Feasibility of an Experiential Community Garden and Nutrition Program for Youth Living in Public Housing: Exploring Outcomes from Youth, Parents & Site Leaders

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ABSTRACT

**Background:** Community gardens have existed in America since the late 1800s and have served multiple purposes from food subsidies to neighborhood beautification. The use of community gardens has grown in popularity and has been recommended as a way to encourage healthy eating habits in youth. Though the health benefits of having a diet high in fruits and vegetables is well known, youth in the United States do not meet recommendations for fruit and vegetable intake. Under-consumption of fruits and vegetables is problematic in youth, as eating habits are established in childhood. Community gardens have been successfully used to improve access, self-efficacy, preference, and consumption of fruits and vegetables. However, few published community garden studies have focused on low socioeconomic youth. The Dan River Partnership for a Healthy Community (DRPHC) was developed according to community-based participatory research (CBPR) principles. With a mission to reduce obesity using healthy lifestyle initiatives, community gardens are an evolving DRPHC initiative.

**Objective:** To evaluate the feasibility (i.e., demand, acceptability, implementation, and limited-effectiveness testing) of a 10-week experiential theory-based gardening and nutrition education program targeting youth living in two public housing sites in the Dan River Region.

**Methods:** Using pre- and post-program questionnaires/interviews, demand and acceptability were measured among youth, parents and site leaders. Implementation was measures via field notes and attendance. Limited-effectiveness was measured among youth using a pre-post design. Three researchers independently coded the qualitative transcripts, met to resolve disagreements, and built consensus through discussion of the codes. Similarly, field notes were reviewed and evaluated for reoccurring themes regarding barriers, facilitators, and other observations. For the quantitative measures, descriptive statistics were used to summarize the variables and Cronbach’s alphas used to assess the reliability of each scale at baseline. Overall effects were tested with repeated measures ANOVA. An intent-to-treat analysis using the last observation carried forward method was used. A critical value of .05 was used for significance testing. A standard equation for reporting effect sizes on a single-group, pre-post study design is also reported.

**Results:** Program enrollment included 43 youth, primarily African American. The positive demand and acceptability findings indicate the potential of the program to be used and suitable for the youth, parents, and site leaders. Field notes revealed numerous implementation facilitators and barriers. Youth weekly attendance averaged 4.6 of 10 sessions. Significant improvements (p<0.05) were found for some (e.g., FV asking self-efficacy, overall gardening knowledge, knowledge of MyPlate recommendations), but not all limited-effectiveness measures (e.g., willingness to try FV, FV eating self-efficacy).

**Study Implications:** This study addresses recommendations for utilizing CBPR in community garden efforts and builds on community identified research priorities of the DRPHC. Results demonstrate the feasibility of a gardening and nutrition program targeting youth in public housing. Lessons learned are being used to adapt and strengthen the program for future efforts targeting FV behaviors. Findings will be shared with local community stakeholders and used to adapt and strengthen the program for future efforts in the Dan River Region targeting of fruit and vegetable behaviors.
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CHAPTER 1: INTRODUCTION

Importance and Predictors of Fruit and Vegetable Consumption in Youth

The benefits of consuming a diet high in fruits and vegetables are well documented and include protection against the development of various diseases such as diabetes, heart disease, and cancer (Van Duyn and Pivonka 2000). In recognition of the benefits of regular consumption of fruits and vegetables, various government agencies provide guidelines, recommendations, and initiatives to encourage Americans to incorporate more fruits and vegetables in their diet (Promotion 2013, USDA 2013). Despite this wealth of information and public health efforts, fruits and vegetables are under consumed in the United States (Serdula, Gillespie et al. 2004). Inadequate consumption of fruits and vegetables is observed in all populations throughout the lifespan (Krebs-Smith, Cook et al. 1996, Serdula, Gillespie et al. 2004, Blanck, Gillespie et al. 2008); however, it is particularly concerning that youth from low socioeconomic backgrounds are not meeting recommendations (Hanson and Chen 2007). Adult eating habits are influenced by childhood patterns and established by age 15 (Dinubile 1993, Kelder, Perry et al. 1994, Krebs-Smith, Heimendinger et al. 1995). Thus eating behaviors, whether healthy or not, may continue through adulthood and older age. Considering these issues, it is important to promote increased fruit and vegetable consumption in youth. While this health behavior change is the ultimate goal, many research studies are not implemented long enough and/or do not have sufficient power to capture changes in behavior (Langellotto and Gupta 2012). However, several indicators have been found to predict consumption and can be measured after a short intervention period. Food neophobia, or the unwillingness to try new foods, has been correlated to a low intake of fruits and vegetables (Falciglia, Couch et al. 2000). Other psychosocial constructs that influence fruit and vegetable behavior include self-efficacy (Granner, Sargent et al. 2004), preference (Resnicow, Davis-Hearn et al. 1997), and outcome
expectations (Resnicow, Davis-Hearn et al. 1997) with the latter two predictors being derived from the Social Cognitive Theory. Community and school gardens have been used to engage youth in agricultural experiences targeting these predictors to increase fruit and vegetable consumption (Morris, Neustadter et al. 2001, Koch, Waliczek et al. 2006).

**Popularization of Community and School Gardens and the Relevance of Local Agriculture**

In *City Bountiful*, Lawson (2005) documents the long history and sentimental value of gardens in the United States, including efforts to engage youth in local gardening efforts. The Putnam School in Boston was the first documented garden implemented in a school setting (Lawson 2005). Established in 1890, the school garden lasted for about 30 years and won the Massachusetts Horticultural Society garden contest every year from 1891 to 1902. The Putnam School catalyzed the school gardening movement, and its success served as an inspiration. Gardens continued to emerge in schools across Massachusetts and spread to states along the East Coast (Lawson, 2005).

As the youth gardening movement evolved, it included ‘places’ outside of the school grounds. The DeWitt Clinton Farm School was established in 1902 in New York City as a cooperative effort between school departments and parks (Lawson 2005). Though the project was intended to serve a temporary purpose, it became a quintessential model for gardening in urban areas. In 1910 the School Garden Association of America and the International Children’s Farm League were formed with similar goals in promoting the establishment of school gardens. The federal government established the Office of School and Home Garden (The Office) within the Bureau of Education in 1914 and published suggestions for establishing and maintaining a school garden. The published reports documented various garden benefits such as improved health, increased morality, and economic return. The Office
also recognized the potential for gardens to serve as an educational platform and encouraged integration with existing curriculum (Lawson 2005).

Beyond education, the utility and necessity of gardens increased again during the Great Depression. To cope with the financial strain, families participated in subsistence garden programs yielding $36 million in produce that was harvested and consumed in homes during the depression (Lawson 2005). Gardening remained popular with the advent of World War II. The victory garden campaign was promoted as a means to boost morale, recreation, and consumption. The School Garden Army was established to utilize children as a labor source to increase food production to allow more domestic food supplies to be shipped overseas. At the end of the war the terms “war gardens” changed to “victory gardens” and the purpose of gardening as a means to supplement the food supply during crisis shifted to a leisure activity (Lawson 2005).

After World War II, support for gardening in schools and integration of gardening into curriculum declined and large public movements surrounding gardens became scarce (Lawson 2005). In the 1970s, community gardens experienced a resurgence in popularity for multiple purposes including beautification of decaying urban areas, mitigation of inflation and rising costs of food, environmental awareness, and social activity (Lawson 2005). Community or neighborhood gardens continued to be popular through the 1980s and 1990s. Surveys by the American Community Gardening Organization (Lawson and Drake 2013) (previously the American Community Gardening Association) in 1990 and 1996 found diversity in the types of organizations engaging in gardening efforts, with neighborhood gardens the most popular. The survey also showed that the number of gardens increased from 2,329 in 1990 to just over 6,000 in 1996 (Lawson and Drake 2013).

Gardening, and specifically community gardening, gained a broader perspective in the 1990s. In 1992 the United Nations hosted the Conference on Environment & Development, informally known as The Earth Summit (Quarrie 1992). This conference resulted in the development of Agenda 21; a
voluntary action plan for sustainable development that can be implemented at local, national, and global levels. Agenda 21 focuses on major issues such as eradication of poverty, protection of water resources, air quality, and deforestation. However, community empowerment and contribution from grassroots efforts are recognized as necessary components for the mobilization and success of sustainable development; therefore some objectives and program areas target action at the local and community level. For example, Agenda 21 emphasizes the need to improve the decision-making structure in regards to the planning and management of land resources that allows input from community members. This objective is relevant as land tenure, an individual’s or group’s relationship to land (Boudreaux and Sacks 2009), was identified as an issue for 75% of community gardens studied by Saldivar-Tanaka and Krasny (2004). In some cases, with the help of non-profit organizations, community members and gardeners were able to rally and propose bills to prevent the government from revoking land used for garden space (Saldivar-Tanaka and Krasny 2004).

