) (Bartlett et al., 2014; USDA FNS, 2016). These findings are inconsistent with the USDA's Economic Research Service 2009 study which found that Americans' daily consumption of fruits & vegetables were 1.03 cups and 1.58 cups, respectively, in 2004, while the recommended daily intakes were 1.80 cups for fruits and 2.60 cups for vegetables (USDA-FNS, 2016; Dong & Lin, 2009). In addition, Dong & Lin (2009) found that individuals who were eligible for benefits through the SNAP program ate only about 0.96 cups of fruits and 1.43 cups of vegetables per day, regardless of whether or not they participated in the program (USDA-FNS, 2016; Dong & Lin, 2009). These inconsistencies can be attributed to the limitation of the ERS study in separating the SNAP program's food stamp program and Women, Infant, and Children's program which restricts benefits to food which meets recommended dietary guidelines.

Despite minimal differences in fruit and vegetable consumption between SNAP participants and non-participants, differences between population subgroups can also elucidate the notion that food stamp program participation does not have a causal effect on the increase or decrease of fruit and vegetable intake. The USDA's 2015 dietary guidelines report concluded that men and women between the ages of 31-70 consumed the highest amount of vegetables despite being below the recommended guidelines. In contrast, men and women between the ages of 1-3, and over 70 consumed the highest

amounts of fruits despite also being below the recommended guidelines. These findings are a confirmation of previous data obtained by the National Health and Nutrition Examination Survey (NHANES) of 2009 which showed only 11% of Americans during 1988-2002 adhered to nutritional guidelines (CDC, 2009). Additional demographic factors should be explored.

Gender. Multiple studies have linked gender to fruit and vegetable consumption. For example, women consumed more fruits and vegetables than their male counterparts, although still falling short of the recommended guidelines on average (USDA, 2016). The USDA's dietary guidelines used age-specific guidelines for gender groups where on average, men had a higher intake recommendation than women. This caused a greater gap in deficiency between intake and recommendation guidelines for men. Wang, Kogashiwa, Mori, Yamashita, Fujii, Ueda, & Masuoka (2016) confer the notion that psychosocial determinants play an instrumental role in fruit and vegetable intake patterns among gender variations. In the study, women were more likely to make dietary choices based on its effect on physical appearance than men (Wang et al., 2016). The social context of reciprocal environmental behaviors leads to the conceptualized theory that more women eat fruits and vegetables because of its effect on weight management and physical appearance rather than its extensive health benefits (Wang et al. 2016). Men were more likely to make decisions based on the nutritional benefits of fruits and vegetables without regard to weight management and physical appearance.

Ethnicity. Ethnicity and culture are strongly associated with fruit and vegetable consumption. Results of the 2011 BRFSS concluded that compared with non-Hispanic

white respondents, non-Hispanic black respondents were least likely to consume each category of fruit and vegetables ≥ 1 time/week except for dark green vegetables, and Hispanics were most likely to consume each category of fruit and vegetables ≥ 1 time/week except for other vegetables (Tichenor & Conrad, 2016). Fruit and Vegetable intake among children is a reliable predictor of familial traits which can be influencing factors on future behaviors. As such, children of households with a higher reported fruit and vegetable intake displayed higher averages of fruit and vegetable intake than their peers (Tichenor & Conrad, 2016). A meta-analysis of 84 articles concluded Hispanic youth had a higher fruit and vegetable intake as compared with African-American and white youth (Di Noia, & Byrd-Bredbenner, 2014). Trends in variation among ethnic groups are expected to change over time due to population acculturation, or the adaption to the American diet. Decreases in variation can have a negative effect on fruit and vegetable consumption among other ethnic groups which currently display higher average intake.

The evolution of the Food Stamp Program has added the eligibility of immigrants in qualifying for benefits. Currently, there is a marginal body of evidence suggesting immigrants on the food stamp program have significant differences in food shopping behaviors than their non-immigrant counterparts. However, the literature suggests ethnic groups least acculturated have significantly higher fruit and vegetable intake than higher acculturated groups (Di Noia, & Byrd-Bredbenner, 2014).

Age. Multiple cross-sectional and longitudinal studies on fruit and vegetable intake among children have identified multiple proximal determinants of intake

behaviors. For example, parental influence has repeatedly been identified as the highest influencing factor determining fruit and vegetable intake among children (Kristjansdottir, De Bourdeaudhuij, Klepp, & Thorsdottir, 2009). In addition, a systematic review of quantitative research of determinants of fruit and vegetable intake among low-income youth has found that fruit and vegetable intake decline with age, suggesting that intake level is correlated with age in all demographic subgroups (Di Noia & Byrd-Bredbenner, 2014). Children display more compliant eating behaviors and adherence to dietary guidelines when eating behaviors are enforced in their home environment. Furthermore, school lunch programs contribute to additional fruit and vegetable intake which begins to decline at the adolescent level when such programs are no longer used (Di Noia & Byrd-Bredbenner, 2014). The most recent USDA Dietary Guidelines confirm that fruits are at the highest intake level at ages 1-8, and decline until the age of 51 before increasing again (USDA, 2016). Vegetables were shown to be at a lower level in childhood, although previous surveys suggest texture, taste, and lack of resources for cooking account for lower levels of vegetables than fruits (Di Noia & Byrd-Bredbenner, 2014). Additional research studies also found a positive association between home eating behaviors during childhood and intake level in adolescence and adulthood (Tichenor & Conrad, 2016).

***Socioeconomic status*.** Fruit and vegetable intake consistently decreases across lower income groups. Determinants of fruit and vegetable intake across low-income groups include limited access to fruit and vegetables at home, lack of financial resources to purchase fruit and vegetables, lack of knowledge about the benefits of fruit and

vegetable consumption, and the high cost, poor quality, and limited variety of fruit and vegetables in low-income neighborhoods (Di Noia & Byrd-Bredbenner, 2014). Several national programs have been implemented to battle the counter effects of poverty on eating behaviors. The USDA has integrated its dietary guidelines into the Supplemental Nutrition Assistance Women, Infants, Children Program to increase fruit and vegetable intake among low-income children who may not otherwise have access to these foods. Michelle Obama's "Let's Move Campaign" was developed to tackle childhood obesity in low-income regions by implementing a nutritional component which promotes a higher intake of fruits and vegetables among children (Eating Healthy, 2017). The influence of education and income is further substantiated by evidence that people with higher education levels are more aware of the health effects associated with fruit and vegetable intake (Landais et al., 2015). People with higher incomes are less affected by the cost of fruit and vegetables or lack of access to them (Landais et al., 2015). To determine the overall impact of poverty on dietary quality and fruit and vegetable intake, demographic variables such as ethnicity, income, education, and geographic location must be accounted for. Public programs such as the Let's Move Campaign and 5-a-day campaign recognize that low-income minority populations are often marginalized to areas where there is less access to healthy food options (Eating Healthy, 2017; Landais et al. 2015).

Supplemental Nutrition Assistance Program Dietary Outcomes

Malnutrition. The Supplemental Nutrition Assistance Program was developed to alleviate the effects of food insecurity such as malnutrition. Malnutrition has been linked to delayed physical, psychosocial, and cognitive development and is now recognized as a

major contributor to the growing problem of overweight and obesity in the child and adolescent population (Stang & Cynthia, 2003). The fallacy that malnutrition is only present among poverty-stricken communities is widely accepted. The American Dietetic Association regards malnutrition as a nutrient imbalance in individuals without regard to race, ethnicity, or income level (Holben, 2010). Dietary guidelines in place by the USDA are intended to aid individuals in maintaining nutritional balance and prevent the onset of obesity-related chronic diseases. Via (2012) suggests that obesity and malnourishment are not mutually exclusive, and that Americans are overfed and undernourished, which contradicts the belief that malnourishment is linearly related to low BMI. The western culture can be perceived as a defiant culture where even high BMI groups can be deficient of key micronutrients such as Vitamins A, B, C, D and other minerals which prevent the onset of disease (Via, 2012). USDA nutrition assistance programs target low-income groups who may be disproportionately affected by malnutrition, however, based on the current body of knowledge, additional research and policy changes are needed to address the growing effects of malnutrition among food stamp recipients who are provided access to fruits and vegetables.

Obesity-related outcomes. Research on the effects of the Food Stamp Program on obesity-related outcomes has found evidence which challenges the paradox that food insecurity is negatively associated with obesity (Baum, 2011). Between 1971 and 1974, the Food Stamp Program served between 9.3 and 12.8 million participants annually, and the prevalence of obesity in the United States was 14.5%. In 2005, the Food Stamp Program served an estimated 25.7 million participants, and the prevalence of obesity is

currently over 30% (Baum, 2011). Despite the Food Stamp Program's goal to alleviate food insecurity, it is regarded as an entitlement program for all income-eligible individuals and many critics blame obesity-related outcomes on the program's unwillingness to implement food purchasing restrictions. Hastings & Washington (2010) also identify higher binge-eating cycles in food stamp recipients than non-participants. SNAP recipients were found to consume higher levels of sugar and fat during the first week of the month when their benefits were available (Hastings & Washington 2010). The dynamic relationship between obesity and the Food Stamp Program is highlighted by recent findings based on the 2007 California Health Interview Survey (CHIS). This state-wide survey consisting of a 5,295,856-population sample found that the prevalence of obesity was 30% higher in SNAP participants (95% *CI* 6-59; p=0.01) than in non-participants (Leung & Villamor, 2011). Specific obesity-related outcomes were not measured in this cross-sectional study; however, children and adults were grouped separately while producing similar results. The adverse effects of the Food Stamp Program on health and nutrition present a need for further research on health and policy interventions within the SNAP program which can improve health status.

Barriers to Nutritional Adherence and Fruit and Vegetable Consumption

Food insecurity. Multiple studies have found a causal relationship between food insecurity and inadequate dietary intake, obesity, and other chronic disease (Gunderson & Ziliac, 2015; Ramsey, Giskes, Turrell, & Gallegos, 2012). Confounding for demographic variables, those who resided in disadvantaged urban areas with less access to fruits and vegetables displayed higher rates of adverse health effects (Ramsey et al. 2012). A 2011

survey of 522 individuals with stakeholder interest in the SNAP program found the top three barriers to improving dietary quality identified were: (a) unhealthy foods marketed in low-income communities; (b) the high cost of healthy foods; and (c) lifestyle challenges faced by low-income individuals (Blumenthal et al., 2014). However, most respondents (70 %) also disagreed that current SNAP benefit levels were adequate to maintain a healthy diet despite being adequate for preventing food insecurity (Blumenthal et al. 2014). Simply, the surveyed group agreed that sugary beverages should be eliminated from eligible food items for purchase while also recommending fruit and vegetable incentives to be provided to SNAP recipients to support the increase of fruit and vegetable intake (Blumenthal et al. 2014). Thus, the self-reported survey data reveals a possibility that obtaining food security may not be enough to alleviate the effects of poverty or achieve a quality diet. Additional interventions must be explored.

Supplemental Nutrition Assistance Program Interventions

Educational interventions. The SNAP program has developed several educational interventions to address USDA dietary guidelines among children and adults. The SNAP nutrition education and obesity prevention program grant will award grants to States for provision of nutrition education and obesity prevention programs (Lanham, 2016). The purpose of these interventions is to promote physical activity and healthy food choices in accordance with the USDA's Dietary Guidelines for Americans. Those who question the grant program's effectiveness argue that educational interventions must be coupled with policy interventions that restructure purchasing guidelines to align with nutritional guidelines. The USDA has also recognized the need for parental involvement

in educational interventions. Current educational interventions in school-aged children have been widely criticized for their failure to promote efficacy. The short-term effect of these educational interventions can be largely attributed to the lack of parental support in maintaining dietary changes such as an increase in fruits and vegetables (Branscum & Sharma, 2012). Michelle Obama's Let's Move program introduces nutritional education in low-income districts while also promoting parental involvement for the maintenance of healthy behaviors.

Policy interventions. The Supplemental Nutrition Assistance Program has proposed a number of policy interventions aimed to reduce the effects of the obesity epidemic common among SNAP participants. As of 2011, 46.5 million people, or one out of seven Americans, participated in the SNAP program (Long, Leung, Cheung, Blumenthal & Willet, 2014). The State of New York proposed to eliminate sugar-sweetened beverages from its SNAP benefits, however, the USDA rejected its proposal on the basis that it stigmatized SNAP participants (Long et al., 2014). The quest to improve population health and reduce expenditures associated with obesity has been a challenge considering the budgetary limitations and constraints of the SNAP Program. Other interventions such as budgetary cuts to the SNAP program have not received favorable public support. In 2012, a survey conducted by the Food Research and Action Center resulted in over 77% of respondents disagreeing with any proposed cuts to the SNAP program. One other proposed intervention has received favorable support. The Food Conservation and Energy Act of 2008 (Farm Bill) awarded $20 million in federal funding to research incentives on fruit and vegetable purchases for SNAP recipients. The

launch of the Healthy Incentives Pilot Program in 2011 was implemented to study the effects of this policy change on fruit and vegetable among SNAP recipients.

Healthy Incentive Pilot Program

The 2011 Healthy Incentives Program was launched in accordance with the Food, Conservation, and Energy Act of 2008 to determine if financial incentives available at point of sale to SNAP recipients would increase the purchase and consumption of fruits and vegetables (Bartlett et al., 2014). A 30% increase in purchasing power (30 cents for every dollar spent on fruits and vegetables) was expected to yield a 20% increase in fruit and vegetable intake (Bartlett et al., 2014). These incentives would be available to participants on their EBT card on a monthly basis for the duration of one year. A total of 55,095 households were observed in Hampden County, Massachusetts where there is an obesity epidemic and a diverse population mix of urban, suburban, and rural geographic areas. The HIP program used a rigorous and meticulous study design to account for confounding variables that may influence study outcomes. According to Bartlett et al., (2014), its key objectives are:

1. Assess the causal impact of HIP on fruit and vegetable consumption by SNAP participants and other key measures of dietary intake.
2. Identify and assess factors that influence the impact of HIP.
3. Describe the process involved in implementing and influencing HIP.
4. Assess HIP's impact on the grantee (State SNAP agency), local SNAP agency, and their partners (including retailers, State EBT processor, and community organizations.

