Exploring the Impact of Increased Access and Experiential Learning on Fruit and Vegetable Consumption for Diabetes Prevention Program Participants

A. Jaelyn Munson

Applied Nutrition and Physical Activity, Virginia Tech

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Dr. Carlin Rafie

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Committee Members:

Dr. Elena Serrano

Kimberly Butterfield, MPH

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Abstract

The aim of this study was to address the need to improve ways of encouraging individuals who are living with prediabetes to increase their daily consumption of fruits and vegetables. In order to address this problem, the study explored a strategy that could serve as motivation and skill-building in people who are living with prediabetes. The first part of the strategy was to provide participants with weekly allotments of fresh fruits and vegetables. In addition to providing fresh fruits and vegetables, the second part of the strategy allowed participants to experience a food demonstration highlighting a healthy recipe using one or two of the fresh fruits and vegetables. The strategy was implemented along with a weekly curriculum from a "lifestyle change program" led by a trained coach (CDC, 2021e). To evaluate the impact of the strategy, dietary consumption surveys were collected from individuals enrolled in the CDC-recognized lifestyle change program in two different cohorts (a control group and intervention group) located in Southwest Virginia over an eighteen-week period. Both groups responded to a survey regarding their fruit and vegetable consumption and the data was analyzed for the relationship between fruit and vegetable access and skill-building food demonstrations and consumption of fruit and vegetables. The results could assist diabetes instructors and coaches in developing program components to implement with their clients who are living with prediabetes to encourage behavior changes around meeting the recommended daily consumption of fruits and vegetables.

Keywords: prediabetes, prevention, fruits and vegetables

Introduction

Background and Significance

Prediabetes is on the rise in the United States and organizations are gathering resources to assist in the fight to reduce the number of Americans developing type 2 diabetes (Centers for Disease

Control and Prevention [CDC], 2021a; CDC, 2021b). The optimal time to intervene with health behavior strategies to decrease the likelihood of developing type 2 diabetes is when an individual is first diagnosed with prediabetes, or otherwise determined to be at risk of developing diabetes due to personal and family health history (Walker et al., 2010). The Centers for Disease Control and Prevention (CDC) is one agency taking on the responsibility to promote a prediabetes program in order to provide the necessary interventions to stop diabetes from developing (CDC, 2021b). The National Diabetes Prevention Program (National DPP) is a national partnership of organizations joined together to implement community focused programming in order to increase awareness of prediabetes and to reduce incidence rates throughout the country (CDC, 2021b). The National DPP promotes the dissemination and implementation of a year-long "CDC-recognized lifestyle change program," based in research, which organizations can utilize for programs in their communities (CDC, 2021e). The CDC program is a highly developed program and has been tested throughout the years to verify its effectiveness in reversing prediabetes in individuals who participate (CDC, 2021b; Klug et al., 2008). Although the lifestyle change program is effective overall, there are times when lack of access to healthy food and knowledge of how to prepare healthy meals in the home needs to be addressed with the participants.

In response to discovering optimal strategies, researchers have endeavored to uncover motivations and barriers around healthy eating and how food access impacts choosing healthier foods. There are a handful of studies with various populations that evaluate what motivates or hinders people to eat a healthy dietary pattern (Bukman, 2014; Lowe, 2003; McGowan et al., 2016; Schoenberg, 2013). Motivations tend to be similar among varying populations (e.g. age, race, geographical regions); however, low economic status is a barrier to healthy food choices that differentiates populations. Low economic status reduces chances to access healthier foods, due to cost or distance, therefore people in poor or rural areas are not as likely to choose healthier foods (Bukman et al., 2014; Rafacz, 2019).

A further review of literature provides insight into skill-building and the necessity of individuals needing food preparation skills to increase their consumption of fruits and vegetables. It is noted that food skills are essential to eating healthy in the home, and in particular, food demonstrations are a desired program component of individuals trying to eating healthier (Hyland et al., 2005; McKellar et al., 2007; Rafacz, 2019; Schulz, 2005). It has been determined that capacity building can be retained over time; however, the skills evaluated were not always in relation to food skills but other behavioral skills (Hyland et al., 2005; Johnson et al., 2005). Further trials are necessary to confirm how long food skills are retained and the impact acquired skills have on healthier food choices.

Overall, there are a limited number of studies that look directly at healthy food access and skill-building with a population who is at risk for developing diabetes in relation to their consumption level of fruits and vegetables. This lack of data on proven strategies to increase fruit and vegetable consumption among those living with prediabetes is unfortunate as it is the type of information needed by health educators. Those whose work is in educating clients who want to make lasting behavior changes and reverse their risk for developing type 2 diabetes need direction on how to best support those individuals. Providing health educators with proven strategies to achieve sustainable change in individuals could increase the likelihood that the individual is successful in improving their behavior and health.

Purpose of Study

To address the gap in knowledge about the impact of skill-building and short-term provision of produce on fruit and vegetable intake in participants of the Diabetes Prevention Program, an eighteen-week, non-randomized controlled pilot study was conducted that provided individuals enrolled in a DPP cohort in Southwest Virginia with fresh produce to use for their daily fruit and vegetable consumption. In addition, during the weekly program sessions, individuals watched a food demonstration featuring a recipe that corresponded with one or more of the fruits and vegetables they received that week. Each

individual self-reported on their habitual consumption of fruits and vegetables at designated times prior to the interventions and during a follow-up period of the study. The collected data was analyzed to explore the correlation between the strategies and the recommended daily intake (RDI) of fruits and vegetables.

Preliminary Work

The study was born out of the observation that participants in the CDC recognized lifestyle change program (DPP) struggle to adopt healthier food habits regardless of weekly curriculum instruction, goal setting, and group support. A 2021 DPP cohort, was provided with easy-to-follow recipes and increased access to fresh produce, indicated such additions to the program encouraged regular fruit and vegetable consumption. The goal of the 18-week study was to measure the difference in response to modifying fruit and vegetable intake between two participant groups, an intervention group and control group. It was hypothesized that skill-building food demonstrations and increased access would have a positive impact on participants meeting the recommended daily intake of fruits and vegetables.

Theoretical Perspective

Introduction to the Theory Approach

In considering how to guide planning for the 18-week study it was determined the most effective approach would be to apply Social Cognitive Theory (SCT) through an ecological model. The focus of SCT is on the individual's cognitions, their environment, and their behavior (McKenzie et al., 2013; Simons-Morton et al., 2012b). SCT recognizes "that the purpose is not simply to change behavior but to facilitate personal control over self-directed behavior" and the proven way to support this self-control is through a reciprocal action between the aforementioned person, behavior, and environment (Simons-Morton et al., 2012b, p.139). For this study, attention to the constructs of environment, self-

efficacy, and behavioral capability were addressed in planned interventions with intent to encourage sustained, self-directed behavior (Simons-Morton et al., 2012b, pp. 136-142).