Throughout the history and evolution of community gardens, the importance of the role of children and youth in the decision-making and implementation of sustainable development programs is highlighted (Quarrie 1992, Lawson 2005). For example, Agenda 21 proposes to involve youth in the use of alternative learning structures, in which the concept of environmental awareness is incorporated (Quarrie 1992). Community and school gardens can serve as a platform to execute this plan of action. For example, garden centered education has been used in schools as an innovative approach to curriculum delivery. This method has been used to deliver core material of standard subjects such as math and science (Klemmer, Waliczek et al. 2005, Smith and Motsenbocker 2005) as well as promote environmental awareness (Waliczek and Zajicek 1990, Skelly and Zajicek 1998).

The modern concept of community gardens demonstrates gardens as multi-faceted vessels (Quarrie 1992, Lawson 2005). Community gardens continue to represent sentimental and historical significance including reformation of degraded or abandoned spaces into usable, viable green
areas and by serving as a means to supplement the food supply and increase healthy, nutrition food sources. Community gardens also contribute to the broader perspective of sustainable and environmentally conscious development while serving as a means for community empowerment. Additionally, community garden programs and interventions have natural appeal as a venue to promote fruit and vegetable consumption, particularly among youth.

Although a complete description of food security is beyond the scope of this literature review and not a primary focus of this study, community gardens have also been proposed as a means of influencing community- and individual-level food security. Although numerous definitions exist, community-level food security can be defined as “the state in which all persons obtain a nutritionally adequate, culturally acceptable diet at all times through local non-emergency sources” (Gottlieb and Fisher 1996, Edelstein 2010). Individual-level food security can be defined as access by all people, at all times to sufficient food for an active and healthy life... [and] includes at a minimum :the ready availability of nutritionally adequate and safe foods, and an assured ability to acquire acceptable foods in socially acceptable ways” (Anderson 1990, Edelstein 2010). Community gardens have the potential of improving access to locally grown produce and therefore strengthening the local agriculture infrastructure of low-income communities suffering from high rates of food insecurity. However, additional community garden studies focused on food security outcomes are needed.

**Social Cognitive Theory**

Health behavior theories are useful as they guide the development and assessment of health promotion programs (Edberg 2007). The social cognitive theory (SCT) is commonly used for understanding and changing health behaviors (Bandura 1989, Baranowski, Mendlein et al. 2000), is useful when working with youth to influence health behaviors (Lytle and Achterberg 1995), and may significantly promote improved dietary habits (Resnicow, Davis-Hearn et al. 1997). The SCT focuses on
how behaviors can be acquired and maintained through reciprocal determinism; an interrelation between personal factors, behavior, and the environment (Figure 1) (Bandura 1986). This theory incorporates numerous constructs to promote behavior changes, which can be characterized as either individual or environmental. Constructs categorized as individual factors include: 1) self-efficacy, a person’s confidence in their ability to perform a behavior, 2) behavioral capability, the amount of knowledge and skill a person has in relation to behavior, 3) expectations, what a person thinks will happen as a result of a behavior change, 4) expectancies, whether a person thinks the outcome of a behavior change will be good, 5) self-control, the amount of control a person has to make a change, and 6) emotional coping, a person’s ability to handle emotions involved in behavior change. Constructs categorized as environmental factors include: 1) vicarious learning, learning behavior by observing others, 2) situation, a person’s perception of the social and physical environment, and 3) reinforcement, positive or negative responses to a behavior (Edberg 2007). Personal and behavioral factors are often evaluated together though they reflect different concepts. Personal factors include a person’s attitudes, beliefs, and experiences. Behavior is the nature, frequency, and intensity of actions. Lastly, the environment includes a person’s physical surroundings and social influences. While reciprocal determinism incorporates three factors they are not always studied in conjunction. Personal factors and behavior are often studied together while environmental factors are explored separately (Edberg 2007).

Several studies acknowledge the issue of access and availability of healthy foods in US neighborhoods. Specifically, low income and African American neighborhoods have been shown to have less access to fresh fruits and vegetables compared to higher income and mixed and predominantly white neighborhoods (Zenk, Schulz et al. 2005, Larson, Story et al. 2009, Odoms-Young, Zenk et al. 2009). Related to fruit and vegetable behavior and the use of community gardens, it is particularly important to further explore the potential influence of the environment. Studies have shown that the home environment influences behavior and the availability of fruits and vegetables in the home.
correlate to healthy eating behavior (Golan and Weizman 2001, Neumark-Sztainer, Wall et al. 2003, Rosenkranz and Dziewaltowski 2008). In a review, McCormack and colleagues (2010) evaluated the effects of community garden and farmers’ market programs on nutrition outcomes in adults. Three types of programs were evaluated; 1) Women, Infants, and Children Farmers’ Market Nutrition Program (WIC FMNP) (n=7), 2) farmers’ market programs for seniors (n=5), and 3) community gardens (n=4). Of the seven studies examining FMNP participation among WIC participants, approximately 71% (n=5) showed that participants reported higher fruit and vegetable consumption compared to controls. Only one study evaluating the effects of farmers’ market programs on seniors found similar results, where participants significantly increased fruit and vegetable consumption compared to controls. The other four studies targeting seniors focused on psychosocial outcomes. Lastly, all four studies evaluating community gardening programs showed some form of nutritional improvement. Generally, gardeners consumed more fruits and vegetables than non-gardeners (Lackey 1998, Johnson and Smith 2006, Alaimo, Packnett et al. 2008, Herman, Harrison et al. 2008).

Though the studies in this review evaluated outcomes in adults, the results suggest a correlation between environmental change (i.e. access and availability) and behavior (i.e. increased fruit and vegetable intake). Specifically, the results of the studies evaluating garden participation on nutrition outcomes further contribute to the benefits and potential utility of community gardens (McCormack, Laska et al. 2010). Thus, the interest in the potential of garden based programming as a method to target healthy eating in youth as grown.
**Current Literature Reviews on the Impact of Garden Based Programs Targeting Youth**

Given the aforementioned increased focus on gardening and youth, several primary articles have been published on gardening and personal and behavioral factors in the past 10 years. Recently, four systematic reviews summarize this literature and are synthesized in the following sections. The primary focus of this synthesis is on which characteristics successfully contribute to positive changes in outcomes for youth. To be included in this literature review, articles had to be published in English, after the year 2000, target youth, and evaluate a gardening component. A search with this criteria produced four reviews (Ozer 2007, Blair 2009, Robinson-O'Brien, Story et al. 2009, Williams and Dixon 2013) and one meta-analytical review (Langellotto and Gupta 2012). Across these reviews, studies were categorized in three types of settings; in-school (n=8), after school programs (n=3), and in the community (n=2). The meta-analysis included studies implemented in multiple settings.

Robinson-O’Brien and colleagues (2009) published a review to evaluate the impact of garden-based nutrition-education programs on nutrition outcomes. This review is highly cited and is considered to be a seminal review of the impact of community gardens. Thus, the structure of this review is modeled after their site categories. For their review, inclusion criterion was defined as studies published in English from 1990 to June of 2007 on youth and adolescents in the United States. Outcomes included fruit and vegetable intake, willingness to taste fruits and vegetables, preferences for fruits and vegetables, and other nutrition-related outcomes. From their search, 11 studies were included in the review. Five studies occurred within schools and were integrated into the school curriculum, three were afterschool programs, and three were implemented in the community.

**In-school studies**

From the Robinson-O’Brien review five studies were implemented in schools. In the first study, McAleese and Rankin (McAleese and Rankin 2007) implemented a 12-week intervention to measure the
effects of garden-based education on participants’ fruit and vegetable consumption. A total of 99 sixth-grade students between the ages of 10-13 enrolled from three schools. The two schools were randomized to either experimental or control while the third was assigned to the experimental group based on garden availability. All participants completed three 24-hour food-recall workbooks at the beginning and end of the program. Participants at the first experimental school received 12 weeks of nutrition education from the Nutrition in the Garden curriculum. In addition to receiving 12 weeks of the same nutrition education curriculum participants at the second experimental school received access to gardening. No intervention was provided at the control school. Participants at the experimental school receiving both nutrition education and gardening significantly increased fruit and vegetable servings, vitamin A and C intake, and fiber intake. There were no significant changes in these outcomes at the two comparison schools.