5. Quantify, to the extent possible, the Federal, State, and local administrative and benefit costs of the pilot.

Policies to encourage an increase in fruit and vegetable intake can restructure the public health agenda by changing the ways food is labeled and marketed, providing nutrition education programs, and changing the influential nature of federal food assistance programs. Andreyeva & Luedicke (2015) studied the effect of incentivizing Women, Infant, Children program participants with cash vouchers to purchase more fruits and vegetables. The study found that purchases of fresh and frozen vegetables increased in volume by 17.5% and 27.8%, respectively (Andreyeva & Luedicke, 2015). The HIP program uses a similar model while reducing the stigma associated with paper vouchers. The literature suggests incentivizing SNAP participants to purchase more fruits and vegetables would produce similar results as those found among WIC participants who completed the study (Andreyeva & Luedicke, 2015).

Past Theories and Interventions

In 2009, the US Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) began to provide participants with cash-value vouchers to purchase fruits and vegetables (Andreyeva & Luedicke, 2015) to test the effects of incentivizing program participants. Currently, the Dietary Guidelines for Americans recommend that adults consume two servings of fruit and three servings of vegetables per day (DHHS, 2015; USDA, 2015). Unfortunately, on average, only 32.5 % of adults meet this benchmark for fruits and 26.3 % for vegetables (Andreyeva & Luedicke, 2015). Currently, almost half of U.S children are in the Supplemental Nutrition Assistance Program's Women, Infant, and

Children program presenting an opportunity to provide early interventions for children which will reduce the long-term effects of poor dietary quality associated with low-income status. The study found an overall increase of $3.12 spent on fruits per household, indicating that incentivizing participants with additional WIC benefits for fruits and vegetables would increase purchases normally made with non-WIC benefits (Andreyeva & Luedicke, 2015).

Alternative studies coincide with a legislative proposal to restrict the use of SNAP benefits to purchase sugary beverages (Barnhill, 2011; Basu et al. 2014). These studies test the overall population health implications resulting from policy-level changes to the SNAP program. Barnhill (2011) states that SNAP recipients consume roughly two times the number of calories from sugary beverages than from fruits and vegetables. Furthermore, the study implies that a ban on sugar-sweetened beverage purchases would be expected to reduce kilocalorie intake from these beverages by a net average of 24.2 kcal per person per day among SNAP participants (95% CI: 22.8, 25.5)—a 15.4 percent decline in calorie consumption from sugar-sweetened beverages, (Basu et al. 2014).

As with any new policy intervention placing restrictions within a program, there are ethical considerations on the potential consequences of banning the purchase of sugary beverages. Stigmatizing recipients can reduce low-income program participation by eligible families and individuals. Alternatively, implementing an incentive-based program could increase food purchasing power of nutrient-dense foods such as fruits and vegetables.

Definitions

Dietary guidelines: Defined by the USDA and DHHS' Dietary Guidelines for Americans (2015-2020) and the MyPlate index (USDA, 2016; DHHS, 2015). Based on a 2,000-calorie diet, the latest guidelines suggest one should eat 3 cups of vegetables and 2 cups of fruit (USDA, 2016; DHHS, 2015) while MyPlate encourages filling half one's plate with fruits and vegetables. The study focuses on nutrient-dense foods within the guidelines that provide substantial amounts of vitamins and minerals and relatively few calories (Nicklas, Drewnowski, & O'Neil, 2014).

Dietary quality: Defined by the meeting of dietary guidelines which enhance personal well-being (Nguyen et al. 2015; USDA FNS, 2016) For the purpose of this study, dietary choices which lead to the consumption of a high-quality or low-quality diet will be analyzed. A high-quality diet is one that meets dietary guidelines for fruits, vegetables, whole grains, dairy, protein foods, seafood and plant proteins and fatty acids. However, this study will only focus on two categories for this index- fruits, and vegetables (Nguyen et al. 2015).

Food insecurity: A household-level economic and social condition of limited or uncertain access to adequate food. Food insecurity is the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (ADA, 2016; Elliott, Khmelko, & Beeland, 2015; Gunderson & Ziliak, 2015; USDA, 2016).

Food Stamp Program: Established in 1939 as a way to generate more income for farmers while distributing food to the needy by providing excess farm commodities during the Great Depression (Landers, 2007).

Fruit and vegetable consumption: The measurement of fruits and vegetables where one cup is equivalent to two servings, of whole fruits and vegetables. This definition excludes fried potatoes and fruit juice and is consistent with serving recommendations based on the 2015-2020 Dietary Guidelines for Americans (DHHS, 2015; USDA, 2015).

Malnutrition: Malnutrition refers to deficiencies or imbalances in a person's intake of energy and/or nutrients. The study refers to malnutrition in terms of micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals) and differentiates from hunger where individual feels discomfort due to lack of food intake (ADA, 2016; USDA, 2016; WHO, 2016).

Supplemental Nutrition Assistance Program: Formerly known as the Food Stamp program, the government entitlement program allows anyone who meets eligibility guidelines based entirely on financial need to receive benefits (Landers, 2007; USDA FNS, 2016). In efforts to fight stigma, the legislative law changed the name of the federal program to the Supplemental Nutrition Assistance Program or SNAP as of Oct. 1, 2008. Benefits are determined and awarded by the USDA's FNS department.

Assumptions

The original study made several assumptions which guided the validity and reliability of the data. The HIP Pilot study operated on the assumption that attrition was

not HIP study related but due to changes in SNAP eligibility. Therefore, this could be controlled for with sampling weights. The study also assumes a per-adult amount of fruits and vegetables based on a total household purchase of fruits and vegetables. Also, the study utilizes mediation analysis which requires a set of implicit assumptions to infer causality. Finally, the study assumes that participants will provide honest, clear, and concise information on attitudes and beliefs about fruit and vegetable intake as well as accurate memory recollection.

Limitations

A limitation of the study is consistent with pre-established attitudes and beliefs about fruits and vegetables which may affect the consumption of fruits and vegetables in the absence of HIP. For example, pre-determined taste perceptions may influence fruit and vegetable intake even in the presence or absence of HIP, therefore skewing outcome data which may not be influenced by the HIP program. Also, the study suggests a causal interpretation would require that any omitted variables (such as the limited covariates) have no (or at least only a small) direct impact on the outcome. This condition may not be met as perceptions of taste may have a greater impact on consumption than the incentive. The use of secondary data poses limitations related to the use of self-reported data. Memory recollection about fruit and vegetable intake can lead to the underrepresentation or overrepresentation of fruit and vegetable intake which can impact the HIP program's reported effect.

Other limitations of the study pertain to the temporary incentive that was provided for the purpose of the pilot study. A universal and permanent incentive established by

legislative changes could potentially generate a higher participation response from retailers willing to participate in the program. This would expand the program's reach to SNAP participants potentially yielding higher rates of response and participation.

Scope and Delimitations

The Healthy Incentives Pilot Program's scope is confined to the study of the program's effect on fruit and vegetable intake among SNAP participants. A recent study on various chronic diseases and fruit and vegetable consumption concluded that the risk of hypertension, heart disease, diabetes, and obesity is significantly reduced with regular consumption of fruits and vegetables. Therefore, the promotion of vegetable and fruit consumption by nutrition and health policies is a preferable strategy to decrease the burden of several chronic diseases (Boeing et al. 2012). The incentive is designed to be the initial motivator for participants to purchase additional fruits and vegetables. Based on previous studies suggesting that an increase in fruit and vegetable intake would improve health status, health status variables were not analyzed in the study. Demographic variables, EBT transaction data, self-reported intake data, and personal beliefs and preferences on fruit and vegetable intake were subjected to a quantitative analysis expected to generate results consistent with the program's effect. Any positive effect can be generalized to the improvement of health without accounting for individual health status variables. Secondly, the study is delimited to a specific target population. SNAP recipients in Hampden County were selected as a representation of a national diverse population with a low-income status. The HIP pilot study was conducted among

current SNAP caseloads between 2011 and 2012. Previous caseloads were not included due to the program's need to follow up with participants post-study.

Significance, Summary, and Conclusions

In summary, the HIP study utilized the 2015-2020 Dietary Guidelines for Americans to establish a baseline of fruit and vegetable consumption among study participants. SNAP participants are disproportionately affected by poverty, limiting the amount of quality food they can purchase to meet nutritional guideline standards. The World Health Organization (WHO) estimates that over 2.7 million lives can be saved each year with regular consumption of fruits and vegetables (WHO, 2013). This translates to greater cost-savings by reducing health expenditures related to chronic disease. The literature review provided evidence that SNAP recipients have multiple constraints against the ability to meet guidelines such as economic factors, personal beliefs, and attitudes. This quantitative study also analyzes the effect of confounding variables such as personal taste preferences and pre-existing beliefs not associated with the HIP study intervention. The studied effect of these variables is a necessary component to determine a causal relationship between the intervention and fruit and vegetable intake. Furthermore, a deeper understanding of how an increase in fruit and vegetable purchasing power leads to a change in food shopping patterns and fruit and vegetable consumption is beneficial to determine whether a modification to the SNAP program would be beneficial to the greater population under similar circumstances. The driving force behind the implementation of the HIP program relates to investigating the impact of making fruits and vegetables more affordable for SNAP participants and whether this will lead to a

change in attitudes and behaviors associated with fruit and vegetable consumption (Bartlett et al., 2014). In Section 3 I give a comprehensive description of the research questions, research design, and methodology.

Section 2: Research Design and Data Collection

Introduction

The purpose of this doctoral study was to determine whether incentivizing SNAP recipients to purchase additional fruits and vegetables is beneficial in increasing purchase and consumption. Section 2 includes a thorough review of empirical studies relating to the study of fruit and vegetable consumption among SNAP participants and the effects of multiple interventions such as monetary incentives and the purchasing ban on sugary beverages. However, there remains a gap in the literature that fails to address reasons why the establishment of food security among low-income SNAP recipients fails to improve health outcomes. In fact, there appears to be a negative association between the establishment of food security and health outcomes among this vulnerable population. Due to a lack of studies available to address this gap, the following HIP quantitative study was conducted on SNAP recipients to address this understudied topic while utilizing the social cognitive theory to further understand the effect that personal attitudes and perceptions about fruits and vegetables will have on the intervention. This study was a secondary data analysis involving descriptive bivariate and multivariate analyses to determine any statistical significance and improvement in outcomes. In this section I discuss the research design and rationale, sampling strategy, data collection, and data analysis plan.

Research Design and Rationale

The HIP study utilized a randomized controlled design between two groups, incentivized and nonincentivized SNAP participants, in order to observe the effect of the

HIP study on fruit and vegetable consumption. A randomized controlled design was most suitable for this study in its greater ability to provide causal estimates for both study and control groups. In addition, the randomized design yields the highest level of internal validity accounting for survey nonresponse (Bartlett et al., 2014). According to Creswell, a randomized design is a true experimental design that limits systematic bias most common among convenience samples. By limiting systematic differences in characteristics among participants, the study outcomes can be greater attributed to the treatment itself (Creswell, 2009).

This quantitative study is derived from the fundamental constructivism paradigm of the social cognitive theory, which implies that learning and behavior change is subjective to personal experiences determined by the reciprocation of environmental and personal constructs (Piaget, 1950). Previous quantitative studies have shown favorable results pointing to the notion that children who are fed fruits and vegetables by their parents or are surrounded by influential people in the household who favor a higher quality diet, will, in fact, have a higher quality diet (Melbye, Overby, & Ogaard, 2012). Thus, to fully understand the factors influencing eating behaviors, it is necessary to study the behavioral component and its role in food choices.

In cooperation with the state of Massachusetts, the USDA-backed HIP study obtained access to 55,095 SNAP households in Hampden County, Massachusetts. Using a randomized controlled design, the study assigned 7,500 households to the HIP intervention, and the other 47,595 to the control group (not receiving the HIP incentives). A random subsample of approximately 5,000 households, equally divided between the

HIP and non-HIP groups, was selected to participate in survey data collection. Round 1 was conducted before HIP implementation. Rounds 2 and 3 were conducted during HIP; one targeted 4 to 6 months after implementation, and the other targeted 9 to11 months after implementation. Both Round 2 and Round 3 surveys collected information on dietary intake using 24-hour dietary recall interviews. Also, two rounds of focus groups were also conducted with HIP participants, corresponding to the Round 2 and Round 3 surveys (Bartlett et al., 2014).

Despite previous studies that suggested respondents who are aware of the U.S. fruit and vegetable promotion campaign ("5 a day") are more likely to consume the recommended number of servings (Erinosho, Moser, Oh, Nebeling, & Yaroch, 2012), the HIP study recognized the social cognitive theory, implying that a person's actions are more greatly influenced in the context of reciprocating social interactions and experiences rather than learned knowledge. This assumption is further substantiated by survey data on participants' attitudes toward fruits and vegetables and on the family food environment. Thus, it was essential to obtain this information at different points during the study to identify any changes to perceptions as a result of the study or a lack of change in behaviors because of no change in perceptions. The survey data collected information on:

- exposure to nutrition education and promotion,
- food preferences and beliefs,
- perceived barriers to the consumption of fruits and vegetables,
- barriers to grocery shopping, and

- family food environment.

Although it is expected that the main driving force influencing change in fruit and vegetable intake will be the HIP incentive, there is substantial literature supporting the effects of attitudes, beliefs, and the family food environment on eating behaviors (Bartlett et al., 2014). The framework for this study recognizes this and mitigates the results based on this survey data. Also, this study is advantageous with its ability to acquire EBT transaction data of participant food shopping patterns, which could be compared to survey data on preferences and consumption. The evaluation of spending measures is a critical component of the HIP study from which to draw any inferences between intervention and fruit and vegetable consumption.

Methodology

Population

This study focused solely on SNAP recipient households that are generalized to represent a national SNAP population. The HIP study was conducted on a total of 55,095 SNAP participant households in Hampden County, Massachusetts, representing a mix of urban, rural, and suburban areas. This study population was selected due to Hampden County having the lowest median household income in the State of Massachusetts and having the highest rates of obesity and related chronic illness in the state (Bartlett et al. 2014). Thus, these findings have a greater ability to generalize results to a nationwide population of SNAP recipients.