Applying an ecological model to the study supports the idea of influencing a variety of levels; the planned interventions (weekly food demonstrations, meeting as a group, and providing access to fruits and vegetables) address at least three levels of influence in conjunction with SCT constructs mentioned previously. Levels of influence covered in the ecological model are the individual perspective, social connections, community culture, environmental landscape, or policies that impact individuals' choices or environment; however, all levels included in the model will not be covered in this study (Salmon et al., 2020, p. 239; Simons-Morton et al., 2012a, pp. 44-46). Applying SCT with an ecological approach increased the likelihood that success would result in the individuals increasing their daily fruit and vegetable consumption (Salmon et al., 2020, pp. 244-246).

General Application of SCT and Ecological Models

Ecological models allow researchers to impact change from a variety of perspectives. Many times, researchers or health practitioners will pair the ecological model with a behavior change theory, like SCT, in order to provide focused structure to planned interventions (Salmon et al., 2020, p. 240, 242). This approach helps to address the weakness of ecological models in that they are general in scope and do not provide directives on how to engage with the population or how to develop interventions (Salmon et al., 2020, p. 239).

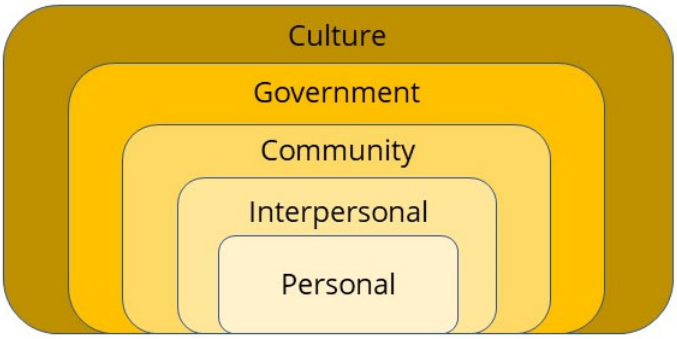
SCT is geared towards changing an individual's behavior rather than a larger group like a family, social circle, workplace, or community (Simons-Morton et al., 2012b). Often SCT is applied in situations where a health practitioner is concerned with making lasting changes like in weight loss, exercise habits, dietary improvements, or smoking cessation (McKenzie et al., 2013, pp. 189-190). Changes in behavior in these realms require the individual to master intrapersonal cognitions influenced by the environment, their behavior and the behaviors of others, as well as the social landscape (Simons-Morton et al.,

2012b). SCT is the best fit because it provides constructs to guide individuals in developing skills and thinking patterns to master their own behaviors.

It is important to remember that ecological models function by addressing influential points at any of the following levels: personal, interpersonal, community, government, and culture (Figure 1) (Salmon et al., 2020, p. 239; Simons-Morton, 2012a, p. 45). In most instances, researchers or health practitioners will not focus on all levels at once; although, it has been determined that the more levels impacted, the greater the opportunity for success (Salmon et al., 2020, p. 243-246). It is more likely for researchers or health promotion planners to influence only one or two levels with a specific health behavior theory as found by Golden and Earp (2012). However, there are times in health promotion programming that multiple levels are influenced; an example would be a smoking cessation program which aims to change attitudes towards smoking of the individual and their families, improve cultural norms through ad campaigns, and pin point societal changes by introducing laws to prohibit smoking in buildings or during gatherings (Salmon et al., 2020, p. 238; Simons-Morton, 2012a, pp. 46, 49-50).

Figure 1

Ecological Model Levels



Literature Review

The CDC created the National DPP which is a partnership among organizations to address the growing need to assist Americans who are at risk for developing type 2 diabetes (CDC, 2021b). In

addition to the partnership, CDC also has a lifestyle change program which community organizations can utilize to promote behavior change in individuals who are living with prediabetes (CDC, 2021b). The lifestyle change program focuses on moderate weight loss and building healthy lifestyle habits to prevent the onset of type 2 diabetes (CDC, 2021e). Healthy lifestyle habits include eating a balanced diet of lean protein, whole grains, low-fat dairy, as well as fruits and vegetables, and being consistently physically active (CDC, 2021f). In addition to healthier eating patterns and physical activity, stress management is also promoted though the program (CDC, 2021f).

Fruit and vegetable consumption are a focus of the lifestyle change program and increased consumption can have an impact on participants meeting goals to reduce diabetes risk and overall mortality (CDC, 2021b; Wang et al., 2021). Therefore, identifying strategies to assist individuals to improve adherence to the recommended daily intake (RDI) of fruits and vegetables is important. Proposed strategies such as ensuring access to fruits and vegetables, utilizing food demonstrations to build individuals' skills, and corresponding recipes to improve compliance with the RDI's need to be further explored prior to making recommendations to health practitioners. Research indicates that if such strategies are implemented for at least six weeks in duration during the DPP lifestyle program, participants will continue to consume increased amounts of fruits and vegetables beyond the six-week time period and reduce their risk of developing type 2 diabetes (Dagogo-Jack, 2019; McKellar et al., 2007).

Analysis of Diabetes Prevention Interventions

Lifestyle modification, such as an increased consumption of fruits and vegetables or increased amounts of physical activity, has been shown to reduce the risk of developing type 2 diabetes by as much as 59% (Walker et al., 2010). A systematic review of literature by Walker et al. (2010), looked at the impact of diet and exercise on the prevention of diabetes and noted that regardless of the continuation of the behavioral interventions that the incidence rate was still lower for those who had

participated in lifestyle modifications years earlier. This finding suggests that interventions to support behavior modification around nutritional habits are an important part of a diabetes prevention program in the short-term as well as the long-term. It is of particular note that fruits and vegetables as part of a healthy diet have been linked to reduced overall mortality (Wang et al., 2021). In addition, a variety of diets focused on incorporating fruits and vegetables have been shown to reduce rates of diabetes in individuals (Walker et al., 2010). Regardless of the evidence and promotion of including fruits and vegetables in a healthy diet, throughout the U.S. the average American does not consume the recommended amounts of fruits and vegetables on a consistent, daily basis (Schoenberg et al., 2013). If an individual were to consume fruits and vegetables more consistently, it is likely that overall dietary goals around diabetes prevention would be met (Walker et al., 2010).

Another study looked at the *Healthy Changes* program which is based on the lifestyle change program recognized by the CDC (Klug et al., 2008). This study considered the intervention's impact on behavior modification and incorporated experiential learning opportunities, like cooking demonstrations and recipe taste tests (Klug et al., 2008). Experiential learning opportunities in diabetes education are important to the participant's ability to establish and maintain behavior changes after completing a program (Wiley et al., 2014, p. 315). Klug et al. (2008) did not isolate the experiential interventions from other program components in regard to their impact on developing healthier food consumption; therefore, no direct correlation between the interventions and program success was determined. However, a study completed by Johnson et al. (2005) showed a strong indication that "behavioral skills training" can and does help individuals retain information (p. 68). This team of researchers worked with pre-school aged children on abduction prevention skills (Johnson el al., 2005). Three-months post intervention, the majority were able to repeat necessary skills back to the instructors without prompts (Johnson et al, 2005). Findings such as this show that interventions designed to give participants skill-building experiences can be beneficial in retaining information and modified behaviors.