With evidence that fruit and vegetable preference predict fruit and vegetable consumption, Morris and Zidenberg-Cherr evaluated the effectiveness of a nutrition education program based on the Social Cognitive Theory combined with a gardening component in increasing preference in fourth-grade students (Morris and Zidenberg-Cherr 2002). Using a quasi-experimental design three schools were assigned to either control receiving no nutrition or gardening education, or one of two experimental groups including nutrition education only or nutrition education plus gardening. Nine lessons were delivered to the two experimental groups every other week over the course of 17 weeks. Participants in all conditions completed pre- and post- surveys to evaluate nutrition knowledge and vegetable preference. Students in both experimental groups showed significant improvements in preference for carrots and broccoli. Students in the group receiving gardening and nutrition showed greater preference for snow peas and zucchini compared to the control group and group receiving nutrition education alone. Additionally, participants in both experimental groups had improvements in nutrition knowledge compared to the control group.
In the third in-school study reviewed by Robinson-O’Brien, Morris and colleagues (2001) conducted a pilot study to determine if a garden enhanced nutrition education program could improve the nutrition knowledge, willingness to taste vegetables, and vegetable preference of first graders. Two schools were matched based on ethnicity of the students and location. Throughout the school year the 48 students at the intervention site received lessons from the Team Nutrition Program that were integrated with the existing curriculum. Participants engaged in food preparation using the vegetables harvested from the garden. No gardening or nutrition content was provided to the 49 students at the control site. Interview administered pre- and post-test evaluations were used to evaluate nutrition knowledge. In addition, students were offered cut raw vegetables to taste (willingness to taste) and were asked to rate how much they liked (preferred) the sampled vegetable. Participants at the intervention site significantly improved in their ability to identify food groups while there was no change in the control group. Neither group showed significant changes in students’ vegetable preference or ability to correctly name vegetables.

Though the primary purpose of their study was to develop a guide to help teachers integrate nutrition education into the existing curriculum, another aim of Lineberger and Zajicek’s study was to evaluate changes in students’ attitudes and behaviors as a result of the nutrition and gardening program. One hundred and eleven third and fifth grade students from five elementary schools participated in the program. Surveys and 24-hour recall journals were administered at the beginning and end of the program to evaluate fruit and vegetable preference and fruit and vegetable consumption. At baseline, preference for vegetables varied by school. After participating in the program this difference was equalized and participants showed increases in their preference in vegetables. Fruit preference did not change after participating in the program. However, preference for choosing fruits and vegetables as a snack increased. There were no differences in fruit and vegetable intake upon completion of the program.
In the fifth in-school study reviewed by Robinson-O’Brien, Cason (1999) described the incorporation of gardening and nutrition into existing curriculum as an innovative approach to nutrition education. Kindergarten students received 30 minutes of weekly nutrition education and 30 minutes of gardening activities along with food preparation and tasting. No control group was included for comparison. Pre- and post- surveys were used to evaluate the impact of the program on willingness to taste fruits and vegetables and the ability of children to correctly identify fruits and vegetables. At the end of the program students showed increases in willingness to taste fruits and vegetables and identify fruits and vegetables.

While the majority of the previously mentioned studies focus on nutrition-based outcomes, other outcomes, such as changes in academic performance, are relevant. In their review, Williams and Dixon (2013) identify the need to demonstrate an effect on academic outcomes in order to continue to justify the effort to integrate garden programs in schools. The authors used a new framework called methodologically inclusive advancements in research synthesis (Suri and Clarke 2009) because it allows one to extract and unify ideas, theories, and strategies. Inclusion criteria for this review included: 1) publication between 1990 and 2010, 2) use of a garden based curriculum, 3) effect on academic outcomes were assessed, 4) at least one hour of treatment for two weeks, 5) a school connections, and 6) assessment measures were reflective of the age of the participants. In addition to these criteria other considerations for inclusion were used such as a sufficient description of the methodology. Through their search and screening process, 48 articles were included for review. Of the 48 studies, 32 included multiple grades while 16 focused on single grades. The majority of studies were on 3rd-5th graders while preschool and grades 10-12 were the least studied. There was a wide range of research designs amongst the studies included in the review. The majority (n=33, 69%) were quasi-experimental studies followed by descriptive (n=8, 17%), case studies (n=4, 8%), participatory research projects (n=2, 4%), and one action research project (2%). Twenty-two studies reported the direct effect of a garden program on the
following school subjects: science (n=15, 38%), language arts (n=11, 28%), math (n=10, 25%), writing (n=3, 8%), and social studies (n=1, 3%). Overall there were positive effects on academic outcomes (n=33, 83%); though there were also reports of no change (n=6, 15%) and negative effects (n=1, 3%). With some overlap among the studies reporting on direct academic effects, 36 studies reported on indirect academic outcomes. Indirect academic outcomes included but were not limited to attendance, motivation, and study habits. In total, 69 indirect outcomes were assessed and the majority (n=55, 80%) showed positive effects. Negative (n=1, 1%) and neutral effects (n=13, 19%) were also observed.

Similar to the Williams and Dixon review, Blair reviewed the benefits of youth participating in school gardening. This review focused on the effects of school gardening on 12 quantitative outcomes, seven qualitative outcomes, and principals’ and teachers’ perception of the effectiveness of school gardens (Blair 2009). Twelve studies used a quasi-experimental pretest and posttest design to evaluate the effect of participating in a school garden on youths’ learning or behavior. Nine of the 12 studies reported significant differences in participant outcomes compared to controls. Collectively, participation in a school gardening program improved science scores, preference for vegetables as snacks, and increased fruit and vegetable consumption. Collective results from the seven qualitative studies showed that children experienced enthusiasm for gardening, improved school attitude and pride, community cohesion, and a diverse approach to learning various science related topics. Noteworthy information related to the success of the garden programs was briefly described. For example, four of the seven studies recognized the necessity of an experienced gardener willing to commit to the program. In all studies evaluating principals’ and teachers’ perception, the majority reported positive perceptions in garden programs impact on performance in school. Other positive perceptions include improved social skills/development and recreation.

In another review, Ozer (2007) recognizes that few studies report the implementation of school gardens with only two studies identified. One study occurred in California in which 9805 self-
administered surveys were sent to all principals in California (Graham, Beall et al. 2005). A total of 4194 principles (43%) completed and returned the surveys. Of those who returned surveys 51% (n= 2381) reported having a school garden. The key findings reported by Ozer reflected four aspects of implementation: 1) the majority of participants were in grades K-8, 2) the most reported purpose of school gardens was to enhance academic performance (89% of principals), 3) subjects most frequently co-taught with gardening were science (95%), environmental studies (70%), nutrition (66%), language arts (60%), and math (59%), and 4) teachers were most often responsible for management of the garden program, though parents and students were also listed as being involved. The second study was conducted in Florida in which a school garden competition was used to promote school gardening (Skelly and Bradley 2000). Seventy-one teachers completed a questionnaire about the garden program. Flower (84.3%) and vegetable (71.4%) gardens were the most common types of gardens used. Based on reported amount of time youth spent in the garden and amount of time gardens were used as instructional tools, gardens were underused. Despite this, 84% of teachers felt that participation in the garden program helped students learn better. In a survey and case study of Los Angeles schools, 14% reported participation in a garden program that had not been sustained (Azuma, Horan et al. 2001). Reasons included but were not limited to teacher burden, funding, lack of support, lack of gardening experience, and loss of gardening space. Schools that were able to maintain a garden program reported continued support from implementers and participants, stakeholder involvement, and integration of the program with the school curriculum at all grade levels. Additionally, the presence of a paid staff person designated to maintain the program was identified as a key facilitator for success. Ozer only briefly summarizes the effects of school gardens on youth by acknowledging the limited number of publications on the matter and concluding that evidence is promising but inconclusive thus far.

After school studies
Three studies from the Robinson-O’Brien review evaluate the impact of garden curriculums implemented in after school programs. O’Brien and Shoemaker (2006) employed a quasi-experimental with control design to evaluate the impact of a garden-based curriculum on the following outcomes; nutrition knowledge, fruit and vegetable preference, self-efficacy for gardening, self-efficacy for fruit and vegetable consumption, outcome expectations for gardening, and outcome expectations for eating fruits and vegetables. Eight lessons from the Junior Master Gardener curriculum were delivered to 17 fourth grade students attending the experimental school. Each week, 80 minutes were allotted for program delivery. Within this time participants received a healthy snack, engaged in a lesson delivered by researchers, and participated in 30 minutes of gardening. Twenty-one fourth grade students at the control school did not participate in the program. There were no reported differences between the two groups. There was no significant increase in fruit and vegetable preference or nutrition knowledge between the two groups. The gardening self-efficacy scores were different between the two groups at baseline. However, the gardening self-efficacy for the control group increased at follow-up and the scores were not significantly different.

Hermann and colleagues evaluated the impact of an Oklahoma Cooperative Extension Service on vegetable intake and physical activity in children in grades 3-8 participating in the after school program (Hermann, Parker et al. 2006). In the program the children received lessons derived from the Junior Master Gardener curriculum, Ag in the Classroom, and USDA Team Nutrition. Additionally, children participated in garden activities and food preparation. Only two questions were used to evaluate the impact of the program: 1) I eat vegetables every day and 2) I am physically active every day. Forty-three children participated in the program with the majority being Native American (72%) and female (53%). There was a significant increase in reporting engaging in both questions asked for the evaluation.
Poston, Shoemaker, and Dzewaltowski implemented a pre-post quasi-experimental program to youth attending the Boys and Girls Club afterschool program (Poston, Shoemaker et al. 2005). In this study, fourth grade students were assigned to either the group receiving eight lessons from the Junior Master Gardener curriculum or 5 weeks of the standard curriculum, Professor Popcorn. Both groups received a weekly healthy snack with each lesson. In addition, participants in the JMG group were involved in 10-15 minutes of gardening. Evaluation measures included self-efficacy and preference for fruit and vegetables, and nutrition knowledge. There were no significant differences on the demographics between the participants in the two groups. There was no significant increase in fruit of vegetable preference or nutrition knowledge between the two groups upon completion of the programs. A significant change in self-efficacy for fruit and vegetable consumption was not reported.