Sampling and Data Collection

The Healthy Incentives pilot sampled a total of 55,095 SNAP households in Hampden County receiving benefits between July 2011-December 2012 (Bartlett et al., 2014). Of this case load, the study randomly assigned 7,500 households to the HIP intervention (encompassing a total of 9,286 adults), and 47,595 households to the control group (59,652 adults). Furthermore, individual survey data was collected in 3 rounds. Round 1 was conducted between August and December, 2011, and included a stratified random sample of 2,538 adults from which 1,388 interviews were completed on the intervention group. The same survey data was administered to 2,538 participants in the control group from which 1,396 interviews were completed. Round 2 was conducted between March and July, 2012, and used a 24-hour recall interview on a sample of 1,388 adults, completing a total of 1,004 interviews on the intervention group. The same survey was administered to a sample of 1,396 adults in the control group, ultimately completing a total of 994 interviews. Finally, Round 3 administered the same 24-hour recall interview on 1,004 adults in the intervention group and obtained 769 completed interviews. The same survey was given to 994 adults in the control group, which yielded 751 complete interviews. In addition, focus groups were conducted in Rounds 2 and 3. These focus groups included a convenience sample of 30 adults from both groups (3 groups of 10 adults).

For determination of the sample size, this study utilized a randomized complete block design creating 12 household-level blocking cells defined by cross-classifying three variables (Bartlett et al., 2014):

- geography (3 levels): Springfield; Chicopee/Holyoke; and remainder of Hampden County;
- household size (2 levels): 1-person and 2-or-more-persons; and
- gender for head of household (2 levels): male-headed and female-headed.

Calculations conducted by preliminary study researchers (Bartlett et al., 2014) yielded the total number of households to select for HIP across all cells to be 7,500 (Bartlett et al., 2014).

In addition, the study utilized a confidence level of $\alpha = 0.10$ based on recent work by Andreyeva, Long, & Brownell (2015) reviewing the effect of pricing on fruit and vegetable purchasing and consumption. Thus, enough statistical power is present to detect a difference of .25 cup in fruit and vegetable measurements.

Inclusion/Exclusion Criteria

Participation in the HIP study had very few factors determining eligibility other than current participation in the SNAP program, residing in Hampden County, households having an adult head of household, and benefits not signed over to treatment facilities. In essence, this study focused more aggressively on inclusion criteria for surveyed data being included in the data set. Thus, an interview did not meet inclusion criteria if:

1. interview was broken off prior to completing the survey (incomplete surveys were not included in the dataset),
2. intake was judged as “unreliable,” and
3. meals were missing foods (to mitigate the effects of nonrecollection).

Pilot Study

The results of this pilot study served to provide unfounded and compelling evidence that providing additional incentives to SNAP recipients for the purchase of fruits and vegetables would increase the average household intake of fruits and vegetables. This information will guide the main study conducted on Southern California residents enrolled in the state's SNAP program (CalFresh). The *¡Mas Fresco! More Fresh* main study launched in 2017 in partnership with six Northgate Gonzalez Market locations across Southern California low-income Latino neighborhoods where food insecurity is high. Results from the Massachusetts pilot study in conjunction with the main study will be the basis of any policy changes and SNAP program modifications on a national level.

Archival Data

This doctoral study entailed a secondary analysis of HIP study data collected between 2011-2012 in Hampden County, Massachusetts. Funded by the USDA, the study's data is publically available at www.data.gov without the need to request any special permission.

Instrumentation and Operationalization of Constructs

The study of key variables was fundamental in identifying any causal relationship between the intervention and dietary outcomes among the study group. The study explored the following variables:

Table 1

Operationalization of Variables by Survey Question, Coding, and Variable Type

Variables	Survey questions	Data code	Variable type
Gender	Gender	0=male 1=female	Categorical covariate
Race/ethnicity	Race/ethnicity	1= Hispanic 2= White 3= Black 4= Other	Categorical covariate
Age	Age	1= 16-30 2= 31-40 3= 41-54 4= 55+	Categorical covariate
Fruit availability	How often do you have fruits available at home? This includes fresh, dried, canned, and frozen.	-8: Don't Know 1: Always 2: Most of the time 3: Sometimes 4: Rarely 5: Never	Categorical predictor variable
Vegetable availability	How often do you have vegetables available at home? This includes fresh, dried, canned, and frozen.	1: Always 2: Most of the time 3: Sometimes 4: Rarely 5: Never 6: Don't have a refrigerator	Categorical predictor variable
Salty snack availability	How often does (you or your family) have salty snacks such as chips or crackers available at home? Do not include nuts	-8: Don't know 1: Always 2: Most of the time 3: Sometimes 4: Rarely 5: Never	Categorical predictor variable

(table continues)

Variables	Survey questions	Data code	Variable type
Sugary drink availability	How often does (you or your family) have soft drinks, fruit flavored drinks, or fruit punch available at home? Please do not include diet drinks, 100 percent juice or sports drinks.	-8: Don't know 1: Always 2: Most of the time 3: Sometimes 4: Rarely 5: Never	Categorical predictor variable
EBT expenses	What has been your household's usual monthly expense for grocery shopping purchases made only with SNAP?	-9: Not ascertained -8: Don't know -7: Refused -5: Did not receive SNAP Amount of purchase:	Continuous predictor
Fruit consumption	During the past month, how many times per day, week, or month did you eat fruit? Include dried, frozen, or canned fruit. Do not include juices or dried fruit. (number & unit by day or week	-8: Don't know -7: Refused 1: Day 2: Week 3: Month	Categorical dependent

(table continues)

Variables	Survey questions	Data code	Variable type
Leafy vegetable consumption	Each time you ate green leafy or lettuce salad, how much did you usually eat?	-8: Don't know 1: About 1/2 cup 2: About 1 cup 3: About 2 cups 4: More than 2 cups	Categorical dependent
Vegetable consumption	During the past month not including lettuce salads, potatoes, and cooked dried beans, how many times per day, week, or month did you eat other vegetables?	-8: Don't know -7: Refused 1: Day 2: Week 3: Month	Categorical dependent
Vegetable consumption	Each of these times that you ate other vegetables, how much did you usually eat?	-8: Don't know 1: About 1/2 cup 2: About 1 cup 3: About 2 cups 4: More than 2 cups	Categorical dependent
Attitudes/beliefs	I enjoy trying new fruits	-8: Don't know -7: Refused 1: Strongly disagree 2: Disagree 3: Neither disagree nor agree 4: Agree 5: Strongly agree 6: Does not apply	Categorical predictor

(table continues)

Variables	Survey questions	Data code	Variable type
Attitudes/beliefs	I eat enough vegetables to keep me healthy	-8: Don't know -7: Refused 1: Strongly disagree 2: Disagree 3: Neither disagree nor agree 4: Agree 5: Strongly agree 6: Does not apply	Categorical predictor
Attitudes/beliefs	It's hard for me to eat more vegetables because they are hard to find where I shop for food	-8: Don't know -7: Refused 1: Strongly disagree 2: Disagree 3: Neither disagree nor agree 4: Agree 5: Strongly agree 6: Does not apply	Categorical predictor
Attitudes/beliefs	It's hard for me to eat more fruits because they are hard to find where I shop for food	-8: Don't know -7: Refused 1: Strongly disagree 2: Disagree 3: Neither disagree nor agree 4: Agree 5: Strongly agree 6: Does not apply	Categorical predictor
Attitudes/beliefs	I don't eat fruits and vegetables as much as I like to because they cost too much	-8: Don't know -7: Refused 1: Strongly disagree 2: Disagree 3: Neither disagree nor agree 4: Agree 5: Strongly agree 6: Does not apply	Categorical predictor

(table continues)

Variables	Survey questions	Data code	Variable type
Attitudes/beliefs	I don't eat fruits and vegetables as much as I like to because I don't like them	-8: Don't know -7: Refused 1: Strongly disagree 2: Disagree 3: Neither disagree nor agree 4: Agree 5: Strongly agree 6: Does not apply	Categorical predictor (confounding)

Data Analysis Plan

The HIP study used a randomized controlled trial which is considered the "gold standard" of causal effect (Bartlett et al., 2014). Participant data obtained for secondary analysis was de-identified prior to publication to prevent any unethical concerns resulting from violation of privacy. *SPSS* statistical software was used to run all statistical testing. The following section details the statistical analyses that were used to answer each research questions.

The secondary analysis of the research study aimed to address the following research questions:

RQ1: Do incentivized SNAP recipients purchase and consume more fruits and vegetables than nonincentivized recipients after controlling for demographic variables such as age, gender, ethnicity, and household composition?

$H_0$1: Incentivized SNAP recipients do not purchase more fruits and vegetables than nonincentivized recipients.

H_a1: Incentivized SNAP recipients purchase more fruits and vegetables than nonincentivized recipients.

In order to mitigate for incomplete answers on the scale, responses such as "don't know" or "refused" were case deleted from all survey questions. First, an independent samples t-test was conducted as a comparison of mean outcomes for respondents in the HIP and non-HIP groups after accounting for the intervention. Second, a paired t-test was conducted to show the level of change resulting from the intervention.

RQ2: Does the increase in fruit and vegetable intake contribute to a change in attitudes and beliefs about fruits and vegetables?

$H_0 2$: The increase in fruit and vegetable intake does not have an effect on attitudes and beliefs.

$H_a 2$: The increase in fruit and vegetable intake contributes to a change in attitudes and beliefs about fruits and vegetables.

Self-reported data on attitudes and beliefs about fruits and vegetables was measured on a Likert scale. To determine the strength of a relationship between the intervention and attitudes and beliefs, a Pearson correlation was utilized to determine a correlation coefficient.

RQ3: Were there changes in SNAP recipient food shopping patterns (reduction in sugary drink purchase or increase in fruit and vegetable purchase) as a result of the HIP study?

$H_0 3o$: The USDA's HIP study had no effect on food shopping patterns among incentivized recipients.

H_a3: The USDA's HIP study had an effect on food shopping patterns among incentivized recipients.

Since this research question addresses multiple variables, a repeated measures multiple regression analysis was necessary in order to determine how the intervention affects multiple point-of-sale purchases such as sugary beverages and fruits and vegetables. Descriptive bivariate and multivariate analyses were run to determine any statistical significance and improvement in outcomes. Standard errors and test statistics were adjusted for clustering at the individual respondent level.

Characteristics accounted for (i.e., covariates included in all the regressions) were:

- stratification/blocking variables used in the sampling, which includes indicators household size and composition;
- demographic characteristics of respondents, including gender, age, and race/ethnicity;
- baseline fruit and vegetable consumption derived from questions on frequency and quantity of specific types of fruits and vegetables consumed in the week prior to the survey (baseline survey); and
- baseline composite scales derived from questions about the home food environment, barriers to grocery shopping, and attitudes about and barriers to consumption of fruits and vegetables (Bartlett et al., 2014).

Threats to Validity

There are multiple considerations for the generalizing of results to a greater population. The HIP study applies sufficient statistical power to measure significant differences between study and control groups and the random assignment provides the greatest amount of internal validity in any study. However, careful consideration is needed when extrapolating the results to a broader group. The HIP study data has less external validity making it difficult to assure that the impact of the intervention would be the same for on a national level. External validity threats arise when experimenters draw incorrect inferences from the sample data to other persons, settings, or situations (Creswell, 2014). To account for these threats to validity, the study used multiple measures to reduce the possible effects. Such measures include post-study interviews and the study's multiple-round design. Surveys were conducted in 3 rounds to recognize the impact of pre-established perceptions about fruits and vegetables to eating behaviors. Without these mitigating efforts, it would be difficult to differentiate whether the HIP incentive is affecting fruit and vegetable intake, or whether it is solely due to food and taste preferences. Also, careful measures were taken to ensure that all interviewed data were completed and participants provided detailed information on a 24-hour recall basis. Finally, it is important to note that this pilot study is scheduled to be followed by a formal study in a different setting, diminishing the possibility that two separate studies would cumulatively produce external validity threats across a greater population.

Ethical Procedures

The implications of utilizing ethical paradigms when constructing valid research designs are a fundamental part in improving health interventions. The HIP study had

some major advantages in obtaining archival data to be used in the study. The research study conducted by the USDA as a pilot program used participants currently enrolled into their national SNAP program. The measures used to recruit participants and collect data was convenient and efficient while also providing a higher level of security in ensuring that all data was handled appropriately within its own federal program reserves. Initial data was collected only after participants completed consent forms while also having the ability to exit the study at any time and have their data removed from the study. Final data was de-identified to protect participant confidentiality. Approval was sought from Walden's Institutional Review Board (approval # 03-16-18-0625855) before initiating data analysis for this dissertation study.

Summary

In summary, this quantitative study was conducted using the constructivism paradigm and social cognitive theory as a theoretical foundation. Section 3 has detailed the sample population and data collection methods, and a comprehensive data analysis plan that will guide the study's research methodology. All caseloads were retrieved from the USDA's HIP study after being de-identified and will be the source of statistical analyses conducted using SPSS software to study address the research questions and hypothesis. Results will be described in Section 3 and future recommendations and implications for social change will be discussed in Section 4.

Section 3: Presentation of Results and Findings

Introduction

The purpose of this doctoral study was to determine whether incentivizing SNAP recipients to purchase additional fruits and vegetables was beneficial in increasing purchase and consumption. In this section, I discuss how the following research questions and hypotheses were tested by various statistical methods to identify any significance in outcomes resulting from the intervention:

RQ3: Do incentivized SNAP recipients purchase and consume more fruits and vegetables than non-incentivized recipients, after controlling for demographic variables such as age, gender, ethnicity, and household composition?

$H_0$1: Incentivized SNAP recipients do not purchase more fruits and vegetables than non-incentivized recipients.

H_a1: Incentivized SNAP recipients purchase more fruits and vegetables than non-incentivized recipients.

RQ2: Does the increase in fruit and vegetable intake contribute to changes in attitudes and beliefs about fruits and vegetables?

$H_0$2: The increase in fruit and vegetable intake does not have an effect on attitudes and beliefs.

H_a2: The increase in fruit and vegetable intake contributes to a change on attitudes and beliefs about fruits and vegetables.

RQ3: Were there changes in SNAP recipient food shopping patterns (reduction in sugary drink purchase or increase in fruit and vegetable purchase) as a result of the HIP study?

$H_0$3o: The USDA's HIP study had no effect on food shopping patterns among incentivized recipients.

H_a3: The USDA's HIP study had an effect on food shopping patterns among incentivized recipients.