A study looking at social determinants of health and diabetes prevention, found that participants have a “strong interest” in educational resources around healthy cooking strategies and recipes including food demonstrations (Schulz et. al., 2005). Another study surveyed participants on preferred ways to develop better eating habits and the participants asked for more educational opportunities to learn food preparation skills through cooking classes (Schoenberg et al., 2013). These conclusions are supported by the work of McKellar et al. (2007), when they worked with women diagnosed with rheumatoid arthritis. In their study they offered the patients six-weeks of instruction including cooking demonstrations in addition to handouts on nutritional information and recipes. Comparing fruit and vegetable intake data of the women before and after the intervention, consumption rates “improved significantly” (McKellar et al., 2007, p. 1241). It is noted by the researchers that six weeks of intervention is sufficient for individuals to modify their behavior and sustain the changes for three months post intervention (McKellar et al., 2007, p. 1241). A review of the literature around interventions based in building skills shows there is success with improving fruit and vegetable consumption when participants are given the opportunity to learn how to incorporate these foods into meals or snacks (see, e.g., Condrasky et al., 2010; Hyland et al., 2006; McKellar et al., 2007; Rafacz, 2019; Schulz et al., 2005).

Barriers to Healthy Food Consumption

Four studies considered barriers to fruit and vegetable consumption and found food access and cost are repeated concerns (Bukman et al. (2014); Lowe (2003); Schoenberg et al., 2013; Schulz et al., 2005). According to Schoenberg et al. (2013), the reasons behind poor dietary habits for those in rural Appalachian communities are a lack of time at home, limited access to stores with quality produce, and cost for families with low socioeconomic status (SES). Participants in the Bukman et al. (2014) study also specifically mentioned the impact of SES in the ability to choose, purchase, and consume healthy food on a regular basis. The residents in the Schulz et al. (2005) study developed a solution to access and cost

concerns; they created “minimarkets” to provide affordable, fresh produce to areas with low access. A concept introduced by Lowe (2003) is to consider providing an incentive to the individual for them to change their own “food environment” like a financial benefit. He indicates that by eliminating, or reducing, the financial barrier the individual will be more likely to choose healthier food options (Lowe, 2003). Access and cost concerns should be addressed in a diabetes prevention program in order to fully support participants in meeting program goals without added stress. One way to do this is to provide free or low-cost produce directly to participants.

Rafacz (2019) looked at reasons people are not consuming healthier foods. She found that the amount of effort an individual has to put towards choosing or preparing a food is one factor that can determine their choice (Rafacz, 2019). The ideas around effort goes beyond cost and access as already discussed although they are mentioned in her report. There is also concern that food knowledge and cooking abilities can be a factor in determining a person’s likelihood of choosing healthy foods over unhealthy foods (McGowan et al., 2016; Rafacz, 2019). By increasing nutrition knowledge with instruction and improving cooking ability through skill-building learning, an individual may be more likely to choose, prepare, and consume healthy foods (McGowan et al., 2016). Rafacz (2019) indicates that combining these focused interventions with cost and access solutions, the likelihood of improved food choices will be increased even more. The study strategy of adding cooking demonstrations and recipe suggestions to the lifestyle change program’s instructional sessions is in line with Rafacz’s findings and will likely be successful in guiding participants to sustained modified dietary behaviors.

Study Design and Methodology

A quasi-experimental design was used to evaluate the impact of fruit and vegetable access and skill-building through food demonstrations on habitual fruit and vegetable consumption. A collaboration with Virginia Cooperative Extension (VCE) made the study possible. The VCE offers the DPP in communities throughout Virginia and agreed to support the study and results will be shared with VCE

program leaders. Participants for two DPP cohorts were recruited from two rural counties in Southwest Virginia over a pre-determined period. Recruitment followed normal procedures taken by DPP Lifestyle Coaches in promoting upcoming programs, including social media advertising, announcements through e-mail listservs and newsletter, as well as fliers distributed to community organizations. The opportunity to participate in a research study was introduced after enrollment into the DPP programs; recruitment activities and promotions took place in late Winter through Spring 2022. All procedures related to the study were reviewed by Virginia Tech's Institutional Review Board (IRB) prior to implementation.

Individuals interested in participating in the DPP met with the Lifestyle Coach prior to the start of the cohort during an information session to review the program and evaluate if individuals met enrollment criteria. According to the CDC, participants must be at risk for developing type 2 diabetes in order to be eligible to participate in the yearlong program (CDC, 2021e). Risk is determined by either a blood test, previous gestational diabetes diagnosis, or through a risk assessment using the CDC's *Prediabetes Risk Test* (CDC, 2021e). The opportunity to participate in the research study was presented to those who enrolled and began the program. Verbal consent was acquired from individuals who enrolled in the DPP and who agreed to participate in the study.

The study was originally designed as a non-randomized, controlled trial, with both the intervention and control group programs conducted by the same Lifestyle Coach. The design was modified as the original Lifestyle Coach left the employ of VCE unexpectedly after completing the intervention cohort. For this reason, the intervention and control cohorts were conducted by different VCE agents/Lifestyle Coaches. As the available control cohort had already begun their program, the evaluation for the control group was modified.

Prior to the study's implementation, it was predetermined that the first cohort would serve as the intervention group. The study intervention (receiving six weeks of free, fresh produce and weekly food demonstrations) procedure was described to the intervention group. The intervention group

completed an assessment survey at three time points, at baseline, six-weeks, and 18-weeks. The control group completed a post-pre assessment survey at 18-weeks that consisted of the same questions as the intervention group survey. For the intervention group, the study began synchronously with the start of the DPP cohort, after the participants were informed of the study and given the opportunity to confirm participation. For the control group, the study began 18 weeks after the start of their DPP cohort and after they were informed of the study and given the opportunity to confirm participation. Upon completion of the six-weeks of intervention, for the intervention group, post intervention follow-up was conducted over the following 12 weeks. There was no post intervention follow-up necessary for the control group.

Intervention Group

The intervention group consisted of individuals from a single DPP program who agreed to participate in the study. Participants received food and food demonstrations during the first six weeks of the DPP curriculum. Prior to the start of the six weeks of intervention participants reported on their usual daily fruit and vegetable consumption through a validated survey, the Food Stamp Program *Fruit and Vegetable Checklist* (Sylva et al., n.d.; Townsend et al., 2003) (see Appendix A). A six-week intervention period was pre-determined to be an appropriate amount of time to observe behavior modifications in eating habits (McKellar et al., 2010, p. 1241). Each weekly session lasted for approximately 60 minutes and covered the DPP curriculum as well as the food demonstration.