Community studies

Two studies from the Robinson-O’Brien review were implemented in community settings. In the first, Lautenshlager and Smith used the Theory of Planned Behavior to develop a gardening program for urban youth (Lautenschlager and Smith 2007). Ninety-six youth aged 8-15 participated in the program 3 days per week for 10 weeks. In the program youth received lessons on nutrition, gardening, and cooking. Surveys and 24-hour recalls were administered at the beginning and end of the program to measure changes in social influences, nutrition knowledge, behavioral control, gardening and nutrition related intentions, and fruit and vegetable intake. Fruit and vegetable intake significantly increased for boys but not girls. For boys, social influence, attitude, and perceived behavioral control were significantly correlated with intention to change at follow-up. For girls perceived behavioral control was slightly predictive of behavior.

In the second study, Koch and colleagues evaluated the effect of lessons from the Health and Nutrition from the Garden program on youths’ nutritional knowledge, nutritional attitudes, and eating behavior (Koch, Waliczek et al. 2006). Duration of program was to the discretion of the county agents.
and ranged from 1-12 weeks in which participants received nutrition education and gardening experience. Of 130 youth in grades two through 5 who initially completed the pre-test assessment only 56 completed the pre-, mid-, and post-surveys and are included in the results. Upon completion of the program youth had improvements in nutrition knowledge and healthful snacking.

Lastly, Langellotto and Gupta (2012) recognized the limitations of attempting to demonstrate the effectiveness of garden based nutrition education programs on outcomes. Particularly, they point out that one of the most common behavioral outcomes, changes in fruit and vegetable consumption, were small in magnitude (i.e. increasing from 3 servings to 4 servings). Because of this, a large amount of power is needed to reach significance, which most studies lack. Therefore, Langellotto and Gupta conducted a meta-analysis to address this issue, as it increases statistical power by combining multiple studies that measure the same hypotheses and outcomes. In addition to the meta-analysis a vote-counting analysis was performed to further assess the effectiveness of garden based nutrition programs. The hypothesis was that participation in a garden based nutrition education program would increase outcomes (i.e. nutrition knowledge, fruit and vegetable preference, and fruit and vegetable consumption) compared to nutrition education without gardening, as well as compared to control conditions. Key word searches were performed in Google Scholar, PubMed, and Web of Knowledge, and the America Society of Horticultural Sciences archives. Other relevant reviews were also used as resources. To be included in the meta-analysis a study had to be conducted in the United State on children in kindergarten through 12th grade. Additionally studies had to report on at least one of the following outcomes: nutrition knowledge, fruit and/or vegetable preference, fruit and/or vegetable consumption. Twenty studies met the inclusion criteria and were included in the meta-analysis. All studies used a quasi-experimental approach and only six did not incorporate a control group. Of the 20 only 9 were included in the vote counting analysis due to lack of reporting information, for example, demographics. For vote counting significance was set at an alpha level of at least 0.05. Changes in
outcomes were scored as either positive (significant improvement), negative (significant decrease), or null (no significant change).

Results from the meta-analysis showed that for control groups there were improvements in nutrition knowledge with no changes in fruit and/or vegetable preference or fruit and/or vegetable consumption. For nutrition education only groups there were significant improvements in nutrition knowledge. There was no change in vegetable consumption and a negative effect on fruit consumption. Sufficient data was not available for analysis on fruit and/or vegetable preference. Lastly, for garden enhanced nutrition education there was no increase in nutrition knowledge. There was a significant improvement for vegetable preference, although not for fruit preference. There were significant improvements for both fruit and vegetable consumption. Vote counting results revealed that the garden enhanced nutrition education group had the most number of significant observations in improving nutrition knowledge (n=2), vegetable preference (n=2), fruit consumption (n=1), vegetable consumption (n=2), and combined fruit and vegetable consumption (n=1). However, the gardening group also had a large number of non-significant effects for nutrition knowledge (n=2), fruit preference (n=3), vegetable preference (n=2), and combined fruit and vegetable preference (n=1). In addition to these mixed results, Langellotto and Gupta exercise caution in interpretation due to the small effect sizes of some outcomes (i.e. impact of gardening on preference for vegetables) and the possibility of publication bias of studies that were able to elicit positive results.

**Synthesis of Youth-Based Community Garden Studies**

Across the reviews presented here, results are mixed, where some but not all measures improved for garden groups. Additionally, there were mixed results across studies measuring the same or similar outcomes. This variability prompts the need to further dissect primary studies to determine the shared and distinct characteristics that may contribute to the success in improving outcomes of
interest. The synthesis of the 15 primary studies, illustrated in Tables 1-5, are limited to studies focusing on nutrition related outcomes, as this information is most relevant to inform and guide the development of the subsequent feasibility study. Studies with nutrition education only are not included as the focus is in understanding the components necessary in effective garden based programs. Differences and similarities across studies are captured in these summary tables. Though numerous outcomes were examined, only those that were the most frequently studied and related to nutrition are reported here including fruit and/or vegetable preference (n=9), nutrition knowledge (n=8), fruit and/or vegetable consumption (n=8), psychosocial outcomes (n=5), and willingness to taste fruits and/or vegetables (n=3). Importantly, these outcomes vary in the way in which they are measured and reported across studies.

Of the nine studies that examined preference, five (55.5%) were able to increase participants’ preference for fruit and/or vegetables (Table 1). One study that increased preference for vegetables had no control group for comparison (Lineberger and Zajicek 2000). In two studies, preference increased for the control groups receiving nutrition education only (Morris and Zidenberg-Cherr 2002, Parmer, Salisbury-Glennon et al. 2009) as well. Four studies showed no change in preference (Morris, Neustadter et al. 2001, Poston, Shoemaker et al. 2005, Koch, Waliczek et al. 2006, O'Brien and Shoemaker 2006). Four studies used a “taste and rate” approach in which bite sized items were offered to participants (Morris, Neustadter et al. 2001, Morris and Zidenberg-Cherr 2002, Parmer, Salisbury-Glennon et al. 2009, Ratcliffe, Merrigan et al. 2011). Two studies directly linked the “taste and rate” approach for evaluating preference with willingness to try fruits and vegetables as the participant had to be willing to try the food before being able to rate the degree to which they enjoyed it (Tables 1 and 2). One other study examined willingness to try fruits and vegetables (Cason 1999); however, no opportunity to sample the food items was provided. Three (75%) of the studies that used this approach saw improvements in preference. The other five studies used a visual presentation of fruits and vegetables
without sampling opportunities. Of these five, only two (Lineberger and Zajicek 2000, Heim, Stang et al. 2009) showed increases in preference though one study (Heim, Stang et al. 2009) presented pictures of foods that had been sampled throughout the program. Lastly, four (80%) of the studies that were able to increase preference were implemented in schools. These findings suggest that integration with schools and the opportunity to sample the food item either during the assessment or throughout the program contributes to improving willingness to try fruits and vegetables and preference for fruits and vegetables.

Seven (87.5%) of the eight studies examining changes in fruit and/or vegetable consumption showed positive changes (Table 3) (Hermann, Parker et al. 2006, Koch, Waliczek et al. 2006, Lautenschlager and Smith 2007, McAleese and Rankin 2007, Parmer, Salisbury-Glennon et al. 2009, Ratcliffe, Merrigan et al. 2011). In the study that did not increase consumption, the authors hypothesize that a more intense and comprehensive program that emphasizes behavioral change was needed. Of the seven studies that showed improvements, five (71.4%) used self-report measures such as 24 hour recalls (Lineberger and Zajicek 2000, Hermann, Parker et al. 2006, Lautenschlager and Smith 2007, McAleese and Rankin 2007, Ratcliffe, Merrigan et al. 2011), however two studies used self-report measures with questionable reliability. One (Koch, Waliczek et al. 2006) asked participants about the snack they had the previous day. If participants had eaten a fruit or vegetable for a snack they received one point. All other snacks received no points. The other was a single item survey: “I eat vegetables every day”. Response options were “yes”, “sometimes”, and “no”. The latter two responses were subsequently collapsed to “no”. The validity of this evaluation method is questionable as a single question is not comprehensive. Additionally, the merging of responses can create a false sense of effectiveness. Only two studies used objective, observational methods to assess consumption. One used salad bar and plate waste data in which food on the salad bar was weighed before and after lunch and visual observations were made for the amount of food remaining on participants’ plates. In the other
study that used an objective approach lunchroom observations were used to record if participants chose and ate fruits and vegetables at lunch. Though the authors report increases in participants choosing fruits and vegetables it is unclear if participants actually consumed the items. One study (Lautenschlager and Smith 2007) was only able to show increases in fruit and vegetable consumption in boys as girls had a high intake at baseline with little room for improvement. Other factors such as age of participants or sample size of the study did not seem to influence the outcome. Though most (62.5%) of the studies were delivered in schools self-report measures were used most often instead of direct observation as observational approaches require appropriate training and can be resource intensive. Thus, self-report of consumption can reflect changes in fruit and vegetable intake if validated measures are used.