In Section 3 I detail the data collection process and time frame for the secondary data utilized in this study. I also examine the secondary data and its ability to successfully represent a larger sample for a broader generalization. In addition, I provide a comprehensive review and summary of all findings as they relate to the research questions and hypotheses of this study as well as specific descriptive statistics of significance in validating or disproving the hypotheses.

Data Collection of Secondary Data Set

A random subsample of approximately 5,000 households, equally divided between the HIP and non-HIP groups, was selected to participate in survey data collection. Respondents for the study were identified as Food Stamp recipients in Hampden County actively receiving benefits between July, 2011, and December, 2012. Round 1 was conducted before HIP implementation and included a letter sent from the HIP study simply notifying recipients that the study was being conducted to assess how the SNAP program was working for families in Hampden County. Rounds 2 and 3 were conducted during HIP; one targeted 4 to 6 months after implementation, and the other targeted 9 to11 months after implementation. Because the follow-up interviews were based on a 24-hour recall, it was expected that later rounds would provide more favorable results as participants would be more familiar with the program and intervention. Highly trained phone personnel conducted all dietary intake and follow-up interviews.

Additionally, EBT transaction data and benefit amount information was obtained in partnership with the Massachusetts Department of Transitional Assistance. The response rate was notably lower in the initial round of data collection but higher in the follow-up rounds. The response rates for the preimplementation participant survey were 63% of HIP-eligible sampled households and 64% of non-HIP-eligible sampled households. In Rounds 2 and 3, the follow-on response rates were between 80% and 84% (Bartlett et al. 2014).

Table 2 illustrates the baseline demographics of the sampled subgroup. Accounting for demographic covariates such as gender, age, and ethnicity, the baseline data provides a deep understanding of a diverse sampled population that can be generalized to a greater population. Respondents whose primary language was a language other than English or Spanish had a household member translate during intake and recall interviews. Coupled with a random assignment design, the study produced a high degree of internal validity to accurately reflect HIP intervention impacts among the study group.

Table 2

Respondent Demographics

		Total	Treatment frequency (%)	Control frequency (%)
Age group	16-30	585	278 (47.5%)	307 (52.5%)
	31-40	373	182 (48.8%)	191 (51.2%)
	41-54	505	257 (50.9%)	248 (49.1%)
	55+	491	263 (53.6%)	228 (46.4%)
Gender	Male	618	307 (49.7%)	311 (50.3%)
	Female	1,336	673 (50.4%)	663 (49.6%)
Ethnicity	Hispanic	823	407 (49.5%)	416 (50.5%)
	Non-Hispanic white	727	381 (52.4%)	346 (47.6%)
	Non-Hispanic black	279	134 (48.0%)	145 (52.0%)
	Non-Hispanic other	125	58 (46.4%)	67 (53.6%)

Note. N = 1,954.

Results

Research Question 1

The secondary analysis of the research study aimed to address the following research questions:

RQ1: Do incentivized SNAP recipients purchase and consume more fruits and vegetables than nonincentivized recipients after controlling for demographic variables such as age, gender, ethnicity, and household composition?

$H_0$1: Incentivized SNAP recipients do not purchase more fruits and vegetables than nonincentivized recipients.

H_a1: Incentivized SNAP recipients purchase more fruits and vegetables than nonincentivized recipients.

The HIP Pilot program was based on a 24-hour dietary recall. Two additional follow-up interviews (Rounds 2 and 3) were conducted to identify any potential changes in fruit and vegetable intake as later rounds can predict greater understanding of the program and intervention. It was expected that the impacts of the HIP intervention would increase with every round.

Round 1. I employed an independent samples *t* test to determine if there was a difference in the purchase of fruits and vegetables between incentivized SNAP recipients and nonincentivized recipients. Assuming unequal variances [$F = 20.70$, $p < .01$], there was a significant difference in the purchase of fruits and vegetables between incentivized SNAP recipients ($M = \$9.25$, $SD = \$13.75$) and nonincentivized SNAP recipients ($M = \$8.76$, $SD = \$13.66$), t (16,197.88) = 3.93, $p < .01$. This is shown in Table 3. Therefore, the null hypothesis is rejected. Altogether, this suggests that during Round 1, being incentivized in SNAP affected the purchase of more fruits and vegetables.

Table 3

Group Statistics (Round 1)

	hip_status	*N*	Mean	Std. deviation	S.E. mean
purchase of FTV	hip	13,464	9.25	13.75	.12
	nonhip	136,317	8.76	13.66	.04

Note. $N = 149{,}781$.

Round 2. An independent samples *t* test was employed to determine if there was a difference in the purchase of fruits and vegetables between incentivized SNAP recipients and nonincentivized recipients. Assuming unequal variances [$F = 241$, $p < .01$], there was a significant difference in the purchase of fruits and vegetables between incentivized SNAP recipients ($M = \$11.72$, $SD = \$16.46$) and non-incentivized SNAP recipients ($M = \$10.65$, $SD = \$15.30$), $t\ (49{,}418.97) = 11.94$, $p < .01$. This is shown in Table 4. Therefore, the null hypothesis is rejected. Altogether, this suggests that during Round 2, being incentivized in SNAP affected the purchase of more fruits and vegetables.

Table 4

Group Statistics (Round 2)

	hip_status	N	Mean	Std. deviation	S.E. mean
purchase of FTV	hip	38,475	11.72	16.46	.08
	nonhip	246,253	10.65	15.30	.03

$N = 284{,}728$.

Round 3. I employed an independent samples *t* test to determine if there was a difference in the purchase of fruits and vegetables between incentivized SNAP

recipients and nonincentivized recipients. Assuming unequal variances [$F = 206.49$, $p < .01$], there was a significant difference in the purchase of fruits and vegetables between incentivized SNAP recipients ($M = \$11.69$, $SD = \$16.97$) and non-incentivized SNAP recipients ($M = \$10.67$, $SD = \$15.41$), $t(39{,}274.90) = 9.90$, $p < .01$. Therefore, the null hypothesis is rejected. This is shown in Table 5. Altogether, this suggests that during Round 3, being incentivized in SNAP affected the purchase of more fruits and vegetables.

Table 5

Group Statistics (Round 3)

	hip_status	N	Mean	Std. deviation	S.E. mean
purchase of FTV	Hip	30,872	11.69	16.97	.10
	Nonhip	196,796	10.67	15.41	.03

$N = 227{,}668$.

Round 1 versus Round 2. I employed a paired samples *t* test to determine if there was a difference in the purchase of fruits and vegetables between Round 1 and Round 2. There was a significant difference in the purchase of fruits and vegetables between Round 1 ($M = \$8.80$, $SD = \$13.66$) and Round 2 ($M = \$10.17$ $SD = \$14.57$), $t(149{,}777) = -26.49$, $p < .01$. Altogether, this suggests that going from Round 1 to Round 2 affected the purchase of more fruits and vegetables. This is shown in Tables 6 and 7.

Table 6

Paired Sample Statistics

		Mean	*N*	Std. deviation	S.E. mean
Pair 1	Net FVT R1	8.80	149,778	13.66	.04
	Net FVT R2	10.17	149,778	14.57	.04

N = 149,778.

Table 7

Paired Samples Test

		Paired differences							
					95% Confidence interval of the difference				
		Mean	Std. deviation	Std. error mean	Lower	Upper	*t*	*df*	Sig. (2-tailed)
Pair 1	Net FVT R1 vs Net FVT R2	-1.37	20.00	.05	-1.47	-1.27	-26.49	149,777	.000

Note. *N* = 149,777.

Round 1 versus Round 3. I employed a paired samples *t* test to determine if there is a difference in the purchase of fruits and vegetables between Round 1 and Round 3. There was a significant difference in the purchase of fruits and vegetables between Round 1 (*M* = $8.80, *SD* = $13.66) and Round 3 (*M* = $10.89 *SD* = $15.46), *t*(149,777) = -39.24, $p < .01$. This is shown in Tables 8 and 9. Altogether, this suggests

that going from Round 1 to Round 3 affected the purchase of more fruits and vegetables.

Table 8

Table Paired Sample Statistics

		Mean	*N*	Std. deviation	S.E. mean
Pair 1	Net FVT R1	8.80	149778	13.66	.04
	Net FVT R3	10.89	149778	15.46	.04

N = 149,778.

Table 9

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. deviation	Std. error mean	Lower	Upper	*t*	*df*	Sig. (2-tailed)
Pair 1	Net FVT R1 vs Net FVT R3	-2.09	20.58	.05	-2.19	-1.98	-39.24	149777	.000

Note. *N* = 149,778.

Round 2 versus Round 3. A paired samples *t*-test was employed to determine if there is a difference in the purchase of fruits and vegetables between Round 2 and Round 3. There was a significant difference in the purchase of fruits and vegetables between Round 2 (M = \$10.49, SD = \$14.93) and Round 3 (M = \$10.81 SD = \$15.63 (Table 10), $t(227{,}663) = -7.07$, $p < .01$ (Table 11). Altogether, this suggests that going from Round 2 to Round 3 affected the purchase of more fruits and vegetables.

Table 10

Paired Sample Statistics

		Mean	*N*	Std. deviation	S.E. mean
Pair 1	Net FVT R2	10.49	227664	14.93	.03
	Net FVT R3	10.81	227664	15.63	.03

N = 227,664.

Table 11

Paired Samples Test

		Paired differences							
					95% Confidence interval of the difference				
		Mean	Std. deviation	Std. error mean	lower	upper	*t*	*df*	Sig. (2-tailed)
Pair 1	Net FVT R2 vs Net FVT R3	-.32	21.60	.05	-.41	-.23	-7.07	227,663	.000

Note. *N* = 227,664.

Research Question 2

RQ2: Does the increase in fruit and vegetable intake contribute to changes in attitudes and beliefs about fruits and vegetables?

$H_0$2o: The increase in fruit and vegetable intake does not have an effect on attitudes and beliefs.

H_a2: The increase in fruit and vegetable intake contributes to a change on attitudes and beliefs about fruits and vegetables.

The HIP Pilot program was based on a 24-hour dietary recall. Two additional follow-up interviews (Rounds 2 and 3) were conducted to identify any potential changes in fruit and vegetable intake as later rounds can predict greater understanding of the program and intervention. It was expected that the impacts of the HIP intervention would increase with every round.

Round 1. A Pearson's product moment correlation coefficient was employed to examine the relationship between fruit and vegetable intake and attitudes and beliefs about fruits and vegetables.

According to Table 12, there was a significant positive correlation between *I eat enough fruits to keep me healthy (FRTHLTH)* and *I enjoy trying new fruits (TRYFRUIT)*, $r = .19$, $N = 2{,}759$, $p < .01$. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between *FRTHLTH* and *TRYFRUIT* (Evans, 1996). Increases in *FRTHLTH* were correlated with increases in *TRYFRUIT*.

There was also a significant positive correlation between *I eat enough fruits to keep me healthy (FRTHLTH)* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG)*, $r = .22$, $N = 2{,}759$, $p < .01$. Thus, the null hypothesis is rejected. Overall, there was a weak, positive correlation between FRTHLTH and FAMVEG (Evans, 1996). Increases in FRTHLTH were correlated with increases in FAMVEG (Table 12).

According to Table 12, there was a significant positive correlation between *I eat enough vegetables to keep me healthy (VEGHLTH)* and *I enjoy trying new vegetables*

(TRYVEG), r = .26, *N* = 2,759, *p* < .01 . Thus, the null hypothesis is rejected. Overall, there was a weak, positive correlation between *VEGHLTH* and *TRYVEG* (Evans, 1996). Increases in *VEGHLTH* were correlated with increases in *TRYVEG*.

There was also a significant positive correlation between *I eat enough vegetables to keep me healthy (VEGHLTH)* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = .22, *N* = 2,759, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a weak, positive correlation between VEGHLTH and FAMVEG (Evans, 1996). Increases in VEGHLTH were correlated with increases in FAMVEG (Table 12).

According to Table 12, there was a significant positive correlation between *During the past month, how many times per day, week, or month did you eat fruit (FRUTNUM)?* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = .05, *N* = 2,759, *p* = .005. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between FRUTNUM and FAMVEG (Evans, 1996). Increases in FRUTNUM were correlated with increases in FAMVEG.

According to Table 12, there was a significant negative correlation between *During the past month, how many times per day, week, or month did you eat fruit (FRUTUNIT)?* and *I enjoy trying new fruits (TRYFRUIT), r* = -.10, *N* = 2,652, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between FRUTUNIT and TRYFRUIT (Evans, 1996). Increases in FRUTUNIT were correlated with decreases in TRYFRUIT.

There was a significant negative correlation between *During the past month, how many times per day, week, or month did you eat fruit (FRUTUNIT)?* and *I often encourage my*

family and friends to eat fruits and vegetables (FAMVEG), r = -.08, *N* = 2,652, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between *FRUTUNIT* and *FAMVEG* (Evans, 1996). Increases in *FRUTUNIT* were correlated with decreases in *FAMVEG* (Table 12).

According to Table 12, there was a significant positive correlation between *Each time you ate fruit, how much did you usually eat? (FRUTAMT)?* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = .03, *N* = 2,652, *p* = .036. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between FRUTAMT and FAMVEG (Evans, 1996). Increases in FRUTAMT were correlated with increases in FAMVEG.

According to Table 12, there was a significant positive correlation between *During the past month how many times per day, week, or month did you eat a green leafy or lettuce salad, with or without other vegetables (LEAFNUM)?* and *I enjoy trying new vegetables (TRYVEG), r* = .08, *N* = 2,759, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between LEAFNUM and TRYVEG (Evans, 1996). Increases in LEAFNUM were correlated with increases in TRYVEG.

There was a significant positive correlation between *During the past month how many times per day, week, or month did you eat a green leafy or lettuce salad, with or without other vegetables (LEAFNUM)?* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = .06, *N* = 2,759, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between

LEAFNUM and FAMVEG (Evans, 1996). Increases in LEAFNUM were correlated with increases in FAMVEG (Table 12).

There was a significant negative correlation between *During the past month how many times per day, week, or month did you eat green leafy or lettuce salad (LEAFUNIT)?* and *I enjoy trying new vegetables (TRYVEG), r* = -.10, *N* = 2,454, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between LEAFUNIT and TRYVEG (Evans, 1996). Increases in LEAFUNIT were correlated with decreases in TRYVEG (Table 12).