Participants received an assortment of fruits and vegetables; this occurred for the first six weeks at the scheduled weekly cohort sessions. The amount (total pounds) of the produce was determined by the number of people in the household which was collected on the baseline survey. Thirty-five pounds of produce would be provided to any participant in a four-person household; this ensured access to enough food to have three to five servings of fruits and vegetables a day throughout the week (Barton & Heald, 1976, p. 4). For smaller households, the total of thirty-five pounds was divided by four and the

allotment calculated based on the number of people in the household; example, a two-person household received approximately 17.5 pounds of fresh fruits and vegetables each week for six weeks. The maximum household size was three people therefore the weekly shopping list reflected the appropriate amount of produce for the households in the study (see Appendix B). The Lifestyle Coach provided, along with the produce, one recipe from the Eat Smart, Move More Virginia website focusing on at least one of the produce provided that week (Virginia Cooperative Extension [VCE], n.d.). Recipes from this website are relatively low in cost and require moderate food skills (see Appendix C). Each week the recipe was demonstrated at the end of the weekly curriculum and participants were given the opportunity to taste test the recipe as an experiential learning exercise.

After completing the six weeks of intervention, participants repeated the survey to report on their habitual fruit and vegetable consumption. The participants continued to attend the weekly DPP cohort sessions as prescribed by the CDC recognized lifestyle change program. Three months post-intervention (at week 18) participants took the survey again to report on current habitual fruit and vegetable consumption. The survey timeframe was based on the findings of Johnson et al. (2005) which illustrates the need to observe behavior modification retention three months post-intervention (p. 75). The researcher conducted a comparison of pre- and post- intervention survey data of the intervention group to determine if they maintained the same level of consumption post intervention. A focus group was conducted among the intervention participants after all survey data was collected. This allowed for qualitative data to be collected on the overall experience and impact of the intervention.

Control Group

As mentioned previously, the method for delivering the study to the control group had to be revised after implementation of the study to the control group, due to a change in staffing. This change was unforeseen and modifications were absolutely necessary for the study to be completed. The main impact was on the assessment timeline and the number of surveys planned for the control group to

participate in. As described below, the control group's surveys were combined and implemented as a post-pre survey at week 18. The change in staffing also impacted the ability to provide the control group with the intervention (produce bags and food demonstrations) after the study was completed as originally intended.

The control group consisted of individuals from a single DPP program who agreed to participate. Through email and during weekly sessions around week 12, participants were informed of the study duration and data collection. Verbal consent to participate was shared directly with the VCE agent who informed the researcher. Participants in the control group participated in the weekly DPP sessions over the 18-week period (sessions were approximately 60 minutes in duration) prior to survey implementation. Upon completion of 18-weekly sessions, the control group was asked to take the post-pre survey on fruit and vegetable consumption. There were two sets of questions within the same assessment. The first set of questions asked them to focus on their fruit and vegetable intake prior to the start of the DPP. The second set of questions asked them to rate their current (week 18) habitual fruit and vegetable consumption. The data from the control groups' surveys was analyzed along with those of the intervention group and compared for any difference in change in intake.

Data Collection

During the study the researcher collected data from both the intervention and control groups regarding their habitual fruit and vegetable consumption as well as attendance at the weekly DPP cohort sessions. Fruit and vegetable consumption was measured using a validated instrument, the *Fruit and Vegetable Checklist*, from the Food Stamp Program in California (Sylva et al., n.d.; Townsend et al., 2003). Participants in the intervention group completed this survey instrument at baseline, the week following the intervention period, and three months post intervention. Participants in the control group completed a post-pre survey that collected data on their fruit and vegetable consumption at baseline (beginning of the DPP) and currently (at week 18); the survey was administered at week 18 for the

control group. Data normally collected during a DPP cohort from each participant on a weekly basis includes their current weight, the number of moderate physical activity minutes performed during the week, and a daily food log (starting at week five) (CDC, 2021d). Since this information was not entirely applicable to the research, the data collected by the Lifestyle Coach was only referred to as secondary data.

A focus group was conducted with the intervention group to collect qualitative data on the overall experience of the study and the impact of receiving the weekly fruits and vegetables and food demonstrations on dietary and purchasing practices, produce preferences, and confidence in food preparation (see Appendix D). The focus group was recorded and transcribed, and reviewed for themes. In addition, an interview was conducted with the VCE agent to gather information on the value and ease of implementing the interventions among the intervention group, which was also recorded, transcribed, and reviewed for themes. The data from the participants and the agent included open-ended responses to allow for more in-depth analysis of the study and assist in knowing how to improve the implementation of the strategy in the future.

The last data point, attendance at weekly DPP cohort sessions, was collected by the Lifestyle Coach leading the group(s). In the event a study participant was absent from the weekly session a make-up session was offered as suggested by the CDC recognized lifestyle change program (CDC, 2021c, p. 12). A comparison of the average participant attendance between the two groups was conducted.

Each question on the survey was analyzed according to the best method as described below. In analyzing questions one, three, four, five, six, and seven the Mann-Whitney *U* test was used to compare the sample means and standard error. For question two, the Fisher's Exact Test for count data was used to compare proportions of the answer "yes" between the two groups. Focus group and interview recordings were transcribed using the Microsoft Office 365 transcribing feature in Word. Hybrid content analysis of the transcripts was conducted as deductive coding was done prior to reviewing the

transcripts and inductive coding was generated as new codes emerged during the review; analysis was completed by the investigator. The transcripts were coded using an online program, Taguette. Codes were reviewed and consolidated to create major themes under each of the areas of inquiry and the findings were summarized.

Ethics

The DPP participants were invited to participate in the study after enrollment into the program. The order of enrollment first, then invitation into the study was important in maintaining an ethical approach (Figure 2). This process ensured that the participant did not feel they had to participate in the study in order to be selected for the year-long program. Participants were provided an IRB approved study participant document that described the study, the voluntary nature of participation, their role in the study, and any risks or benefits to them. Verbal agreement to participate was acquired from each participant prior to the initiation of any study activities.

Figure 2

Study Timeline

	Control Group	Intervention Group
Pre-Program/ Prior to Study	Information session with Lifestyle Coach	Information session with Lifestyle Coach Study invitation Consent to participate Review serving sizes of fruits and vegetables Initial survey completed
Week 1-6	Attend weekly DPP cohort sessions	Attend weekly DPP cohort sessions Each week receive 35 pounds of fresh produce, one recipe, and watch food demonstration
Week 7	Attend weekly DPP cohort sessions	Complete 2nd survey
Week 18	Study invitation Consent to participate Review serving sizes of fruits and vegetables Complete survey	Complete 3rd survey Participate in the focus group

Participants were assigned a participant identification (ID) number to maintain anonymity. The participant ID was used on all study related data collection instruments and databases. The codebook that links the participant ID to the participant's name has been kept separately from participant data and databases.

Summary of Outcomes

Study Results

Survey results

The survey questions focused on the number of servings of fruits and vegetables a participant consumed on a usual basis, if they ate fruits and vegetables as snacks, and whether they had more than one type of fruit or vegetable a day. The survey asked participants to consider what they normally do; some questions were based on a day's time, or no time parameter was provided. One question regarding fruit juice asked for them to report whether they had consumed any fruit juice in the past week. Upon comparing the survey's baseline data of the control group to the intervention group, there was no statistical evidence showing any difference in the consumption of fruits and vegetables between the two groups (Table 1). This was expected due to the random selection of which cohort was the control group versus the intervention group. The comparison of the end of study data also showed no evidence of significant difference between the control group and intervention group (Table 1). This also was expected as the sample size was small and did not provide the amount of data needed for statistical power.