Six (75%) of eight studies showed improvements in nutrition knowledge (Table 4). In the two studies showing null results (Poston, Shoemaker et al. 2005, O’Brien and Shoemaker 2006), authors identify the high nutrition knowledge scores at baseline as the likely cause. The evaluation of nutrition knowledge varied. In one study (Koch, Waliczek et al. 2006) nutrition and gardening knowledge were assessed together via a multiple choice test and an interview. In the multiple-choice segment, nutrition based questions included food-nutrient association (e.g. Fiber is an important nutrient for our body), dietary recommendations (e.g. To stay healthy, how many servings of fruits and vegetables should we eat each day?), and other types of nutrition knowledge based questions. Garden knowledge questions included plant needs (e.g. What do plants need to live?) and harvest season (e.g. When can gardening help us to get fruits and vegetables?). Though there was no control group for comparison, knowledge scores increased from baseline, to the midpoint assessment, and further increased upon completion of the program (Koch, Waliczek et al. 2006). In one study, (Morris, Neustadter et al. 2001) nutrition knowledge was assessed via food group identification (e.g. participants’ ability to correctly identify which food group an item belonged to). Students participating in the garden-enhance nutrition program significantly increased their scores compared to the control group. In another study, (Morris and
the content of the nutrition knowledge questionnaire was not provided. However, participants receiving nutrition education and garden-enhanced nutrition education significantly improved knowledge scores compared to participants in the control group. Three studies used identification (participants’ ability to correctly identify fruits and/or vegetables) to evaluate nutrition knowledge. In all cases, knowledge increased from baseline. Ratcliffe and colleagues (2011) did not use any other sub-categories to evaluate nutrition knowledge. Cason (1999) included “best choice” in this assessment where participants had to select the healthiest snack from a list of options, which also increased. Lastly, Parmer and colleagues (2009) included food-nutrient association (participants’ ability to identify which nutrients can be obtained from which foods) and nutrient job association (participants’ ability to identify what function a nutrient performs in the body and all nutrition knowledge sub-categories increased from baseline.

Psychosocial measures had the most variability in outcomes ranging from self-efficacy for consuming fruit and vegetables to perceived behavioral control (PBC) (Table 5). One study (Lautenschlager and Smith 2007) was developed using the Theory of Planned Behavior and attempted to find associations between psychosocial measures, such as intention, and behavior. This study in particular found differences in gender and outcomes. As previously mentioned, there was a difference between boys and girls in fruit and vegetable intake. For psychosocial outcomes intention and PBC were correlated with behavior in girls. No psychosocial outcomes were predictive of behavior in boys. No other studies found differences by sex. However, consideration for appropriate behavioral targets based on gender may be warranted in future studies. In another study the same authors examined attitudes, PBC, subjective norm, intention, and behavior. These measures were assessed by focus group analyses. Compared to controls, participants had higher PBC of specific tasks such as trying unfamiliar foods, intent to garden, and cooking behavior. Two studies examined self-efficacy for gardening (Poston, Shoemaker et al. 2005, O’Brien and Shoemaker 2006). In one study gardening self-efficacy was high for
the experimental group and remained unchanged upon completion of the program. Also, gardening self-efficacy unexpectedly increased for the control group. In the other study (Poston, Shoemaker et al. 2005) the self-efficacy for gardening in the experimental group unexpectedly decreased. In both cases variance in outcomes are attributed to seasonal differences. In the O’Brien study it is hypothesized that the warmer weather by the end of the program allowed students in the control group to participate in outdoor activities which may have included some gardening experience, though not provided by the program. In the Poston study two groups receive gardening and are compared to a control, though not consecutively. One group participated in a fall harvest and the other in a spring harvest. It is hypothesized that the fall harvest experienced more challenges and thus contributed to the decreased self-efficacy for gardening. Combined, these two studies suggest that seasonality is important in evaluating self-efficacy for gardening with warmer weather harvesting being more likely to produce positive change. The last study (Heim, Stang et al. 2009) evaluated asking behavior. Asking behavior increased upon completion of the program though there was no control group for comparison. All of the five studies measuring psychosocial outcomes used theory as a guide. The two Lautenshlager studies used the theory of planned behavior and the remaining studies used social cognitive theory. The use of theory in all studies examining psychosocial outcomes suggests the importance of utilizing theory to guide program development and outcome assessments.

The most commonly used curriculum was the Junior Master Gardener either exclusively or in combination with other curriculums (n=5). Other curricula were either developed specifically for the intervention or were combinations of multiple existing programs. The duration and frequency of curriculum delivery ranged from one lesson per week for 8 weeks to 3 lessons per week for 10 weeks with the longest duration being 17 weeks. One study used a “low dose” approach and delivered lessons for one week (Koch, Waliczek et al. 2006), though one of the four counties participating in that study delivered the program over 12 weeks. “Medium dose” studies ranged from eight to 12 weeks. “High
“dose” studies includes those that were delivered throughout the school year (Cason 1999, Morris, Neustadter et al. 2001), the 17 week long study (Morris and Zidenberg-Cherr 2002), and a study that held the program three times per week for 10 weeks (Lautenschlager and Smith 2007). A mixture of outcomes can be expected amongst low, medium, and low dose approaches in which some but not all measures may improve. Thus, duration and/or intensity my not be a strong factor in determining the effectiveness of a program.

Examination of the mixed results between similar outcomes highlights one issue; the definition and assessment method of outcomes is variable. While studies use the same terminology for an outcome there is no standard approach for defining and assessing that outcome. Despite this issue, some programs have been successful in changing outcomes. Key components that may lead to successfully changing various nutrition related outcomes emerged from this synthesis. 1) The opportunity to sample fruits and vegetables influences willingness to try fruits and vegetables as well as preference. 2) Self-report measures of fruit and vegetable consumption are acceptable for various age ranges in the form of 24 hour recalls or other validated food frequency assessment. 3) The use of a theory is important in changing psychosocial outcomes with the social cognitive theory being the most used. 4) Duration and/or intensity do not strongly predict the success of an intervention. Lastly, the review on adult populations shows similar results to the youth studies in that changing participants’ ability to access fruits and vegetables increases consumption.

Though these studies are informative there are several gaps that still have not been addressed. Few of these studies target youth from low socioeconomic backgrounds though these individuals are even less likely to meet recommendations as mentioned previously. With the exception of one study, none attempt to evaluate the home environment through parental report though environmental factors influence health behaviors. Lastly, none use the community based participatory research approach to
implement studies. These nuances are taken into consideration for this study and the process of program development is discussed in further detail below.

**Community Based Participatory Research**

Despite recommendations, few studies have been published that directly applied the community-based participatory research (CBPR) approach to community garden programs (Robinson-O'Brien, Story et al. 2009). CBPR is an approach that emphasizes collaboration and power sharing between community members and research partners in order to effectively address the health concerns of the community (Israel 2013). Though there is no standard approach to the practice of CBPR, there are nine principles that serve as a guide for the development and maintenance of a partnership: 1) respect the community as a unit of identity; 2) thrive on the strengths and resources possessed by the community; 3) encourage and uphold an equitable partnership in all phases of research; 4) facilitate co-learning and capacity building; 5) establish balance between research and outreach efforts that benefits all partners; 6) recognize the larger context of social determinants of health and their relevance to local public health issues; 7) use a cyclical and continual process toward system development; 8) disseminate findings to all partners and include them in further disseminating results to the community; and 9) acknowledge CBPR as a long-term process requiring a commitment to sustainability (Israel 2013). Successfully combining all of these principles is proposed to elicit benefits not typically achieved with traditional research practices. Involving the community as equal partners through all phases of research can not only improve the community directly through increased local knowledge, empowerment, and health outcomes, but can also elicit information relevant for other settings (Macaulay, Commanda et al. 1999). CBPR has been used to address various health concerns such as HIV/AIDS awareness (Berkley-Patton, Bowe-Thompson et al. 2010, Rhodes, Malow et al. 2010), cancer education (Beck, Young et al.
tobacco cessation (Mendenhall, Harper et al. 2011, Andrews, Tingen et al. 2012), and cardiovascular disease risk management (DeHaven, Ramos-Roman et al. 2011). This diversity demonstrates that CBPR can be used to implement and evaluate a wide range of health programs.