There was a significant negative correlation between *During the past month how many times per day, week, or month did you eat green leafy or lettuce salad (LEAFUNIT)?* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = -.09, *N* = 2,454, *p* < .01Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between LEAFUNIT and FAMVEG (Evans, 1996). Increases in LEAFUNIT were correlated with decreases in FAMVEG (Table 12).

There was a significant positive correlation between *Each time you ate green leafy or lettuce salad, how much did you usually eat (LEAFAMT)?* and *I enjoy trying new vegetables (TRYVEG), r* = .05, *N* = 2,454, *p* = .008. Thus, the null hypothesis is rejected. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between LEAFAMT and TRYVEG (Evans, 1996). Increases in LEAFAMT were correlated with increases in TRYVEG (Table 12).

There was a significant positive correlation between *Each time you ate green leafy or lettuce salad, how much did you usually eat (LEAFAMT)?* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = .06, *N* = 2,454, *p* =

.002. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between LEAFAMT and FAMVEG (Evans, 1996). Increases in LEAFAMT were correlated with increases in FAMVEG (Table 12).

Table 12

Relationship between fruit and vegetable intake and on attitudes and beliefs about fruits and vegetables (Round 1)

Round 1	I enjoy trying new fruits			I enjoy trying new veg			I encourage friends and fam to try new veg		
	R	*p*	*n*	*R*	*P*	*n*	*r*	*P*	*n*
Eat enough fruit	0.19	0.000	2759	0.09	0.000	2759	0.22	0.000	2759
East enough veg	0.1	0.000	2759	0.26	0.000	2759	0.22	0.000	2759
Fruit in past mo.	0.01	0.370	2759	0.02	0.126	2759	0.05	0.005	2759
Fruit in past mo.	-0.1	0.000	2652	-0.08	0.000	2652	-0.09	0.000	2652
How much fruit each time	0.02	0.192	2652	0.02	0.136	2652	0.03	0.036	2652
Veg in past mo.	0.02	0.134	2759	0.08	0.000	2759	0.06	0.000	2759
Veg in past mo.	-0.04	0.039	2454	-0.1	0.000	2454	-0.09	0.000	2454
How much veg. each time	-0.04	0.029	2454	0.05	0.008	2454	0.06	0.002	2454

Note: *N* = 21,248. Evans (1996) suggests for the absolute value of *r*: .00-.19 “very weak” .20-.39 “weak” .40-.59 “moderate” .60-.79 “strong” .80-1.0 “very strong”.

Round 2. A Pearson's product moment correlation coefficient was employed to examine the relationship between fruit and vegetable intake and attitudes and beliefs about fruits and vegetables.

According to Table 13, there was a significant positive correlation between *I eat enough fruits to keep me healthy (FRTHLTH)* and *I enjoy trying new fruits (TRYFRUIT)*, $r = .26$, $N = 1{,}983$, $p < .01$. Thus, the null hypothesis is rejected. Overall, there was a weak, positive correlation between *FRTHLTH* and *TRYFRUIT* (Evans, 1996). Increases in *FRTHLTH* were correlated with increases in *TRYFRUIT*.

There was also a significant positive correlation between *I eat enough fruits to keep me healthy (FRTHLTH)* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG)*, $r = .16$, $N = 1{,}983$, $p < .01$. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between FRTHLTH and FAMVEG (Evans, 1996). Increases in FRTHLTH were correlated with increases in FAMVEG (Table 13).

According to Table 13, there was a significant positive correlation between *I eat enough vegetables to keep me healthy (VEGHLTH)* and *I enjoy trying new vegetables (TRYVEG)*, $r = .36$, $N = 1{,}983$, $p < .01$. Thus, the null hypothesis is rejected. Overall, there was a weak, positive correlation between *VEGHLTH* and *TRYVEG* (Evans, 1996). Increases in *VEGHLTH* were correlated with increases in *TRYVEG*.

There was also a significant positive correlation between *I eat enough vegetables to keep me healthy (VEGHLTH)* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG)*, $r = .22$, $N = 1{,}983$, $p < .01$. Thus, the null hypothesis is rejected. Overall, there was a weak, positive correlation between

VEGHLTH and FAMVEG (Evans, 1996). Increases in VEGHLTH were correlated with increases in FAMVEG (Table 13).

According to Table 13, there was a significant positive correlation between *During the past month, how many times per day, week, or month did you eat fruit (FRUTNUM)?* and *I enjoy trying new fruits (TRYFRUIT), r* = .06, *N* = 1,983, *p* = .007. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between FRUTNUM and TRYFRUIT (Evans, 1996). Increases in FRUTNUM were correlated with increases in TRYFRUIT.

According to Table 13, there was a significant positive correlation between *During the past month, how many times per day, week, or month did you eat fruit (FRUTNUM)?* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = .04, *N* = 1,983, *p* = .027. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between FRUTNUM and FAMVEG (Evans, 1996). Increases in FRUTNUM were correlated with increases in FAMVEG.

There was a significant negative correlation between *During the past month how many times per day, week, or month did you eat green leafy or lettuce salad (LEAFUNIT)?* and *I enjoy trying new vegetables (TRYVEG), r* = -.13, *N* = 1,880, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between LEAFUNIT and TRYVEG (Evans, 1996). Increases in LEAFUNIT were correlated with decreases in TRYVEG (Table 13).

There was a significant negative correlation between *During the past month how many times per day, week, or month did you eat green leafy or lettuce salad (LEAFUNIT)?* and *I often encourage my family and friends to eat fruits and vegetables*

(FAMVEG), r = -.13, *N* = 1,880, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between LEAFUNIT and FAMVEG (Evans, 1996). Increases in LEAFUNIT were correlated with decreases in FAMVEG (Table 13).

There was a significant positive correlation between *Each time you ate green leafy or lettuce salad, how much did you usually eat (LEAFAMT)?* and *I enjoy trying new vegetables (TRYVEG), r* = .08, *N* = 1,880, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between LEAFAMT and TRYVEG (Evans, 1996). Increases in LEAFAMT were correlated with increases in TRYVEG (Table 13).

Table 13

Relationship between fruit and vegetable intake and on attitudes and beliefs about fruits and vegetables (Round 2)

Round 2	I enjoy trying new fruits			I enjoy trying new veg			I encourage friends and fam to try new veg		
	R	*P*	*n*	*R*	*P*	*n*	*R*	*P*	*n*
Eat enough fruit	0.26	0.000	1983	0.15	0.000	1983	0.16	0.000	1983
East enough veg	0.17	0.000	1983	0.36	0.000	1983	0.22	0.000	1983
Fruit in past mo.	0.06	0.007	1983	0.03	0.120	1983	0.04	0.027	1983
Fruit in past mo.	-0.02	0.180	1620	-0.03	0.144	1620	-0.01	0.334	1620
How much fruit each time	0.03	0.108	1620	-0.01	0.276	1620	-0.01	0.309	1620
Veg in past	0.04	0.023	1983	0.01	0.344	1983	0.03	0.075	1983

mo.									
Veg in past mo.	-0.1	0.000	1880	-0.13	0.000	1880	-0.13	0.000	1880
How much veg. each time	0.08	0.000	1880	0.08	0.000	1880	0.01	0.370	1880

Note: N = 14,932. Evans (1996) suggests for the absolute value of r: .00-.19 "very weak" .20-.39 "weak" .40-.59 "moderate" .60-.79 "strong" .80-1.0 "very strong".

Round 3. According to Table 16, there was a significant positive correlation between *I eat enough fruits to keep me healthy (FRTHLTH)* and *I enjoy trying new fruits (TRYFRUIT)*, r = .17, N = 1,511, p < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between *FRTHLTH* and *TRYFRUIT* (Evans, 1996). Increases in *FRTHLTH* were correlated with increases in *TRYFRUIT*.

There was also a significant positive correlation between *I eat enough fruits to keep me healthy (FRTHLTH)* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG)*, r = .18, N = 1,511, p < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between FRTHLTH and FAMVEG (Evans, 1996). Increases in FRTHLTH were correlated with increases in FAMVEG (Table 14).

According to Table 14, there was a significant positive correlation between *I eat enough vegetables to keep me healthy (VEGHLTH)* and *I enjoy trying new vegetables (TRYVEG)*, r = .34, N = 1,511, p < .01. Thus, the null hypothesis is rejected. Overall, there was a weak, positive correlation between *VEGHLTH* and *TRYVEG* (Evans, 1996). Increases in *VEGHLTH* were correlated with increases in *TRYVEG*.

There was also a significant positive correlation between *I eat enough vegetables to keep me healthy (VEGHLTH)* and *I often encourage my family and friends*

to eat fruits and vegetables (FAMVEG), r = .25, *N* = 1,511, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a weak, positive correlation between VEGHLTH and FAMVEG (Evans, 1996). Increases in VEGHLTH were correlated with increases in FAMVEG (Table 14).

According to Table 14, there was a significant negative correlation between *During the past month, how many times per day, week, or month did you eat fruit (FRUTUNIT)?* and *I enjoy trying new fruits (TRYFRUIT), r* = -.06, *N* = 1,211, *p* = .015. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between FRUTUNIT and TRYFRUIT (Evans, 1996). Increases in FRUTUNIT were correlated with decreases in TRYFRUIT.

There was a significant negative correlation between *During the past month, how many times per day, week, or month did you eat fruit (FRUTUNIT)?* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = -.09, *N* = 1,211, *p* = .001. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between FRUTUNIT and FAMVEG (Evans, 1996). Increases in FRUTUNIT were correlated with decreases in FAMVEG (Table 14).

According to Table 14, there was a significant positive correlation between *Each time you ate fruit, how much did you usually eat (FRUTAMT)?* and *I enjoy trying new fruits (TRYFRUIT), r* = .08, *N* = 1,211, *p* = .004. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between *FRUTAMT* and *TRYFRUIT* (Evans, 1996). Increases in *FRUTAMT* were correlated with increases in *TRYFRUIT*.

According to Table 14, there was a significant positive correlation between *During the past month how many times per day, week, or month did you eat a green leafy or lettuce salad, with or without other vegetables (LEAFNUM)?* and *I enjoy trying new vegetables (TRYVEG), r* = .05, *N* = 1,511, *p* = .040. Thus, the null hypothesis is rejected. Overall, there was a very weak, positive correlation between LEAFNUM and TRYVEG (Evans, 1996). Increases in LEAFNUM were correlated with increases in TRYVEG.

There was a significant negative correlation between *During the past month how many times per day, week, or month did you eat green leafy or lettuce salad (LEAFUNIT)?* and *I enjoy trying new vegetables (TRYVEG), r* = -.06, *N* = 1,433, *p* = .012. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between LEAFUNIT and TRYVEG (Evans, 1996). Increases in LEAFUNIT were correlated with decreases in TRYVEG (Table 14).

There was a significant negative correlation between *During the past month how many times per day, week, or month did you eat green leafy or lettuce salad (LEAFUNIT)?* and *I often encourage my family and friends to eat fruits and vegetables (FAMVEG), r* = -.12, *N* = 1,433, *p* < .01. Thus, the null hypothesis is rejected. Overall, there was a very weak, negative correlation between LEAFUNIT and FAMVEG (Evans, 1996). Increases in LEAFUNIT were correlated with decreases in FAMVEG (Table 14).

Table 14

Relationship between fruit and vegetable intake and on attitudes and beliefs about fruits and vegetables (Round 3)

Round 3	I enjoy trying new fruits			I enjoy trying new veg			I encourage friends and fam to try new veg		
	R	*p*	*n*	*R*	*P*	*n*	*R*	*p*	*n*
Eat enough fruit	0.17	0.000	1511	0.12	0.000	1511	0.18	0.000	1511
East enough veg	0.16	0.000	1511	0.34	0.000	1511	0.25	0.000	1511
Fruit in past mo.	-0.03	0.135	1511	0.01	0.387	1511	0.02	0.238	1511
Fruit in past mo.	-0.06	0.015	1211	-0.01	0.326	1211	-0.09	0.001	1211
How much fruit each time	0.08	0.004	1211	0.01	0.357	1211	0.03	0.157	1211
Veg in past mo.	0.03	0.130	1511	0.05	0.040	1511	0.04	0.064	1511
Veg in past mo.	-0.07	0.006	1433	-0.06	0.012	1433	-0.12	0.000	1433
How much veg. each time	0.01	0.327	1433	0.02	0.251	1433	0.02	0.279	1433

Note: *N* = 11,332. [1]Evans (1996) suggests for the absolute value of *r*: .00-.19 “very weak” .20-.39 “weak” .40-.59 “moderate” .60-.79 “strong” .80-1.0 “very strong”.

Research Question 3

RQ3: Were there changes in SNAP recipient food shopping patterns (reduction in sugary drink purchase or increase in fruit and vegetable purchase) as a result of the HIP study?

$H_0$3: The USDA's HIP study had no effect on food shopping patterns among incentivized recipients.

H_a3: The USDA's HIP study had an effect on food shopping patterns among incentivized recipients.

The HIP Pilot program was based on a 24-hour dietary recall. Two additional follow-up interviews (Rounds 2 and 3) were conducted to identify any potential changes in fruit and vegetable intake as later rounds can predict greater understanding of the program and intervention. It was expected that the impacts of the HIP intervention would increase with every round.

Round 1. Multiple linear regression analysis was used to test if the USDA's HIP study predicts food shopping patterns among incentivized recipients while controlling for household size and composition; gender, age, and race/ethnicity; frequency and quantity of specific types of fruits and vegetables consumed in the week prior to the survey (baseline survey); home food environment, barriers to grocery shopping, and attitudes about and barriers to consumption of fruits and vegetables.

The results of the regression indicate the model explains 4% of the variance (Adjusted R^2 =.04) (Table 15), $F(14,1669) = 5.49$, $p < .01$) (Table 16). It was found that, while controlling for the above covariates, HIP participation did not significantly predict purchase of targeted fruits and vegetables ($\beta = .03$, $p = .168$), thus, the null hypothesis is

accepted. However, these covariates yielded significance as follows: being Hispanic (β = -.19, p = .001), White (β = -.32, p < .01), or Black (β = -.19, p < .01) (Table 15). These remaining covariates yielded significance as well: household size and composition (β = .06, p = .028) and having fruits available at home in the refrigerator and/or on the counter (β = .09, p = .001) (Table 17).