Table 1

Comparison of Fruit and Vegetable Consumption at Baseline and 18 Weeks Between Intervention and Control Groups

		Baseline			18 Weeks		
	Rank	Control (n = 4) # of Responses	Intervention (n = 7) # of Responses	W[a] (p-value)	Control (n = 4) # of Responses	Intervention (n = 6) # of Responses	W[a] (p-value)
Do you eat fruits or vegetables as snacks?[d]	1	0	0	12.0 (0.57)	0	0	11.0 (0.90)
	2	4	6		2	3	
	3	0	1		2	2	
	4	0	0		0	1	
Do you eat more than one kind of fruit each day?[e]	1	2	0	10.5 (0.47)	0	0	8.0 (0.28)
	2	1	7		4	4	
	3	1	0		0	2	
	4	0	0		0	0	
Do you eat more than one kind of vegetable each day?[e]	1	1[c]	1	6.5 (0.37)	0	0	9.0 (0.53)
	2	2	4		3	3	
	3	0	2		1	3	
	4	0	0		0	0	
Do you eat 2 or more vegetables at your main meal?[e]	1	2	0	6.0 (0.07)	0	0	8.5 (0.46)
	2	2	6		3	3	
	3	0	1		1	2	
	4	0	0		0	1	
Did you have citrus fruit or citrus juice during the past week?[f]	1	1	7	n/a[b] (0.02)	2	6	n/a[b] (0.13)
	2	3	0		2	0	

[a] Wilcoxon rank sum test. [b] Fisher's exact test. [c] n = 3, only 3 participants responded to this question. [d] Ranking scale: No = 1, sometimes = 2, often = 3, daily = 4. [e] Ranking scale: No=1, sometimes=2, often=3, always=4. [f] Ranking scale: Yes=1, No=2.

Reviewing the raw data revealed trends within the intervention group. There were indications that participants did increase their vegetable consumption as far as the number of servings they had daily and the variety of vegetables consumed (Table 2). There was also an increasing trend in the intervention group participants in the variety of fruits they consumed; however, the number of servings of fruit decreased from baseline to 18 weeks (Table 2). In reviewing the calculated means for the

number of servings of fruits and vegetables, it revealed there was no change in the number of servings of fruits from six weeks, post-intervention, to 18 weeks, end of study. There was a small increase in the number of servings of vegetables for the period of post-intervention to the end of study. When accounting for the loss of one participant in the intervention group at the 18-week collection period, the calculated mean for the number of servings of vegetables increased at both baseline and at the six-week time period. The calculated mean for the number of servings of fruits increased at baseline and had a slight decrease at six weeks. The inquiry in regards to whether fruits and vegetables were consumed as snacks indicated an increasing trend as well.

Table 2

Comparison of Number of Servings of Fruit and Vegetable Consumed at Baseline and 18 Weeks Between Intervention and Control Groups

	Baseline			18 Weeks		
	Control (n = 4) Mean (s.d.)	Intervention (n = 7) Mean (s.d.)	W[a] (p-value)	Control (n = 4) Mean (s.d.)	Intervention (n = 6) Mean (s.d.)	W[a] (p-value)
How many servings of fruit do you eat each day?	1.75 (1.50)	2.43 (1.30)	9.0 (0.37)	2.63 (0.75)	1.83 (0.68)	19.5 (0.12)
How many servings of vegetables do you eat each day?	2.00 (1.15)	2.40 (1.08)[b]	7.0 (0.53)	2.63 (0.75)	2.83 (0.68)	10.0 (0.74)

[a] Wilcoxon rank sum test. [b] n = 5, only 5 participants responded to this question.

For the control group, the raw data showed similar trends in the control group as it did for the intervention group as far as increasing the number of overall servings (Table 2). In the control group, there was a trend of increased servings in both fruit and vegetables. There was also an increase in the variety of fruits and vegetables consumed and the consumption of fruits and vegetables as snacks. The

similarity in the results between both groups indicates that the curriculum does support participants in increasing their fruit and vegetable consumption.

A formal statistical analysis of data at the various time intervals within each group was conducted (Table 3). The comparison of the intervention group showed that there was a marginal indication of evidence against the null hypothesis for whether they consumed fruits and vegetables as snacks when looking at the baseline data compared to the end of study data. When reviewing the analysis of the control group, the results indicated the same when comparing whether they ate two or more vegetables at the main meal from baseline to 18 weeks. The overall analysis for each group confirmed a lack of statistical evidence with the quantitative data.

Table 3

Comparison of Fruit and Vegetable Consumption at Various Time Intervals

	Intervention		Control[a]	
Do you eat fruits or vegetables as snacks?	Baseline/ 6 Weeks	W = 0 p = 0.07	Baseline/ 18 Weeks	W = 0 p = 0.17
	6 Weeks/ 18 Weeks	W = 1.5 p = 0.68		
	Baseline/ 18 Weeks	W = 0 p = 0.07		
How many servings of fruit do you eat each day?	Baseline/ 6 Weeks	W = 15 p = 0.86	Baseline/ 18 Weeks	W = 2 p = 0.17
	6 Weeks/ 18 Weeks	W = 0 p = 1.00		
	Baseline/ 18 Weeks	W = 12 p = 0.91		
Do you eat more than one kind of fruit each day?	Baseline/ 6 Weeks	W = 0 p = 0.17	Baseline/ 18 Weeks	W = 2 p = 0.39
	6 Weeks/ 18 Weeks	W = 1.5 p = 0.68		
	Baseline/ 18 Weeks	W = 0 p = 0.17		

Do you eat more than one kind of vegetable each day?	Baseline/ 6 Weeks	W = 2 p = 0.39		
	6 Weeks/ 18 Weeks	W = 1.5 p = 0.68	Baseline/ 18 Weeks	W = 0 p = 0.50
	Baseline/ 18 Weeks	W = 2 p = 0.39		
How many servings of vegetables do you eat each day?	Baseline/ 6 Weeks	W = 3 p = 0.97		
	6 Weeks/ 18 Weeks	W = 0 p = 0.04	Baseline/ 18 Weeks	W = 1.5 p = 0.29
	Baseline/ 18 Weeks	W = 4 p = 0.81		
Do you eat 2 or more vegetables at your main meal?	Baseline/ 6 Weeks	W = 0 p = 0.06		
	6 Weeks/ 18 Weeks	W = 1.5 p = 0.68	Baseline/ 18 Weeks	W = 0 p = 0.07
	Baseline/ 18 Weeks	W = 0 p = 0.19		
Did you have citrus fruit or citrus juice during the past week?[b]	Baseline/ 6 Weeks	M = 0 diff = 1 p = 1.00	Baseline/ 18 Weeks	M = 0 diff = 1 p = 1.00
	6 Weeks/ 18 Weeks	M = 0 diff = 1 p = 1.00		

Note. W = Wilcoxon rank sum test (one-sided test completed to show whether fruit/vegetable consumption increased across time), M = McNemar's chi-squared test.