There are few published accounts of applying CBPR principles in community garden efforts. One team used CBPR to evaluate participants’ perceived benefits of working in a garden which included improved nutrition and increased access to healthy foods (Wakefield, Yeudall et al. 2007). Another research team used CBPR to gage community interest in gardening (Zoellner, Zanko et al. 2012) and to evaluate the impact of community gardens on participants and residents (Zanko 2012). This team is part of a large collaborative effort between Virginia Tech researchers and community partners in the Dan River Region.

**The Dan River Region**

The Dan River Region (DRR) is situated in south central Virginia and north central North Carolina. All counties in this region meet the medically underserved area/population classification with high indices of poverty, low educational attainment and health disparities (U.S. Department of Health and Human Services Health Resources and Services Administration). There is no regional data specific to the nutrition, health, or well-being of youth. However, low SES, rural, and African American populations in Virginia consistently experience higher mortality rates and poorer health status across a variety of outcomes when compared to higher SES, urban, and non-black Virginians (Virginia Department of Health 2008).

**Dan River Partnership for a Healthy Community**

Originating in 2009, the Dan River Partnership for a Healthy Community (DRPHC) is a community-academic partnership operating under CBPR principles. The DRPHC’s mission is ‘to foster
community partnerships to combat obesity in the Dan River Region through healthy lifestyle initiatives’ (DRPHC 2013). Detailed elsewhere, community stakeholders developed six causal models for obesity and identified CG to address nutrition as a priority (2006). To advance the causal models, the DRPHC formed subcommittees for physical activity, nutrition and social marketing. Members of the nutrition subcommittee included site leaders of prospective housing communities, religious leaders and congregation members with gardening or farming experience, extension agents with agricultural and nutrition expertise, and Virginia Tech researchers from the Department of Human Nutrition, Foods, and Exercise. Given the interest in CG, the nutrition subcommittee along with research partners initiated a series of pilot projects targeting CG in the region.

The first study, a mixed methods study conducted in summer 2010, aimed to determine the perceptions and potential interest of community members for participating in a CG (Zoellner, Zanko et al. 2012). Ten key informant interviews conducted with community stakeholders revealed positive perceptions of the potential benefits of CG including, but not limited to, increased community cohesion, nutritional benefits, and the potential for physical activity benefits. Additionally, 87 children who were attending summer camps and their parents responded to a survey on CG and nutrition-related outcomes. Results showed that the majority of the children indicated that they would work in a garden (68%) and eat food grown from the garden (82%).

At the first annual community garden forum occurred in January of 2011. These annual forums were designed to serve as a platform for dissemination of results back to community members and provide an opportunity for community members to contribute new ideas for progression. Though no logging had occurred at this time this forum was a catalyst in which the concept of logging flourished. A mixed methods case study was conducted in 2011 to explore the potential public health impact of six community gardens that had been recently established in the Dan River Region (Zanko 2012). These CGs included two church-based, two school-based, and two community-based gardens. These organizations
were successful in securing local funding to support the initiation and start-up costs of their gardens (Foundation 2013).

The gardens yielded 811 pounds of produce, most of which was distributed to the families of the youth who participated in the garden. Interviews and focus groups revealed that garden leaders and participants were enthusiastic about impacts of the CG, expressed interest in continuing to garden, and requested educational programming to accompany the CG initiative. Yet the degree to which low income persons and youth were being involved in the CG efforts was unclear. Additionally, though there was general consensus and enthusiasm for engaging youth in gardening combined with nutrition education the coalition partners were unsure of the potential of such a program to succeed. These results and concerns were discussed at the second annual CG forum, and attendees expressed desire to implement a youth-based CG program in the region.

Based on this progress, the next goal was to engage youth in regional CG efforts. At this point, the DRPHC had successfully secured funding to establish CG programs in partnership with the regional public housing authority. Two sites within the housing authority that had active on-site youth programming were identified partners for these efforts. Leaders from these two sites were already partners in the larger DRPHC and had been involved in the grant development process. Therefore, the objective of the summer 2012 project was to explore the feasibility of an experiential theory-based CG and nutrition education program for youth living in public housing. Results from the studies reviewed in this chapter helped guide and inform the decision making process between researchers and community members and led to the development of a feasibility study, though not all components were adopted for this pilot. Dietary measures were not used, as for a feasibility study we likely would not have sufficient power to detect changes in fruit and vegetable consumption. Thus, other outcomes related to intake were used such as willingness to try fruits and vegetables (neophobia) and outcomes based on SCT constructs such as self-efficacy for eating fruits and vegetables. Due to budgetary constraints food
sampling opportunities were not provided throughout the program delivery. However, opportunistic sampling of ripe garden produce and one lesson dedicated to child friendly recipes were used. The Junior Master Gardener curriculum was frequently used and was selected for this study due to the comprehensive gardening content and “fun format” for youth. Results from the studies reviewed also revealed gaps in the literature; 1) no studies used the CBPR approach despite recommendations and 2) few studies targeted youth from low SES backgrounds, though this population suffers disproportionately from health issues. This study will attempt to address these gaps in the literature and build on results from previous studies implemented in the DRR by the DRPHC. Using Bowen and colleagues’ recommendations for designing a feasibility study, this research reports on four focus areas, including demand, acceptability, implementation, and limited-effectiveness testing (Bowen, Kreuter et al. 2009).
CHAPTER 2: FEASIBILITY OF AN EXPERIENTIAL COMMUNITY GARDEN AND NUTRITION PROGRAM FOR YOUTH LIVING IN PUBLIC HOUSING

Overview of a Feasibility Study

Bowen and colleagues (2009) illustrate how feasibility studies can be designed and applied in various phases of research. The authors broadly describe a feasibility study as any study that precedes a full-scale study and enables researchers to determine if results are promising enough to warrant further testing. Reasons to conduct a feasibility study include development of a community partnership, lack of published research on the topic of interest, existing research is not applicable or generalizable to a particular population, the population of interest requires special consideration in one or more areas of research such as methodology, and previous interventions need improvement or need to be tested in different settings. Bowen et al provide eight areas of focus that can be addressed by feasibility studies including: 1) acceptability is the extent to which participants deem a program to be suitable or satisfactory, 2) demand reflects the likelihood that a program will be used by participants, 3) implementation measures the degree to which a new program can be delivered as intended, 4) practicality is the degree to which a program can be implemented under existing resources and circumstances, 5) adaptation is the extent that a program is successful after changes are made to the format or after it is delivered to a different population, 6) integration is the degree to which a program can become institutionalized, 7) expansion is the ability of a program grow in capacity to provide a new service, and 8) limited efficacy testing is ability of a program to show promising result for outcome measures considering some restraint such as limited power. It is important to note that while the authors use the term “limited efficacy”, the term “limited effectiveness” is more appropriate for this study, as it is implemented in a community setting instead of a controlled environment (Flay 1986). The
authors present the development of an intervention in the form of three questions; “Can it work” (the initial phase of development), “Does it work” (efficacy and effectiveness testing), and “Will it work” (application in various contexts, settings, and populations). A feasibility study can be conducted in all three of these phases with appropriate use of any or all of the eight areas of focus.

**Purpose and Aim**

Guided by Bowen and colleagues’ recommendations for designing a feasibility study the purpose of this research is to explore the feasibility of an experiential theory-based CG and nutrition education program for youth living in public housing using four areas of focus. The specific aims of this study are to:

1. Use mixed methods to determine the demand and acceptability of a CG program.
   
   Based on previous CG studies in the DRR, including focus group data, we anticipate that demand and acceptability of a CG program will be high.

2. Use mixed methods to evaluate implementation of the program.
   
   Due to researcher development and delivery of the program, we anticipate high fidelity.

3. Quantitatively evaluate limited-effectiveness outcomes such as willingness to try fruits and vegetables, self-efficacy for eating fruits and vegetables, self-efficacy for asking for fruits and vegetables, self-efficacy for gardening, gardening knowledge, nutrition knowledge, and fruit and vegetable home availability.

   We anticipate an increase from baseline to post-test in willingness to try fruits and vegetables and secondary outcomes.
Methods

Setting and Recruitment

Two public housing sites that were active members of the DPHRC and predominately served families were targeted by this project. Internal census data from the two housing authority sites indicate that 97% of housing residents were black, 85% of the households headed by single women, and more than 125 households had two or more children under the age of 14. The partnering site leaders were familiar with youth at families at each location and had roles to engage youth in directed activities and distribute recruitment materials and flyers; in some instances, visiting families in their homes to provide program information. Researchers also spent time at each site to inform potential participants about the program. Using a community-friendly approach, eligibility criteria were broad. The only inclusion criteria were youth to be 5-17 years of age and both the youth and parent had to reside full-time at the housing authority.