For Hispanics, the average decrease in the mean purchase of targeted fruits and vegetables was $15.75 (Table 17). For Whites, the average decrease in the mean purchase of targeted fruits and vegetables was $27.92 (Table 17). For Blacks, the average decrease in the mean purchase of targeted fruits and vegetables was $22.48 (Table 17). Meanwhile, for each one unit increase in household size and composition, the average increase in the mean purchase of targeted fruits and vegetables was $0.72 (Table 17). Lastly, for each one unit increase in having fruits available at home in the refrigerator and/or on the counter, the average increase in the mean purchase of targeted fruits and vegetables was $2.05 (Table 17).

Table 15

Model Summary (POS purchases; Round 1)

R	*R* Square	Adjusted *R* square	Std. error of the estimate
.21	.04	.04	39.79

N = 1,684.

Table 16

ANOVA (POS purchases; Round 1)

	Sum of Squares	*df*	Mean square	*F*	Sig.
Regression	121,640.01	14	8688.57	5.49	.000
Residual	2,642,004.27	1669	1582.99		
Total	2,763,644.28	1683			

N = 1,684.

Table 17

Coefficients (POS purchases; Round 1)

	Unstandardized coefficients		Standardized coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	68.65	8.26	.00	8.31	.000
HIP intervention	2.69	1.95	.03	1.38	.168
age	-.94	.94	-.03	-1.00	.316
sex	3.76	2.20	.04	1.71	.088
hispanic	-15.75	4.68	-.19	-3.37	.001
white	-27.92	4.76	-.32	-5.87	.000
black	-22.48	5.23	-.19	-4.30	.000
household size and composition	.72	.33	.06	2.20	.028
fruits	-.23	.16	-.04	-1.38	.168
vegetables	-.20	.21	-.03	-.96	.339
barriers to fruits	.03	.72	.00	.04	.969
barriers to vegetables	-.04	.62	.00	-.06	.950
household fruit available	2.05	.63	.09	3.26	.001
household veg available	.42	.63	.02	-.67	.504
cook in household	.77	.64	.03	-	.228

Note. N = 1,684.

Round 2. Multiple linear regression analysis was used to test if the USDA's HIP study predicts food shopping patterns among incentivized recipients while controlling for household size and composition; gender, age, and race/ethnicity; frequency and quantity

of specific types of fruits and vegetables consumed in the week prior to the survey (baseline survey); home food environment, barriers to grocery shopping, and attitudes about and barriers to consumption of fruits and vegetables.

The results of the regression indicate the model explains 6% of the variance (Adjusted R^2 =.06) (Table 18), $F(14,1241) = 7.09$, $p = 000$) (Table 19). It was found that, while controlling for the above covariates, HIP participation did not significantly predict purchase of targeted fruits and vegetables ($\beta = .01$, $p = .612$), thus, the null hypothesis is accepted. However, these covariates yielded significance as follows: being female ($\beta = .06$, $p = .023$), Hispanic ($\beta = -.34$, $p < .01$), White ($\beta = -.39$, $p < .01$), or Black ($\beta = -.27$,$p < .01$) (Table 19). These remaining covariates yielded significance as well: household size and composition ($\beta = .12$, $p < .01$) and having fruits available at home in the refrigerator and/or on the counter ($\beta = .09$, $p = .007$) (Table 20).

For females, the average increase in the mean purchase of targeted fruits and vegetables was $14.51 (Table 20). For Hispanics, the average decrease in the mean purchase of targeted fruits and vegetables was $69.49 (Table 20). For Whites, the average decrease in the mean purchase of targeted fruits and vegetables was $84.49 (Table 20). For Blacks, the average decrease in the mean purchase of targeted fruits and vegetables was $77.54 (Table 20). Meanwhile, for each one unit increase in household size and composition, the average increase in the mean purchase of targeted fruits and vegetables was $3.76 (Table 20). Lastly, for each one unit increase in having fruits available at home in the refrigerator and/or on the counter, the average increase in the mean purchase of targeted fruits and vegetables was $5.53 (Table 20).

Table 18

Model Summary (POS purchase; Round 2)

R	*R* square	Adjusted *R* square	*Std.* error of the estimate
.27	.07	.06	98.87

N = 1,256.

Table 19

ANOVA (POS purchase; Round 2)

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Regression	969668.39	14	69262.03	7.09	.000
Residual	12130776.12	1241	9775.00		
Total	13100444.51	1255			

Note. N = 1,256.

Table 20

Coefficients (POS purchase; Round 2)

	Unstandardized Coefficients		*Standardized Coefficients*		
	B	*Std. Error*	*Beta*	*t*	*Sig.*
(Constant)	217.92	23.30	.00	9.35	.000
HIP intervention	2.84	5.60	.01	.51	.612
age	-5.09	2.66	-.05	-1.91	.056
gender (female)	14.51	6.37	.06	2.28	.023
hispanic	-69.49	13.65	-.34	-5.09	.000
white	-84.49	13.74	-.39	-6.15	.000
black	-77.54	15.03	-.27	-5.16	.000
household size and composition	3.76	.93	.12	4.06	.000
fruits	-.85	.45	-.06	-1.89	.058
vegetables	-.38	.61	-.02	-.62	.534
barriers to fruits	-1.35	2.17	-.05	-.62	.533
barriers to vegetables	-.20	1.84	-.01	-.11	.915
household fruit available	5.53	2.06	.09	2.68	.007
household veg available	2.00	2.17	.03	-.92	.357
cook in household	2.64	1.82	.04	-1.45	.147

Note. N = 1,256.

Round 3. Multiple linear regression analysis was used to test if the USDA's HIP study predicts food shopping patterns among incentivized recipients while controlling for

household size and composition; gender, age, and race/ethnicity; frequency and quantity of specific types of fruits and vegetables consumed in the week prior to the survey (baseline survey); home food environment, barriers to grocery shopping, and attitudes about and barriers to consumption of fruits and vegetables.

The results of the regression (Tables 21 and 22) indicate the model explains 6% of the variance (Adjusted R^2 =.06) ,$F(14,1153) = 6.62$, $p = 000$). It was found that, while controlling for the above covariates, HIP participation did not significantly predict purchase of targeted fruits and vegetables ($\beta = .01$, $p = .607$), thus, the null hypothesis is accepted. However, these covariates yielded significance as follows: one's age ($\beta = -.08$, $p = .008$) and being Hispanic ($\beta = -.32$, $p < .01$), White ($\beta = -.41$, $p < .01$), or Black ($\beta = -.28$, $p < .01$). These remaining covariates yielded significance as well: household size and composition ($\beta = .11$, $p = .001$) and having fruits available at home in the refrigerator and/or on the counter ($\beta = .09$, $p = .013$).

For each one unit increase in one's age, the average decrease in the mean purchase of targeted fruits and vegetables was $5.84 (Table 23). For Hispanics, the average decrease in the mean purchase of targeted fruits and vegetables was $52.75 (Table 23). For Whites, the average decrease in the mean purchase of targeted fruits and vegetables was $71.13 (Table 23). For Blacks, the average decrease in the mean purchase of targeted fruits and vegetables was $64.65 (Table 23). Meanwhile, for each one unit increase in household size and composition, the average increase in the mean purchase of targeted fruits and vegetables was $2.65 (Table 23). Lastly, for each one unit increase in having fruits available at home in the refrigerator and/or on the counter,

the average increase in the mean purchase of targeted fruits and vegetables was $4.39 (Table 23).

Table 21.

Model Summary (POS purchases; Round 3)

R	*R* square	Adjusted *R* square	Std. error of the estimate
.27	.07	.06	78.98

N = 1,168.

Table 22.

ANOVA (POS purchases; Round 3)

	Sum of squares	*df*	Mean square	*F*	Sig.
Regression	577839.50	14	41274.25	6.62	.000
Residual	7191441.51	1153	6237.16		
Total	7769281.01	1167			

N = 1,168.

Table 23

Coefficients (POS purchases; Round 3)

	Unstandardized coefficients		*Standardized coefficients*		
	B	*Std. Error*	*Beta*	*t*	*Sig.*
(Constant)	159.30	18.95	.00	8.41	.000
Hip implementation	2.39	4.65	.01	.51	.607
age	-5.84	2.20	-.08	-2.65	.008
gender (female)	9.60	5.37	.05	1.79	.074
hispanic	-52.75	11.01	-.32	-4.79	.000
white	-71.13	11.10	-.41	-6.41	.000
black	-64.65	12.21	-.28	-5.30	.000
household size and composition	2.65	.77	.11	3.44	.001
fruits	.74	.40	.06	1.86	.063
vegetables	-.54	.48	-.04	-1.15	.252
barriers to fruits	.28	1.78	.01	.16	.874
barriers vegetables	-1.58	1.51	-.08	-1.04	.296
household fruit available	4.39	1.76	.09	-2.49	.013
household veg available	.66	1.84	.01	-.36	.718
cook in household	1.39	1.50	.03	-.93	.354

***Note. N* = 1,168.**

Summary

In Section 3 I fully detail the data collection procedures for the secondary data as well as the inferential statistics used to approach the data. Based on the results, there are several key points of significance to the study's findings. For all three rounds in which an independent t-test was employed, it was found that incentivized SNAP participants purchased more fruits and vegetables than non-incentivized participants with a mean difference of $0.49 for Round 1, $1.07 for Round 2, and $1.02 for Round 3. Furthermore, a paired t-test employed between rounds suggests that there is significance in the difference between the purchase of fruits and vegetables in Round 1 vs Rounds 2 and 3. This was initially expected as a natural occurrence due to participants becoming familiar with the study and intervention after the initial round. Overall, the null is rejected and results indicate that incentivized SNAP participants purchase more fruits and vegetables than non-incentivized participants. In order to address the influence that attitudes and beliefs have on fruit and vegetable purchase and consumption, the study employed a Pearson correlation test among various survey questions. Results indicate there is a positive correlation between eating more fruits and vegetables and having positive attitudes and beliefs about fruit and vegetable intake and preferences. Therefore, the null hypothesis is rejected and results are indicative that an increase in fruit and vegetable intake is correlated with positive feelings towards fruit and vegetable intake. However, it remains unclear whether increasing fruit and vegetable intake would change attitudes and beliefs. Lastly, a multiple linear regression was employed to determine whether participation in the HIP study would change food shopping patterns. All three rounds did not indicate that HIP participation predicted the purchase of fruits and vegetables or other

food shopping behaviors when controlling for covariates. However, there was significance in food shopping behaviors among yielded covariates. Thus, the null hypothesis is accepted and it can be inferred that overall, HIP participation will not significantly affect food shopping patterns unless specific demographics are compared.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this study was to determine whether incentivizing SNAP recipients to purchase additional fruits and vegetables was beneficial in increasing purchase and consumption. Furthermore, the study aimed to identify whether the intervention would produce a change in food shopping patterns as well as attitudes and beliefs about fruits and vegetables. I utilized the social cognitive theory (Bandura, 1986) in this study to explain the natural behavioral interaction between environmental and personal factor constructs. This led to the development of three research questions and hypotheses that implied that the HIP study would increase the purchase and consumption of fruits and vegetables among incentivized recipients and that the intervention would lead to changes in food shopping patterns and attitudes and beliefs about fruits and vegetables. In Section 3 I presented all statistical findings to validate or dispel the established research questions and hypotheses. In Section 4 I review these key findings and address the relevance and significance in the study's findings' ability to contribute to social change. In this section I also address limitations of the study as well as future recommendations.

Key Findings

Fruit and Vegetable Purchase

The HIP study intervention was able to successfully support the claim that increasing purchasing power and providing a monetary incentive to people on the Food Stamp Program would increase their purchase of fruits and vegetables. Overall, it was found that incentivized SNAP participants purchased more fruits and vegetables than

nonincentivized participants with a mean difference of $0.49 for Round 1, $1.07 for Round 2, and $1.02 for Round 3. It also became evident that fruit and vegetable purchase would increase with every round as participants became acquainted with the study. Findings were based on independent *t* test and paired *t* test analyses.

The Food Stamp Program has undergone several policy changes throughout the years. The current administration has proposed budget cuts of up to 25% over the next ten years for vital public assistance programs such as the Food Stamp Program (Rosenbaum, 2017). This would leave millions of Americans at risk of adverse health outcomes associated with poverty and food insecurity. Basu et al. (2014) studied two alternate approaches to the reduction of obesity and type 2 diabetes among SNAP recipients. One approach was an end to SNAP subsidies for sugar-sweetened beverages, and the other was the USDA's Healthy Incentives Program (HIP), which provides a 30-cent incentive for every dollar spent on fruits and vegetables. The current body of literature presents substantial evidence that supports the assertion that individuals on the Food Stamp Program do not meet the fruit and vegetable intake requirements and dietary guidelines (Bhattarai et al., 2013). My findings have determined that the HIP program would be a viable way to increase fruit and vegetable consumption among SNAP recipients.

Attitudes and Beliefs

One of the biggest confounding variables in the study was participant attitudes and beliefs about fruit and vegetable consumption. The survey addressed some of the potential barriers by determining whether preestablished attitudes and beliefs about fruits and vegetables could change as a result of the intervention. After conducting a Pearson correlation, there were significant positive correlations found between questions such as *I*

eat enough fruits and vegetables to keep me healthy and *I enjoy trying new fruits and vegetables.* Hence, participants who had a more positive attitude towards fruits and vegetables were more likely to eat more or encourage others to do so. In comparison, it was found that those who reported low numbers of *During the past month, how many times per day, week, or month did you eat green leafy or lettuce salad?* were negatively correlated with *I like trying new fruits and vegetables.* Key findings suggest that during all three rounds, preestablished attitudes affected fruit and vegetable purchase, which did not significantly affect an increase in fruit and vegetable increase as the rounds progressed. Thus, it can be stipulated that the intervention would not significantly affect or change preestablished attitudes or beliefs in regards to fruit and vegetable consumption.

The findings coincide with past systemic reviews that indicate one of the most influential indicators of fruit and vegetable consumption is personal preferences associated with attitudes and beliefs (Di Noia & Byrd-Bredbenner, 2014).

Food Shopping Patterns and Behaviors

The HIP study addressed various food shopping patterns while controlling for multiple covariates by utilizing a multiple linear regression analysis. Key findings suggest that the HIP study is not a predictor of any changes to food shopping patterns if controlled for covariates. However, when observed independently among specific groups, the HIP study does predict a positive change to food shopping patterns. For example, among women, the average increase in the mean purchase of fruits and vegetables was $14.51. Similar outcomes were found among individual demographic groups.