[a] Control group did not complete 6 weeks data therefore the time comparison of baseline/6 weeks was omitted. [b] Computed only for two time intervals due to observations being exactly the same.

Attendance of participants in both the control group and intervention group was collected and analyzed over the 18-week study period. The average number of sessions attended by those in the control group was 7.70 compared to the average of 7.00 sessions in the intervention group. Due to the slight margin of difference between the two groups, along with the lack of statistical significance in the survey data, attendance data was not further analyzed.

Focus group and interview results

Analysis of themes from the qualitative data illustrated the impact of the intervention on the participants in the three areas of SCT, environmental, personal, and behavioral. The discussion regarding the impact of the weekly produce bags indicated a positive environmental impact. They were generally helpful in providing access to fruits and vegetables especially given that participants were concerned about cost. In addition to cost and access, the variety of fruits and vegetables exposed the participants to new varieties they were not likely to try on their own. Personal skill building and behavior change were themes that came out during discussion around the food demonstrations. These indicated that the demonstrations were helpful in providing ideas to participants on how to use the fruits and vegetables. It was noted that the recipes were delicious, and increased their knowledge of how to incorporate a larger variety of fruits and vegetables into their diets. Finally, the demonstrations encouraged them to try the recipes on their own.

There were no recommendations on how to improve the food demonstrations, however, one concern was around the food demonstrations and the VCE agent having access to the appropriate equipment and space. The VCE agent leading the intervention group had access to a large cooking area in the classroom where the cohort met. This cooking area and kitchen provided the necessary equipment to demonstrate the recipes each week. However, there is concern for VCE agents who do not have access to such a space and how this would impact their ability to effectively implement an intervention like a food demonstration.

One recommendation obtained from the focus group was for the duration of the produce bags to be extended. The participants mentioned they often had too much produce each week and prepared the leftover produce for freezing and later use. They enjoyed the bags and recommended that instead of only six weeks duration that the program be extended for twice the amount of time, to 12 weeks, and the amount of produce each week be reduced to cover the extended duration. This would eliminate the need to prepare unused produce for freezing and use at a later date.

Information from the interview with the VCE agent who led the intervention group fell into three themes for improving the delivery of the strategy, addressing the workload, benefits of demonstrations, and sustainability (see Appendix E). First, the workload, shopping for all of the produce and then separating the produce out into bags for each participant household, was too much for one person. It was recommended for the agent to have volunteers (e.g. Master Food Volunteer) to assist in the shopping and dividing out the produce among the bags for the participants. Second, the food demonstrations were a fun, interactive additional element to the weekly sessions and was continued after the duration of the study. There were no recommendations on how to improve the food demonstrations. Third, for sustainability of providing produce bags to participants in DPP cohorts, it was recommended that VCE agents partner with local grocery chains and apply for gift cards. This would allow for available, local funds to be used for interventions to support participant's access to healthy, fresh produce.

Discussion

The survey results of both the intervention group and control group suggests that the DPP curriculum used along with the support from the VCE agents (Lifestyle Coaches) and group members is providing the necessary support to make behavior change possible around increased fruit and vegetable consumption. The qualitative feedback from participants in the intervention group, a strong case is made for providing the produce bags and cooking demonstrations. Indications of the helpfulness of the produce bags in improving access to fruit and vegetables was clear along with how beneficial it was to household budgets. When reviewing the demographics of cohort participants, if household income is collected and correlations to budgetary concerns are confirmed, making a decision to provide produce bags to participants would eliminate the cost barrier to healthy eating choices. The food demonstrations were proven to be helpful in providing ideas on how to incorporate more fruits and vegetables in meals and snacks in the home. They were also able to taste a greater variety of fruits and vegetables before

attempting to eat them on their own and this decreased a barrier to trying new varieties. The demonstrations were seen as a morale booster and allowed the participants to have something to look forward to each week in addition to the curriculum review. The strategy to increase access and provide skill-building opportunities contributed to the overall success of increasing fruit and vegetable consumption among the intervention group. When possible, adding strategies like these to the implementation of the DPP curriculum can impact the participants' success in making the necessary behavior changes to prevent prediabetes.

Limitations

Limitations that occurred during the 18-week study were related to the sample size, demographics of participants, and geographical location. The proposed project was a pilot study and was not powered to detect statistically significant effects. Regardless, the sample size depended on the number of participants enrolled in the DPP programs and those willing to participate in the study. Due to a low response to local marketing of the two DPP programs, there was a small number of participants in both the intervention group and control group. Every effort to use recruitment methods that would result in sufficient enrollment was made.

Another limitation relates to the generalizability of the findings. Promotion for the in-person programs was done by the respective organization leading the cohort (e.g. VCE) in a specific geographical location in Virginia (i.e. Southwest Virginia). Promotion efforts were determined by the hosting organization and the targeted communities which influenced the demographic make-up of the cohorts. Due to the limited area of recruitment, the outcomes may not be generalizable to other areas of the state or nation.

A third, unforeseen, limitation was the resignation of the VCE agent who led the intervention cohort. The original plan for the cohorts was to have the same VCE agent lead both the control group and the intervention group. However, due to the agent leaving the position after the intervention group

completed the study, the control group was left unfinished. This required the researcher to seek out another VCE agent willing to assist with the study who was promoting a DPP cohort. The only available cohort to serve as the control group had started the DPP program 12 weeks earlier therefore the study timeline, including the number and distribution of surveys, was revised. The control group's survey was combined into one assessment (post-pre survey); the assessment asked the same questions regarding fruit and vegetable consumption habits, but in the post-pre format in a single survey. This unforeseen change led to a decreased number of survey respondents and caused the data of the control group available for the analysis to be reduced to estimates of fruit and vegetable intake at baseline and 18 weeks. The six-week data was not available; a comparison at that time period was omitted and full analysis was not able to be completed. In planning for collecting qualitative data, the control group was not included; however, by conducting a focus group with the control cohort could have helped confirm if the trends shown in the data came from the curriculum and participation in the weekly DPP sessions or if there were other underlying, contributing causes for the similar trends between both groups.

Conclusion

The research conducted has important relevance for the diabetes prevention world, providing information on how to better serve clients and meet their need for effective supports for behavior change. This project responded to a need for further research on strategies to increase dietary behavior change through experiential learning and food access. By taking an ecological approach to the research and studying a multi-strategy approach that addressed personal, environmental, and behavioral factors, we have provided health educators with additional information on how to assist participants in their programs to overcome barriers to healthier eating. Due to this being a pilot study, the next step would be to design a study that is large enough to be powered to detect significant changes, if any, between the control group and the intervention group. Including collection of qualitative data from both groups will assist in understanding possible contributing factors to the findings as the current qualitative data

indicates that the study strategy is promising. In addition to collecting data on fruit and vegetable consumption, it is recommended that gender, age, race, and household income be included in the collection of quantitative data. During the focus groups, it is recommended to specifically ask if there are limitations to making the recipes (e.g., lack of necessary equipment or recipe ingredients). The impact of further research when applied in practice will result in more individuals finding success with consuming higher amounts of fruits and vegetables and reducing their risk of developing type 2 diabetes.