Program Development and Delivery

The CG educational material was adapted from the Junior Master Gardeners curriculum, (Texas Agricultural Extension Service. and National Wildlife Federation. 2004) including changes to incorporate nutrition-focused lessons, to align more closely with the Social Cognitive Theory(SCT), (Bandura 1989) and to address cultural relevance for the targeted youth (Table 6). There are two versions of the JMG curriculum (i.e., level one for grades 3-5 and level two for grades 6-8). The level one curriculum was chosen for this pilot as it was intended for the younger age range. Lessons were chosen based on learning objectives, including providing experiential learning experiences in the garden and perceived ease of delivery by the researchers. To supplement the JMG curriculum with nutrition-focused content,
publically available information from the United States Department of Agriculture’s (USDA) MyPlate website (USDA 2013) was used.

Each site had access to a garden. One site had established a garden in the previous year and had 6-8 raised beds enclosed in a locked fenced area. The second site had not previously had a garden and had limited space to create one. Thus, three hanging pots and four large gardening containers were used. Researchers delivered the program once weekly at both sites, providing approximately 60 minutes of interactive gardening or nutrition education and 30 minutes of hands-on gardening. Weeks 1-4 focused on gardening and weeks 5-9 focused on nutrition education. Week 10 featured a review of key concepts and a graduation ceremony. To increase participants’ engagement throughout the program, two reward systems were created. One was to promote meeting weekly goals (i.e., paper cutouts of growing plant) and one to increase program participation (i.e., star stickers for active participation). The program was offered during regular operating hours at the youth centers at each site. The program was intended for youth enrolled in the program; however, no restrictions were set for other residents. Thus, unenrolled youth, and siblings and parents of enrolled children would often attend the lessons.

**Feasibility Measures**

As illustrated in Table 7, measurement focused on four areas of feasibility including demand, acceptability, implementation, and limited-effectiveness testing (Bowen, Kreuter et al. 2009).

**Demand and Acceptability**

Demand examines the extent that a new program will be used by the participants. Acceptability reflects the degree to which a program was viewed as satisfactory by the participants. These constructs were measured in the youth, parents, and site leaders. For the youth, post-program interviews were conducted, including eight open-ended questions pertaining to enjoyment of the program, perceived benefits of participating in the program, and suggestions for program improvement. For the parents, 31
pre-program quantitative questions were asked. Fifteen questions asked about attitudes related to gardening and responses were rated on a 7-point likert scale (i.e. 1=extremely unenjoyable, 7=extremely enjoyable). Seven questions asked about gardening confidence on a 5-point likert scale (i.e. 1= not at all confident, 5= very confident). Nine questions reflect participants interest in gardening on a 10-point likert scale (0= strongly disagree, 10= strongly agree). In this section, one “yes/no” question asks participants about previous participation in gardening. At post-program, parents were asked to self-complete eight open-ended questions related to demand and acceptability. For the two site leaders, post-program interviews included nine open-ended questions pertaining to recruitment experience, data collection perception, demands of continuing to provide a garden and use the curriculum, and perceived benefits or acceptability of the program.

*Implementation*

Implementation is the degree to which a program is delivered as intended. Implementation measures were completed by the three Virginia Tech researchers who delivered the program to assess feasibility of implementation. Evaluations were completed after program delivery, each week, at each site. Consensus among the three evaluators was achieved through discussion of the session. Three questions reflected the extent to which the lesson was delivered as intended and the barriers and facilitators to delivery. Additionally, field notes were used to document opportunities and challenges for curriculum implementation. Finally, weekly attendance records were used to measure the proportion of youth participating.

*Limited-efficacy testing*

Limited-efficacy refers to the potential of a program to be successful while tested in a limited way; in this case, low statistical power. Limited-efficacy was tested using measures that were assessed at baseline and follow-up. All data collectors were trained according to standardized protocol. Interview-
administered surveys included previously validated measures (i.e., willingness to try FV (Thomson, McCabe-Sellers et al. 2010), self-efficacy for eating FV(Geller, Dzewaltowski et al. 2009), self-efficacy for asking for FV (Domel, Thompson et al. 1996)), as well as measures developed for the purposes of this study (i.e., expectations for eating FV, self-efficacy for gardening, gardening knowledge, and nutrition knowledge). Based on previous literature, yet recognizing limitations with adequate power, we hypothesized trends of improvements for each of these measures. Additionally, height and weight were measured using a portable stadiometer and Tanita Body fat analyzer model TBF-310GS, respectively.

The primary focus of this study was outcomes surrounding youth. However, due to the established relationship between the home environment and parental influence on child behavior these factors were of interest. Attempting to modify the home environment was too ambitious for this feasibility study yet surveying the home environment from the perspective of the parents would allow us to set a foundation from which future studies could expand upon. Thus a home environment survey completed by parents of participants was developed by combining various previously validated surveys to address various topics. Fourty-one questions ask about fruit (n=17) and vegetables (n=24) that were available in the home over the past 30 days. This section was adapted from a self-reported inventory developed by Marsh and colleagues (Marsh, Cullen et al. 2003) where the “yes/no” response options were rescaled to a 5-point scale of 0=never, 5=always and the reference of time was expanded from seven to 30 days (Gattshall, Shoup et al. 2008). Two questions asked about participation in SNAP and WIC programs. A 6-item food frequency questionnaire (FFQ) (CDC and NCHS 2003) was used to evaluate fruit and vegetable consumption over the previous 30 day period to determine if parents were meeting the recommendations for fruit and vegetable consumption along with other demographic information. Additional questions pertaining to neighborhood perception were also asked however are not explored in this document. These questions may provide information for future studies but are too broad in scope.
for this analysis. Surveys were self-administered pre-post and took 20-30 minutes for participants to complete.

**Data Analysis**

All data was managed and analyzed by the researchers who delivered the program. Qualitative data from post-program interviews were transcribed verbatim (Creswell 2012). Two researchers then generated a list of codes from the initial review of the transcripts. Subsequently, three researchers independently coded the transcripts and meet to resolve disagreements and build consensus through discussion of the codes. Similarly, field notes were reviewed and evaluated for reoccurring themes regarding barriers, facilitators, and other observations. Data entry and analysis for the quantitative measures were conducted in SPSS 20.0 (IBM 2011). Descriptive statistics were used to summarize variables and Cronbach’s alphas were used to assess the reliability of each scale at baseline, with the exception of the knowledge-based scales. Since the Cronbach’s alpha for outcome expectations for eating FV was below the level of acceptability results are not be reported. Overall effects were tested with repeated measures ANOVA. An intent-to-treat analysis using the last observation carried forward method [i.e. for non-completers, baseline value is substituted for post-intervention value (assumes a zero change)] was used along with analysis using complete cases only (DeSouza, Legedza et al. 2009). Findings did not vary by approach; therefore, intent-to-treat results are presented. A critical value of .05 was used for significance testing. Estimated effect sizes are also reported.

**Results**

**Demand and Acceptability**

Twenty-five youth completed the post-program interviews. As detailed in Table 8, the majority of youth expressed positive impressions with the most liked components including food sampling, games, and
gardening experiences. The most common suggestion for improving recruitment and program engagement was increased distribution of printed materials and door-to-door solicitation. Fifteen parents completed the pre-program questionnaire. Expected benefits of working in a garden averaged 5.36 (0.90) (7-point scale; 1=extremely unlikely, 7=extremely likely). Beliefs about maintaining a garden averaged 5.25 (1.34) (7-point scale; 1=extremely un-enjoyable, 7=extremely enjoyable). Confidence in participating in a garden averaged 3.65 (1.12) (5-point scale; 1=not at all confident, 5=very confident). Interest in gardening averaged 7.85 (1.92) (10-point scale (1=strongly disagree, 10= strongly agree).

Fifteen parents also completed the post-program questionnaire. Most (87%) confirmed that the time of day that the program was offered was convenient. Some (53%) expressed that their children demonstrated new asking behavior in requesting fruits, vegetables, or new preparation methods for vegetables. When asked about their interest in allowing their children to participate in a future gardening program the majority (93%) indicated that they noticed an increase in their child’s confidence in gardening and would allow their child to participate in a CG program again.

Both site leaders expressed several benefits of the program. As illustrated by the quotes below, both described better cohesion and positive interactions amongst the youth who participated in the program.

Site Leader A: “Oh yeah! Even garden time, it forced them to deal with each other even if they didn't want to and work together. While in garden, they found something to connect them (like an ice breaker) they could find a common ground and get along.”

Site Leader B: “Yes, gave me a better relationship with children and allowed me to connect with more parents and saw new faces of children who didn’t come to community center before. Also a better relationship between residents anytime you have people doing something together it brings them together to have a better relationship. I think next year will be better with more participation since they are familiar with the program.”

Site leaders also observed an increase in the children’s willingness to try FV that were served as part of the summer feeding program, for example:
Site Leader A: “They are always hungry so they will try anything, but I will say it has increased. Tomatoes, cucumbers, and string beans and corn they wanted more and more. We will try to incorporate more FV in our meals that we provide.”