Changing food shopping patterns has been a challenging task for public health professionals and lawmakers. Nguyen et al. (2014) presented survey data that indicated sugary drinks are the number one purchase using SNAP benefits. There have been multiple legislative efforts to ban the purchase of sugary beverages with food stamp benefits; however, the USDA has strongly opposed these changes. As with any new policy intervention placing restrictions within a program, there are ethical considerations on the potential consequences of banning the purchase of sugary beverages. Stigmatizing recipients can reduce low-income program participation by eligible families and individuals. Also, there is no guarantee that there would be a reduction in private purchase of sugary beverages if recipients were not able to purchase them with benefit assistance. A new approach to targeting food shopping patterns was needed that would address individual groups. As a result, the current HIP study (postpilot) is being conducted in partnership with Hispanic markets to determine if individualizing interventions among ethnic groups would be successful in changing food shopping patterns.

Interpretation of the Findings

It remains unclear in which direction the SNAP is headed in regards to legislative funding; however, it is evident that the current program's structure is not addressing the various negative health outcomes associated with participation. The SNAP is structured under the pretense that providing food security to food insecure participants will improve some of the negative health outcomes associated with poverty. However, understanding of household behavior, attitudes, and beliefs in local contexts is a significant impediment to the reform of the Food Stamp Program (Debono, Ross, & Berrang-Ford, 2012).

The results of this study suggest several things. One is that the dynamic interaction between environmental and personal constructs plays a much bigger role in nutritional behaviors than the reduction or elimination of barriers. Bandura (1986) explains two focal ideas: (a) Arbitrating processes occur between stimuli and response, and (b) behavior is learned through the environment. One notable observation made by Torkan, Kazemi, Paknahad, & Bahadoran (2018) is the role self-regulation plays on behaviors. If this idea is incorporated into the "Food Stamp Cycle effect," it can be theorized that there is less self-regulation in the purchase of unhealthy food options during the first few days of food stamp benefit award. Also, if children in SNAP households are environmentally influenced by these behaviors, it may be a reason why later preestablished attitudes and beliefs are difficult to change despite addressing other barriers.

The results of RQ1 revealed that incentivized participants increased fruit and vegetable purchase. A notable observation was that purchase increased throughout each round indicating that the repeated intervention contributed to a change in behavior. A previous systemic review of randomized controlled trials to increase fruit and vegetable intake noted an overall decrease in cholesterol and body fat percentage among recipients who increased their fruit and vegetable intake (Bhattarai et al., 2013). The interventions in these studies were implemented face-to-face at the primary care setting. Although face-to-face interaction yielded higher participation rates as compared to the telephone-based intervention of the current study, the 1-year follow-up data did not indicate that participants were consistent with dietary behavior changes. Thus, a monetary incentive may provide greater long-term results.

This findings in RQ2 suggest that during all three rounds, preestablished attitudes had a significant correlation to fruit and vegetable consumption. Those who expressed positive attitudes towards fruits and vegetables also reported purchasing and consuming more. In retrospect, those who reported negative feelings towards fruits and vegetables reported purchasing and consuming less despite the intervention. Overall, it was determined that preestablished attitudes significantly contributed to fruit and vegetable consumption, while the intervention had a weak correlation to the increase in fruit and vegetable purchase. This finding is substantiated by a previous study by Di Noia & Byrd-Bredbenner (2014) that analyzed the determinants of fruit and vegetable intake. Personal and environmental determinants were more correlated to dietary behaviors than other constructs. More prominently, these determinants established in early childhood were good indicators of future dietary behaviors in adults making current interventions more difficult in achieving results among adults. Di Noia & Byrd-Bredbenner suggested a family participation environment to reinforce fruit and vegetable consumption. This dynamic was present in the current study although it did not specifically focus on children and adolescents.

Although RQ3 had statistically significant results regarding the purchase of fruits and vegetables between incentivized and nonincentivized groups, the data did not indicate that the intervention influenced food shopping patterns any more than preestablished attitudes and beliefs. For example, the results are consistent with the idea that those who have a more positive attitude towards fruits and vegetables will not only purchase and consume more, but will also encourage others to do so. It was also noted that with the exception of specific groups such as women, participation in the HIP study

did not significantly affect food shopping patterns. Jilcott Pitts et al. (2015) conducted a previous study among SNAP recipients by studying farmers' market shopping behaviors. Similar to the current study, it was determined that farmers' market shopping behaviors and pre-established attitudes were a good indicator of fruit and vegetable intake. However, the intervention itself did not contribute to a change in behavior though it could be predicted by where the participants chose to purchase food using their benefits. Although the current study did utilize farmers' markets as a participating retailer, the majority of retailers were large grocery chains. Further research would need to be conducted to determine if increasing the number of participating farmers' markets would generate higher fruit and vegetable purchasing. Jilcott Pitts et al. estimated that a decrease in fruit and vegetable pricing by 30% would generate an increase in fruit and vegetable spending by 19%. Typically, farmers' markets sell fruits and vegetables at a considerably lower price than grocery chains. Although the HIP study did contribute to the increase in purchase of fruits and vegetables among incentivized participants, if providing monetary relief for the purchase of food is not changing attitudes and beliefs and food shopping patterns, there should be multiple considerations for future studies.

Limitations of the Study

Study bias generally arises from unobserved confounding variables and reverse causation. Random assignment, when properly implemented, remedies both of these problems (Bartlett et al. 2014). There is no evidence that random assignment was improperly implemented in the HIP evaluation. Although the study used a randomized controlled trial which is considered the "gold standard" of study designs, there are some

limitations to be addressed that may have contributed to the findings presented in this study.

Survey Design

Survey nonresponse can affect the study's inability to be generalizable to a larger population if there is a high degree of nonresponse. The response rates for the preimplementation participant survey were 63% of HIP-eligible sampled households and 64% of non-HIP-eligible sampled households (Bartlett et al. 2014). Also, the study did not include follow-up with all participants initially randomized. Those who dropped from the SNAP program during the duration of the study were not included. In addition, the study used a 24-hour recall to obtain data on fruit and vegetable intake, which opens the possibility that HIP participants may be more likely to overstate their fruit and vegetable intake than nonparticipants. It is important to emphasize that there were more than double the amount of female respondents than male (618 men vs. 1,336 women), which opens the possibility that female-led households could potentially have different shopping patterns than male-led households regardless of the intervention. Lastly, although all EBT transaction data was obtained through the Massachusetts Department of Transitional Assistance, it is very difficult to track whether all fruits and vegetables purchased were actually eaten by the household and not just purchased. There was an early assumption in the study that a purchase would convert to its consumption and without this being validated with accuracy, it is not likely that the data are a true representation of whether incentivized recipients are eating more fruits and vegetables as a result of the study because a 24-hour recall has limitations as well.

Attitudes and Beliefs

Though the statistical analyses did mitigate for confounding variables, the results show overwhelming evidence to support the assumption that preestablished attitudes and beliefs play a significant role in nutritional behaviors. One important observation to explore is the "food stamp cycle effect". The food stamp cycle effect first observed by (Wilde & Ranney, 2000) suggests that food stamp recipients have less constraints and judgment on food purchase in the first three days of benefit award. Food energy intake drops dramatically by the fourth week of the month since over 42% of SNAP households only do their grocery shopping once a month (Wilde & Ranney, 2000). This behavioral pattern can trigger a different outcome than it would if benefits were dispersed weekly instead of monthly. Also, the HIP study's survey data on the effect of attitudes and beliefs on food shopping behaviors do not support the hypothesis that implementing an incentivized intervention would lead to a change in these attitudes and beliefs about fruits and vegetables. Thus, pre-established negative beliefs can significantly lessen the effects of the intervention and provide skewed results compared to those who have positive feelings associated with fruits and vegetables.

Recommendations

The study's findings present several limitations to be addressed for future studies. The HIP study was implemented to survey SNAP households in Hampden County, Massachusetts to determine if providing a monetary incentive to purchase additional fruits and vegetables would be a viable method to increase fruit and vegetable consumption among SNAP households. A comprehensive literature review is consistent with evidence of the program's counterproductive effect on improving outcomes

(Nguyen at al. 2014; Leung & Villamor, 2011; Alvarez et al. 2015). Although the current study applied a randomized controlled trial to limit any bias, there are some recommendations on the study's design that should be explored for future study. One is the way that benefits are dispersed. Wilde & Ranney (2000) observed the "food stamp cycle" and described it as the purchasing behavior patterns of SNAP recipients. Purchasing power is highest during the first three days of receiving benefits. This decreases with time and by the fourth week, has dropped dramatically. This behavior pattern potentially alters the food shopping patterns of recipients as well as the types of foods purchased. It would be beneficial to explore if there is a difference in food shopping patterns and purchases if the benefit amounts were distributed every week instead of once a month. Torkan et al. (2018) related this behavior to less self-regulation where SNAP recipients display less of it when benefits are obtained only once a month. Less self-regulation would severely impact the intervention's ability to change nutritional behaviors. Also, it is recommended that future studies further explore differences between male and female groups on food shopping patterns. Traditionally, there are more women as head of households when receiving SNAP benefits, however, study results cannot be generalized to all males with the same level of significance on a broader level.

Further recommendations for future studies relate to attitudes and beliefs. The study's findings suggest that having positive feelings about fruits and vegetables lead to an increase in purchase and consumption. However, there is no indication that the intervention itself leads to a change in attitudes and beliefs. Future studies should compare two groups (positive feelings and negative feelings about fruits and vegetables) using pre and post assessments to determine any specific changes resulting from the

intervention. It is possible that pre-established attitudes about fruits and vegetables significantly affect the results and would require additional behavioral interventions to attempt to modify these beliefs.

Implications for Professional Practice and Social Change

The SNAP program is the nation's largest government assistance program and affects over 43 million recipients (USDA, 2016). As public health professionals, we have a moral obligation to serve some of the most underprivileged groups to identify affective approaches to improving their health outcomes. Multiple studies have shown that obesity is over 30% higher among SNAP recipients than non-recipients and over 32% of recipients self-report "poor" health status (Nguyen at al. 2014; Leung & Villamor, 2011; Alvarez et al. 2015). The ability to identify causal factors for the nutritional behaviors that affect disproportionate groups such as SNAP recipients is the key to improving such behaviors and health outcomes. Currently, legislative efforts have signaled a possibility of using the monetary incentive approach which has been shown to be successful in increasing fruit and vegetable intake in multiple studies including this one. The capacity of the nation's largest anti-hunger program to improve health outcomes among 43 million recipients can impact various economic factors such as the reduction of health expenditures. The ability to improve the current SNAP program to target these goals can also impact the future generations whose current environment will significantly impact their future nutritional behaviors.

The implications for social change based on the study's findings provide a greater understanding on why SNAP recipients who establish food security do not have better health outcomes associated with the relief of food insecurity. The SNAP program has

undergone various policy changes since its inception while attempting to achieve positive health outcomes among disparate groups. The study's findings are consistent with the claim that providing a monetary incentive would enable SNAP recipients to purchase more fruits and vegetables. Since the USDA has failed to support the elimination of sugary beverage purchase with SNAP benefits due to ethical considerations, the monetary incentive is a valid alternative to achieve positive results. In addition, the current study and past literature support the assertion that dietary changes are best approached from a multilateral perspective. Addressing individual constructs does not fully explain the way multiple constructs are interrelated or interact with one another. This leaves vacancy for a new approach for legislative officials, public health practitioners and providers, and social services agencies to work together to develop a new strategy for changing dietary behaviors among SNAP recipients. The body of literature supports the claim that fruit and vegetable intake can increase by incentivizing recipients, and providing interventions in the primary care setting. Furthermore, the research indicates that attitudes and beliefs established in early childhood and adolescence will have a lasting impact on dietary behaviors as adults. This presents an opportunity for legislative officials to enact policies targeting nutritional interventions in children and adolescents, restructure the SNAP program to include incentives and access to farmers' markets, and promote a collaborative effort among groups to maximize positive outcomes through nutritional education and interventions across various settings.

Conclusion

The SNAP program currently provides food security to over 43 million recipients. Previous studies have linked food insecurity to the development of chronic diseases

associated with a lower quality of food intake to compensate for a lower quantity of food availability (Béatrice et al., 2012). Despite providing food relief to over 43 million recipients, health outcomes among SNAP households continue to be worse compared to non-recipients. This clearly shows a counterproductive effect of the program's initiatives. Legislative efforts have introduced two possible policy changes to reduce these effects. One is to ban the ability to purchase sugary beverages with SNAP benefits, and the other is to incentivize recipients to purchase additional fruits and vegetables. This study hypothesized that incentivizing recipients would be successful in increasing their fruit and vegetable purchase and consumption. The results indicated this hypothesis to be correct. Moreover, this study also found that attitudes and beliefs are a significant factor in food shopping behaviors and fruit and vegetable intake despite the intervention. While even a modest increase in fruit and vegetable intake can significantly contribute to the improvement in health outcomes among low-income groups, it is important to consider the implications that such improvements would have on our economic and health systems. Reducing health expenditures among low-income groups with lower health access can be a starting point in addressing the current health disparities experienced by SNAP recipients.

References

Alvarez, C., Lantz, P., Sharac, J. & Shin, P., (2015). Food insecurity, food assistance and health status in the U.S. community health center population. *Journal of Health Care for the Poor and Underserved, 26*(1), 82-91. https://doi.org/10.1353/hpu.2015.0006

Andreyeva, T., & Luedicke, J. (2015). Incentivizing fruit and vegetable purchases among participants in the special supplemental nutrition program for women, infants, and children. *Public Health Nutrition, 18*(1), 33-41. https://doi.org/10.1017/s1368980014000512

Bandura, A. (1986). *Social foundations of thought and action: a social cognitive theory.* Englewood Cliffs, N.J.: Prentice-Hall.

Barnhill, A. (2011). Impact and ethics of excluding sweetened beverages from the SNAP program. *American Journal of Public Health, 101*(11), 2037-2043. https://doi.org/10.2105/ajph.2011.300225

Bartlett, S., Klerman, J., Olsho, L., Logan, C., Blocklin, M., Beauregard, M., & Enver, A. (2014). *Evaluation of the Healthy Incentives Pilot (HIP).* Cambridge, MA: Abt Associates.