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Appendix A

Survey

Fruit and Vegetable Checklist

These questions are about the ways you you plan and fix food.
Think about how you usually do things.

Participant ID

Today's date

Month Day Year

How many people are in your household?

Do you eat fruits or vegetables as snacks?

- No

Fruit and Vegetable Checklist QuestionPro

- Yes, sometimes
- Yes, often
- Yes, everyday

Did you have citrus fruit or citrus juice during the past week?

- Yes
- No

How many servings of fruit do you eat each day?

Do you eat more than one kind of **fruit** each day?

Fruit and Vegetable Checklist QuestionPro

- No
- Yes, sometimes
- Yes, often
- Yes, always

Do you eat more than one kind of **vegetable** each day?

- No
- Yes, sometimes
- Yes, often
- Yes, always

Fruit and Vegetable Checklist QuestionPro

How many servings of vegetables do you eat each day?

Do you eat 2 or more vegetables at your main meal?

- No
- Yes, sometimes
- Yes, often
- Yes, everyday

Appendix B

Eat Smart, Move More Recipe

Eat Smart • *Move More*

Garden Vegetable Wrap

Prep Time: 10 minutes
Total Time: 15 minutes

Ingredients

1 ½ ounces reduced fat cream cheese
2 carrots, shredded
1 cup spinach, chopped
1 tomato, diced
1 bell pepper, chopped
¼ cup reduced fat cheddar cheese, shredded
4 whole-wheat tortillas

Directions

1. Spread cream cheese evenly onto each tortilla.

2. Place carrots, spinach, tomato, bell pepper, and cheese on top of cream cheese.

3. Roll up tightly and secure with a toothpick, if needed.

Quick Tips

- Try using different vegetables, such as avocado, zucchini, cabbage, cauliflower, onion, and beans to make this wrap.
- Try roasting the vegetables before making these wraps.
- Substitute the cream cheese for strained yogurt or hummus.

(Recipe adapted from: https://www.bettycrocker.com.)

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Nutrition Facts

4 servings per container
Serving size **1 serving (156.22g)**

Amount per serving	
Calories	**180**
	% Daily Value*
Total Fat 9g	**12%**
Saturated Fat 4.5g	**23%**
Trans Fat 0g	
Cholesterol 15mg	**5%**
Sodium 290mg	**13%**
Total Carbohydrate 23g	**8%**
Dietary Fiber 5g	**18%**
Total Sugars 3g	
Includes g Added Sugars	
Protein 7g	
Vitamin D 0mcg	0%
Calcium 84mg	6%
Iron 0mg	2%
Potassium 269mg	6%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

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Appendix C

Weekly Shopping List

Week 1	Recipe: Vegetable Stir Fry		
	1-Person	2-Person	3-Person
Fruits			
Bananas	1# (3)	2# (6)	3# (9)
Oranges	.5# (2)	1# (4)	1.5# (6)
Kiwis	.5# (3)	1# (6)	1.5# (9)
Raspberries	12 oz (2-6 oz packs)	18 oz (3-6 oz packs)	24 oz (4-6 oz packs)
Pears	.5# (2)	1# (4)	1.5# (6)
Vegetables			
Broccoli	.5# (1 head)	1# (2 heads)	1.5# (3 heads)
Califlower	1# (1 head)	2# (2 heads)	3# (3 heads)
Beets	1# (1 bag)	1# (1 bag)	2# (2 bags)
Carrots (whole)	1# (1 bag)	1# (1 bag)	2# (2 bags)
Celery	1# (1 bag)	1# (1 bag)	2# (2 bags)
Bell Pepper	.5# (2)	1# (4)	1.5# (6)
Green Beans	.5#	1#	1.5#
Sweet Potatoes	.5# (2)	1# (4)	1.5# (6)
TOTAL WEIGHT	**~9#**	**~15#**	**~24#**

Week 2	Recipe: Apple Salsa		
	1-Person	2-Person	3-Person
Fruits			
Apples	1# (3)	2# (6)	3# (9)
Bananas	1# (3)	2# (6)	3# (9)
Grapes	.75#	1.5#	2.25#
Mangos	.5# (1)	1# (2)	1.5# (3)
Limes	.5# (2)	1# (4)	1.5# (6)
Vegetables			
Bell Pepper	.5# (2)	1# (4)	1.5# (6)
Onion	.5# (2)	.75# (3)	1# (4)
Baby Bok Choy	1# (3 heads)	2# (6 heads)	3# (9 heads)
Baby Carrots	1# (1 bag)	2# (2 bags)	3# (3 bags)
Jalapeno Pepper	.25# (2)	.5# (4)	.75# (6)
Green Beans	.5#	1#	1.5#
Potatoes	2# (4)	3# (6)	4# (8)
TOTAL WEIGHT	**9#**	**17.75#**	**25.5#**

Week 3	Recipe: Garden Vegetable Wrap		
	1-Person	2-Person	3-Person
Fruits			
Pears	.5# (2)	1# (4)	1.5# (6)
Blueberries	.75# (1 pint)	.75# (1 pint)	1.5# (2 pints)
Oranges	.5# (2)	1# (4)	1.5# (6)
Grapes	.75#	1.5#	2.25#
Bananas	1# (3)	2# (6)	3# (9)
Vegetables			
Yellow Squash	1# (3)	1.5# (5)	2# (7)
Carrots (whole)	1# (1 bag)	1# (1 bag)	2# (2 bags)
Bell Peppers	.5# (2)	1# (4)	1.5# (6)
Tomatoes	1# (3)	1.25# (4)	1.5# (5)
Onions	.5# (2)	.75# (3)	1# (4)
Potatoes	2# (4)	3# (6)	4# (8)
Baby Spinach	.75# (1-10 ounce bag)	1.5# (2-10 oz bags)	2.25# (3-10 oz bags)
TOTAL WEIGHT	**10.25#**	**16.25#**	**24#**

Week 4	Recipe: Baked Apples and Sweet Potatoes		
	1-Person	2-Person	3-Person
Fruits			
Apples	1# (3)	2# (6)	3# (9)
Bananas	1# (3)	2# (6)	3# (9)
Guava	1# (1 package)	1# (1 package)	2# (2 packages)
Oranage (Cara Cara)	.5# (2)	1# (4)	1.5# (6)
Grapes	.75#	1.5#	2.25#
Vegetables			
Sweet Potatoes	.75# (3)	1# (4)	1.5# (6)
Sugar Snap Peas	.5# (1 bag)	1# (2 bags)	1.5# (3 bags)
Brussel Sprouts	1# (1 bag)	2# (2 bags)	#3 (3 bags)
Onion	.5# (2)	.75# (3)	1# (4)
Baby Carrots	1# (1 bag)	2# (2 bags)	3# (3 bags)
Tomatoes	1# (3)	1.25# (4)	1.5# (5)
Kale	1# (1 bunch)	2# (2 bunches)	3# (3 bunches)
TOTAL WEIGHT	**10#**	**17.5#**	**26.25#**