Basu, S., Seligman, H. K., Gardner, C., & Bhattacharya, J. (2014). Ending SNAP subsidies for sugar-sweetened beverages could reduce obesity and type 2 diabetes. *Health Affairs, 33*(6), 1032-1039. Retrieved from https://doi.org/10.1377/hlthaff.2013.1246

Baum, C. L. (2011). The effects of food stamps on obesity. *Southern Economic Journal, 77*(3), 623-651. https://doi.org/10.4284/sej.2011.77.3.623

Béatrice, N., Lise, G., Victoria, Z. M., & Louise, S. (2012). Longitudinal patterns of poverty and health in early childhood: Exploring the influence of concurrent, previous, and cumulative poverty on child health outcomes. *BMC Pediatrics, 12*, 141. https://doi.org/10.1186/1471-2431-12-141

Bhattarai, N., Prevost, A. T., Wright, A. J., Charlton, J., Rudisill, C., & Gulliford, M. C. (2013). Effectiveness of interventions to promote healthy diet in primary care: Systematic review and meta-analysis of randomized controlled trials. *BMC Public Health, 13*, 1203. https://doi.org/10.1186/1471-2458-13-1203

Blumenthal, S. J., Hoffnagle, E. E., Leung, C. W., Lofink, H., Jensen, H. H., Foerster, S. B., Willett, W. C. (2014). Strategies to improve the dietary quality of supplemental nutrition assistance program (SNAP) beneficiaries: An assessment of stakeholder opinions. *Public Health Nutrition, 17*(12), 2824-2833. https://doi.org/10.1017/s1368980013002942

Boeing, H., Bechthold, A., Bub, A., Ellinger, S., Haller, D., Kroke, A., Watzl, B. (2012). Critical review: vegetables and fruit in the prevention of chronic diseases. *European Journal of Nutrition, 51*(6), 637–663. https://doi.org/10.1007/s00394-012-0380

Branscum, P., & Sharma, M. (2012). After-school based obesity prevention interventions: A comprehensive review of the literature. *International Journal of Environmental Research and Public Health, 9*(4), 1438-1457. https://doi.org/10.3390/ijerph9041438

California Department of Social Services. (2017, December 27). Retrieved from CalFresh: http://www.cdss.ca.gov/inforesources/calfresh

Centers for Disease Control and Prevention. (2009). National Health and Nutrition Examination Survey: NHANES 2009–2010 dietary data. Retrieved from https://wwwn.cdc.gov/nchs/nhanes/Search/DataPage.aspx?Component=Dietary&CycleBeginYear=2009

Chang, K., Zastrow, M., Zdorovtsov, C., Quast, R., Skjonsberg, L., & Stluka, S. (2015). Do SNAP and WIC programs encourage more fruit and vegetable intake? A household survey in the Northern Great Plains. *Journal of Family and Economic Issues, 36*(4), 477-490. https://doi.org/10.1007/s10834-014-9412-5

Debono, N., Ross, N., & Berrang-Ford, L. (2012). Does the Food Stamp Program cause obesity? A realist review and a call for place-based research. *Health & Place, 18*(4), 747-756. https://doi.org/10.1016/j.healthplace.2012.03.002

Di Noia, J., & Byrd-Bredbenner, C. (2014). Determinants of fruit and vegetable intake in low-income children and adolescents. *Nutrition Reviews, 72*(9), 575-590. https://doi.org/10.1111/nure.12126

Elliott, S. K., Khmelko, I., & Beeland, R. (2015). Food insecurity challenge to families in the greater Chattanooga area: The case of the food bank. *Journal of Adolescent and Family Health, 7*(1), A1-16. Retrieved from https://scholar.utc.edu/cgi/viewcontent.cgi?article=1032&context=jafh

Erinosho, T. O., Moser, R. P., Oh, A. Y., Nebeling, L. C., and Yaroch, A. L. (2012). Awareness of the fruits and veggies—More Matters campaign, knowledge of the fruit and vegetable recommendation, and fruit and vegetable intake of adults in

the 2007 Food Attitudes and Behaviors (FAB) Survey. *Appetite, 59,* 155–160. https://doi.org/10.1016/j.appet.2012.04.010

Gordon, A. R., Briefel, R. R., Collins, A. M., Rowe, G. M., & Klerman, J. A. (2017). Delivering Summer Electronic Benefit Transfers for Children through the Supplemental Nutrition Assistance Program or the Special Supplemental Nutrition Program for Women, Infants, and Children: Benefit Use and Impacts on Food Security and Foods Consumed. *Journal of the Academy of Nutrition & Dietetics, 117(3),* 367-375. https://doi.org/10.1016/j.jand.2016.11.002

Gregg, E. W., & Albright, A. (2015). Compelling evidence linking sugary drinks with diabetes. *BMJ: British Medical Journal (Online), 351*. https://doi.org/10.1136/bmj.h4087

Gregory, C. (2013). SNAP participation and diet outcomes. *Amber Waves,* U.S. Dept. of Agriculture, Economic Research Service.. Retrieved from https://www.ers.usda.gov/amber-waves/2013/november/snap-participation-and-diet-outcomes/

Gundersen, C., & Ziliak, J. P. (2015). Food insecurity and health outcomes. *Health Affairs, 34*(11), 1830-1839. https://doi.org/10.1377/hlthaff.2015.0645

Hastings, J., & Washington, E. (2010). The first of the month effect: Consumer behavior and store responses. *American Economic Journal. Economic Policy, 2*(2), 142-162. https://doi.org/10.1257/pol.2.2.142

Holben D. H. (2010). Position of the American Dietetic Association: Food insecurity in the United States. *Journal of the American Dietetic Association, 110*(9), 1368-1377.

Jilcott Pitts, S.,B., Wu, Q., Demarest, C. L., Dixon, C. E., Dortche, C. J. M., Bullock, S. L., . Ammerman, A. S. (2015). Farmers' market shopping and dietary behaviours among supplemental nutrition assistance program participants. *Public Health Nutrition, 18*(13), 2407-2414. https://doi.org/10.1017/s1368980015001111

Kristjansdottir, A. G., De Bourdeaudhuij, I., Klepp, K., & Thorsdottir, I. (2009). Children's and parents' perceptions of the determinants of children's fruit and vegetable intake in a low-intake population. *Public Health Nutrition, 12*(8), 1224-1233. https://doi.org/10.1017/s1368980008004254

Kurotani, K., Nanri, A., Goto, A., Mizoue, T., Noda, M., Kato, M., Tsugane, S. (2013). Vegetable and fruit intake and risk of type 2 diabetes: Japan public health center-based prospective study. *British Journal of Nutrition, 109*(4), 709-17. https://doi.org/10.1017/S0007114512001705

Landais, E., Bour, A., Gartner, A., McCullough, F., Delpeuch, F., & Holdsworth, M. (2015). Socio-economic and behavioural determinants of fruit and vegetable intake in Moroccan women. *Public Health Nutrition, 18*(5), 809-816. https://doi.org/10.1017/s1368980014001761

Landers, P. S. (2007). The Food Stamp Program: History, nutrition education, and impact. *Journal of the American Dietetic Association, 107*(11), 1945-1951. https://doi.org/10.1016/j.jada.2007.08.009

Leak, T. M. (2015). *Behavioral economics strategies and vegetable consumption among low-income children* (Doctoral dissertation, University of Minnesota). Retrieved from https://search-proquest-com.ezp.waldenulibrary.org/docview/1734038701?accountid=14872

Leung, C. W., & Villamor, E. (2011). Is participation in food and income assistance programmes associated with obesity in California adults? Results from a state-wide survey. *Public Health Nutrition, 14*(4), 645-652. https://doi.org/10.1017/s1368980010002090

Long, M. W., Leung, C. W., Cheung, L. W. Y., Blumenthal, S. J., & Willett, W. C. (2014). Public support for policies to improve the nutritional impact of the supplemental nutrition assistance program (SNAP). *Public Health Nutrition, 17*(1), 219-224. https://doi.org/10.1017/s136898001200506x

Melbye, E. L., Overby, N., C. & Ogaard, T. (2012). Child consumption of fruit and vegetables: The roles of child cognitions and parental feeding practices. *Public Health Nutrition, 15*(6), 1047-1055. https://doi.org/10.1017/s1368980011002679

Nakamura, S., Inayama, T., & Arao, T. (2017). A randomized-controlled trial focusing on socio-economic status for promoting vegetable intake among adults using a web-based nutrition intervention programme: Study protocol. *BMC Public Health, 17*. https://doi.org/10.1186/s12889-016-3907-y

Nguyen, B. T., Shuval, K., Bertmann, F., & Yaroch, A. L. (2015). The supplemental nutrition assistance program, food insecurity, dietary quality, and obesity among US adults. *American Journal of Public Health, 105*(7), 1453-1459. https://doi.org/10.2105/ajph.2015.302580

Nguyen, B. T., Shuval, K., Njike, V. Y., & Katz, D. L, (2014). The supplemental nutrition assistance program and dietary quality among US adults: Findings from a nationally representative survey. *Mayo Clinic Proceedings, 89*(9), 1211-1219. https://doi.org/10.1016/j.mayocp.2014.05.010

Nicklas, T. A., Drewnowski, A., & O'Neil, C. E. (2014). The nutrient density approach to healthy eating: Challenges and opportunities. *Public Health Nutrition, 17*(12), 2626-2636. https://doi.org/10.1017/s136898001400158x

Piaget, J. (1950). *The psychology of intelligence*. New York, NY: Routledge.

Pomeranz, J. L., & Chriqui, J. F. (2015). The Supplemental Nutrition Assistance Program: Analysis of Program Administration and Food Law Definitions. *American Journal of Preventive Medicine, 49(3),* 428-436. https://doi.org/10.1016/j.amepre.2015.02.027

Ramsey, R., Giskes, K., Turrell, G., & Gallegos, D. (2012). Food insecurity among adults residing in disadvantaged urban areas: Potential health and dietary consequences. *Public Health Nutrition, 15*(2), 227-237. https://doi.org/10.1017/s1368980011001996

Rosenbaum, D. (2017, July). *Administration's 2018 budget would severely weaken and cut the supplemental nutrition assistance program*. Retrieved from Center on Budget and Policy Priorities: https://www.cbpp.org/research/food-assistance/administrations-2018-budget-would-severely-weaken-and-cut-the-supplemental

Roy, M., Millimet, D. L., & Tchernis, R. (2012). Federal nutrition programs and childhood obesity: Inside the black box. *Review of Economics of the Household, 10*(1), 1-38. https://doi.org/10.1007/s11150-011-9130-9

Ryu, J. H. (2012, November). *Long-term patterns of food insecurity and health status among school-aged children: Evidence from ECLS-K.* Paper presented at the

Association for Public Policy Analysis & Management Fall Conference, Baltimore, MD.

Stang, J., & Bayerl, C. T. (2003). Position of the American dietetic association: Child and adolescent food and nutrition programs. *Journal of the Academy of Nutrition and Dietetics, 103*(7), 887-893. https://doi.org/10.1016/s0002-8223(03)00468-1

Tichenor, N., & Conrad, Z. (2016). Inter- and independent effects of region and race/ethnicity on variety of fruit and vegetable consumption in the USA: 2011 behavioral risk factor surveillance system (BRFSS). *Public Health Nutrition, 19*(1), 104-113. https://doi.org/10.1017/s1368980015000439

Torkan, N., Kazemi, A., Paknahad, Z., & Bahadoran, P. (2018). Relationship of social cognitive theory concepts to dietary habits of pregnant women. *Iranian Journal of Nursing & Midwifery Research, 23*(2), 125-130. https://doi.org/10.4103/ijnmr.IJNMR_157_16

Travis, A. (2012). *The supplemental nutrition assistance program and adherence to nutritional guidelines for fruit and vegetable consumption* (Doctoral dissertation, Walden University). Retrieved from http://search.proquest.com.ezp.waldenulibrary.org/docview/1225576748?accountid=14872

U.S. Dept. of Agriculture, Food and Nutrition Service. (2011). *Supplemental Nutrition Assistance Program USDA Food and Nutrition Service Benefit Redemption Division 2011 annual report.* Washington, DC: Author. . Retrieved from https://fns-prod.azureedge.net/sites/default/files/snap/2011-annual-report.pdf

U.S. Dept. of Agriculture, Food and Nutrition Service. (2016a). *Supplemental Nutrition Assistance Program USDA Food and Nutrition Service Benefit Redemption Division 2016 annual report.*. Washington, DC: Author. Retrieved from https://fns-prod.azureedge.net/sites/default/files/datastatistics/november-performance-report-2016.pdf

U.S. Dept. of Agriculture, Food and Nutrition Service. (2016b). *The supplemental nutrition assistance program: Nutrition education and obesity prevention grant program.* Washington, DC: Author.

U.S. Dept. of Agriculture, Food and Nutrition Service. (2017, May). Women, infants, and children (WIC). Retrieved from https://www.fns.usda.gov/wic/women-infants-and-children-wic

U.S. Dept. of Health and Human Services & U.S. Dept. of Agriculture. (2015, December). *2015–2020 dietary guidelines for Americans* (8th Ed.). Washington, DC: Author. Retrieved from http://health.gov/dietaryguidelines/2015/guidelines/

Wise, J. B. (2002). Social cognitive theory: A framework for therapeutic recreation practice. *Therapeutic Recreation Journal, 36*(4), 335–351. Retrieved from https://eric.ed.gov/?id=EJ673944

Vartanian, T. P., & Houser, L. (2012). The effects of childhood SNAP use and neighborhood conditions on adult body mass index. *Demography, 49*(3), 1127-1154. https://doi.org/10.1007/s13524-012-0115-y

Via, M. (2012) The malnutrition of obesity: Micronutrient deficiencies that promote diabetes. *ISRN Endocrinology, 2012,* 1-8. https://doi.org/10.5402/2012/103472

Wang, D., Kogashiwa, M., Mori, N., Yamashita, S., Fujii, W., Ueda, N., . . . Masuoka, N. (2016). Psychosocial determinants of fruit and vegetable consumption in a Japanese population. *International Journal of Environmental Research and Public Health, 13*(8), 1-11. https://doi.org/10.3390/ijerph13080786

Wilde, P., & Ranney, C. (2000). The monthly Food Stamp cycle: Shopping frequency and food intake decisions in an endogenous switching regression framework. *American Journal of Agricultural Economics*, *82*(1), 200-213. https://doi.org/10.1111/0002-9092.00016