Week 5	Recipe: Strawberry Spinach Salad		
	1-Person	2-Person	3-Person
Fruits			
Strawberries	1# (1 package)	2# (2 packages)	3# (3 packages)
Dragonfruit	1# (1)	2# (2)	3# (3)
Blueberries	.75# (1 pint)	.75# (1 pint)	1.5# (2 pints)
Bananas	1# (3)	2# (6)	3# (9)
Plums	.5# (3)	1# (6)	1.5# (9)
Vegetables			
Spinach	1# (1 bag)	2# (2 bags)	3# (3 bags)
Onion	.5# (2)	.75# (3)	1# (4)
Green beans	.5#	1#	1.5#
Sweet Potatoes	.5# (2)	1# (4)	1.5# (6)
Collards	1.5# (1 bunch)	3# (2 bunches)	4.5# (3 bunches)
Broccoli	.5# (1 head)	1# (2 heads)	1.5# (3 heads)
Parsnips	1# (1 bag)	1# (1 bag)	2# (2 bags)
TOTAL WEIGHT	**9.75#**	**17.5#**	**27#**

Week 6	Recipe: Summer Squash Medley		
	1-Person	2-Person	3-Person
Fruits			
Bananas	1# (3)	2# (6)	3# (9)
Pears	.5# (2)	1# (4)	1.5# (6)
Peaches	.75# (2)	1.5# (4)	2.25# (6)
Oranges (Blood)	.5# (2)	1# (4)	1.5# (6)
Apples	1# (3)	2# (6)	3# (9)
Vegetables			
Tomatoes	1# (3)	1.25# (4)	1.5# (5)
Zucchini	1# (3)	1.5# (5)	2# (7)
Yellow Squash	1.25# (4)	1.5# (5)	2# (7)
Onion	.5# (2)	.75# (3)	1# (4)
Potatoes	2# (4)	3# (6)	4# (8)
Carrots (whole)	1# (1 bag)	1# (1 bag)	2# (2 bags)
Bell Peppers	.5# (2)	1# (4)	1.5# (6)
TOTAL WEIGHT	**11#**	**17.5#**	**25.25#**

Appendix D

Focus Group Guide

Introduction

[Moderator: Introduce yourself and any co-moderators or other project members present.]

Thank you for agreeing to participate in this discussion group. We are conducting this discussion group because we want to hear your opinions and experiences regarding your experience during the DPP study. We are trying to learn more about how the program interventions affected behaviors. Your opinions and experiences are important part of that effort.

Before we begin discussing today's topic, I want to go over some basic information. The first part is to make sure that everyone wants to participate today and to give you information about what that means. When we gather information from people as part of research, we ask them to understand what part they have in the research and to verbally consent that you would like to participate. We will go over that now:

Are there any questions so far? Is there anyone not comfortable with the session being recorded?

Next, I would like to give you an overview of how the discussion group will work. I will ask some questions about your experiences and opinions as they relate to the DPP study interventions. There are no right or wrong answers, and the most important information will come from the range of everyone's thoughts and experience. We want to be sure that everyone feels comfortable and gets the opportunity to express their opinions. In order to accomplish that, we will go over a few ground rules for today's discussion. Stop me if you have any questions.

1. This is a conversation. There are no right or wrong answers and we are not here to judge each other's responses. Once someone is finished speaking, the next person will have a chance and it does not matter if people agree or disagree with each other. We also ask that only one person speak at a time, so that we can be sure to hear what everyone has to say.

2. My role is to facilitate the discussion. I may ask specific people about their thoughts or ideas if they have not had a chance to share, and I may move us along in the conversation in order to keep within our allotted time. Having said that, I do want to be sure that everyone gets to express all of their thoughts, so please feel free to speak up.

3. In order for people to feel free to speak, we need to respect each other's thoughts and opinions. We also want to be sure that we respect each other's privacy. What you hear people talk about here should stay in this room – please do not share what other people said with others outside this group.

4. You have all chosen the name by which you would like us to call you and have written that on your name tag. Please use each other's chosen name.

5. Finally, please turn your cell phones off and put them away.

Focus Group Questions

Study Participants

1. What impact, if any, did receiving a weekly bag of fruits and vegetables have on your habit of eating fruits and vegetables?
    Probes:
    1. Did it effect how often or which vegetables you ate?
    2. How about how often or which fruits you ate?
2. How did receiving the weekly bag of fruits and vegetables for 6 weeks effect your purchases of fruits and vegetables in the following 12 weeks?
    1. How did it effect the fruit and vegetables you ate in the following 12 weeks?
3. What impact, if any, did the cooking demonstrations have on you?
    Probes:
    1. Did it effect your confidence in preparing fruits and vegetables?
    2. Did it effect the fruits and vegetables that you like? (whether they liked them or not)
    3. How about how often you ate fruits and vegetables in the food demonstration?
4. What about the recipes did you enjoy? What about the recipes did you not enjoy?
5. What other impacts, if any, did you notice from receiving the produce bags?

Conclusion

Thank you so much for your time and feedback. The information you provided will be helpful in determining the success and future of program interventions like the one in the study.

Appendix E

Interview Guide

Introduction

[Moderator: Introduce yourself.]

Thank you for agreeing to participate in this interview. We are conducting this because we want to hear your opinions and experiences regarding your role in the DPP study. We are trying to learn more about how the implementation of the program's intervention went. Your opinion and experience is important part of that effort.

Next, I would like to give you an overview of how the interview will go. I will ask some questions about your experiences and opinions as they relate to the DPP study intervention. There are no right or wrong answers. Please openly share your thoughts on each question. If there is a question you wish to skip over, please indicate that and we will move on.

Lifestyle Coach Questions

1. Tell me your general impressions of the impact of providing the produce and food demonstrations had on the DPP participants.
2. What was your experience having to organize the purchase and distribution of the produce?
   Probes:
   1. How did the process of purchasing the weekly bags of produce go?
   2. Did any issues arise with the purchasing of the weekly produce bags?
3. What was your experience conducting the food demonstrations?
   Probe:
   1. What issues, if any, arose with conducting the weekly food demonstrations?
4. Do you have any recommendations on how to make the food purchasing or food demonstrations easier?
5. How likely are you to provide a similar program to future DPP cohorts?
   Probes:
   1. What barriers would keep you from offering a produce bag in the future?
   2. What barriers would keep you from offering food demonstrations as part of the DPP in the future?

Conclusion

Thank you so much for your time and feedback. The information you provided will be helpful in determining the success and future of program interventions like the ones in the DPP study.