Site Leader B: “Everyone asked about squash and a lot about strawberries. I think if the garden would have been better they would of def. wanted more because they asked about it a lot. They ask for fruit and vegetables more because they know more about them.”

Lastly, both also expressed intentions to continue to have a garden and expressed excitement of the possibility of having the program delivered again in the following summer.

**Implementation**

The extent to which lessons were delivered as intended were measured on a 5-point scale (i.e., 1=not at all, 5=completely) and averaged 4.6 (0.88). Field notes revealed various facilitators and barriers to implementation. The most frequently noted facilitator was the involvement of site leaders. While site leaders did not deliver content, their established role as a respected authority figure was essential to classroom management. Accordingly, their relationship with the youth was beneficial during food sampling activities as they role modeled the behavior of trying unfamiliar foods. In one particular instance, a black bean salsa recipe was demonstrated for participants and distributed with corn chips for sampling. Initially, none of the children wanted to try the recipe because some of the ingredients were unfamiliar to them. However, encouragement and participation from the site staff in sampling the dish not only led all of the youth to try the salsa, but also resulted in many of them requesting additional samples. The most commonly recorded barrier was noise and distractions from the children. This resulted in the need to stop delivery and focus on classroom management which detracted from the lessons. Another noteworthy challenge was the presence of parents during the lessons. Parents would often answer questions before allowing the children the opportunity to answer. Also, parents would vocalize their disdain for certain FV which was perceived by the researchers as a possible hindrance to
participants’ willingness to try FV. Similar issues were noted in the garden. Children were often distracted, requiring time to manage crowd control. During times when a crop was ready for harvest and an impromptu tasting opportunity was available parents and other onlookers would express negative comments about sampling food directly from the garden. Youth weekly attendance averaged 4.8 (0.63) and 4.4 (1.07) out of 10 sessions, at the site with raised beds and site with containers, respectively.

Limited-effectiveness

Of the 43 enrolled youth, the majority (n=42; 97.7%) were African American. The mean age was 8.7 years and included 20 (46.5%) males and 23 (53.5%) females. BMI z-scores indicated that the majority of youth were overweight (34.1%) or obese (18.2%). Of the 43 youth enrolled, 32 (74.4%) completed follow-up assessments. As compared to those retained, youth who were lost to follow-up did not vary significantly by race, age, or gender. As detailed in Table 9 significant improvements were found for self-efficacy for asking for FV, overall gardening knowledge, knowledge of plant parts (sub-scale of gardening knowledge), and knowledge of MyPlate categories. However, the knowledge of food safety significantly decreased at follow-up. There were no significant effects on willingness to try FV, self-efficacy for eating FV, self-efficacy for gardening, other knowledge subcategories, or overall nutrition knowledge. Twenty-five parents completed baseline assessments. All were female and the majority were African American (n=22, 91.7%) and overweight (n=4, 18.2%) or obese (n=9, 40.9%). At baseline the average consumption for fruits and vegetables was 4.37 (±3.10) times per day which is under the recommendation for five servings per day. Consequently, 64% of respondents were not meeting recommendations. At the end of the program there was a small, yet insignificant, increase to 4.64 (±3.20) times per day and 61.9% of respondents still were not meeting recommendations. The majority of parents indicated that their household received SNAP (95.8%) or WIC (37.5%) benefits within the past year. Table 10 shows that six different vegetables (corn, potatoes, greens, lettuce, green beans, and
onions) and four fruit items (bananas, apples, applesauce, and grapes) were frequently available in the home (an average score of 3 or higher). The majority of the fruits and vegetables remained frequently available at the end of the program with a decreased availability of apples and applesauce and an increased availability of strawberries and oranges. Of these only corn significantly (p<.05) increased in availability. Cantaloupe/melon and sweet potatoes also significantly increased in availability.

**Discussion**

To our knowledge, this is the first published study to deliver a gardening and nutrition program to low-income youth living in public housing using the CBPR approach. In our study, the demand and acceptability findings indicate the high potential of the program to be used and be suitable for the youth, parents, and site leaders. The implementation findings demonstrate that the program can be implemented by researchers with a high-level of fidelity. On the contrary, the feasibility outcomes also reveal several issues that can threaten the likelihood of program success, such as classroom management, lack of specific components geared towards the parents at the educational/experiential sessions, and intermittent program attendance. Addressing these issues, as well as exploring the degree to which the housing authority site leaders and staff can implement the program will be key to future efforts. Additional implementation factors that were identified in the literature and should be considered include; 1) engagement from implementers, participants, and stakeholders, 2) integration with school curriculum, and 3) use of a paid staff person designated to maintain the program.

Most youth-based gardening research solely focuses on efficacy/effectiveness or outcome measures. As hypothesized, there were mixed findings in changes in outcomes from the limited efficacy measures in our project, which both refutes and supports findings from other studies.

Though willingness to try fruits and vegetables was our primary outcome, there was no change upon completion of the program. One study also documented no change (Morris and Zidenberg-Cherr
2002) while two other studies saw improvements for willingness to taste vegetables (Morris, Neustadter et al. 2001) and willingness to taste fruits and vegetables (Cason 1999). All studies used validated, yet different approaches. For the two studies that provided food samples, one saw improvements and one did not. Similarly, for the two studies that didn’t provide samples, one say improvements and the other did not. At first glance, this may seem perplexing and the use of sampling during evaluation may seem irrelevant. However, other factors should be considered. In the two studies that saw improvements, the study population was relatively young (kindergarten and first grade) and the program was delivered throughout the school year. Aside from the use of sampling, our study was similar to the one that did not see change. We both tested a relatively older group compared to the other two studies and we had a similar number of lessons delivered. Considering these details, possible explanations for these mixed results could be; 1) use of food sampling during the assessment of willingness to try appears to be most effective with younger participants than older participants and 2) duration of the program, particularly when integrated into the school system, may influence participants’ willingness to try fruits and vegetables.

Due to the variability in the definition and assessment of nutrition knowledge, caution in comparing our results to those in the literature is warranted. For our study, knowledge was divided into two categories, nutrition and garden, which were further divided into subcategories. Subcategories for nutrition knowledge included; 1) MyPlate, knowledge of MyPlate recommendations, 2) macronutrients, food-nutrient association and nutrient-job association, 3) food safety. Significant improvements were only found for the MyPlate subcategory. Overall, this outcome is incongruent with other studies that saw changes in similar categories. Only one study (Koch, Waliczek et al. 2006) saw similar improvements in participants’ ability to assign food items to the appropriate category on the food guide pyramid (the predecessor for the MyPlate food guide). For the macronutrients category, we documented no change.
while another study (Ratcliffe, Merrigan et al. 2011) saw improvements for food-nutrient association and nutrient-job association. This may be due to the differences in comprehension levels of participants between the studies. Though our study had a wide age range, the average age would place students in approximately the third or fourth grade. In the study that saw improvements for this subcategory, participants were in the sixth grade. For other studies that saw improvements, the evaluation of nutrition knowledge was relatively simple; 1) food group identification, participants’ ability to correctly determine which food group an item belongs to (Morris, Neustadter et al. 2001), and 2) fruit and/or vegetable identification (Cason 1999, Parmer, Salisbury-Glennon et al. 2009, Ratcliffe, Merrigan et al. 2011), participants’ ability to correctly name an item. For most studies that used these measures, participants were young; kindergarten (Cason 1999), first grade (Morris, Neustadter et al. 2001), and second grade (Parmer, Salisbury-Glennon et al. 2009). One study (Morris and Zidenberg-Cherr 2002) did not provide detail regarding the content of the knowledge assessment. Lastly, one study (O'Brien and Shoemaker 2006) did not show improvements in knowledge, which authors contribute to a ceiling effect due to high scores at baseline.

Inconsistent with the literature, we found significant improvements of self-efficacy for eating fruits and vegetables, whereas two other studies (Poston, Shoemaker et al. 2005, Heim, Stang et al. 2009) reported no change. Our results were similar to one study (O'Brien and Shoemaker 2006) that saw no changes in self-efficacy for gardening but inconsistent with another study (Poston, Shoemaker et al. 2005) that reported a decrease in self-efficacy. For the study that saw a decrease, authors contribute these results to crop failure during the fall growing season. Lastly, for this outcome only one study (Lautenschlager and Smith 2007) used the Theory of Planned Behavior and thus had different psychosocial outcomes. For boys, no construct correlated to behavior change. However, in girls, perceived behavioral control was correlated to behavior change. Self-efficacy, a construct from SCT, is
distinct from perceived behavioral control. While both constructs reflect an individuals’ perception of their ability to change, self-efficacy is a better predictor of behavior (Manstead and Eekelen 1998).

Only one study evaluated fruit and vegetable consumption both in- and outside of the home (Ratcliffe, Merrigan et al. 2011). Ratcliffe and colleagues (2011) found that while participants increased consumption in school there was no change in consumption at home. They propose a lack of availability of fruits and vegetables in the home as a possible explanation. Our study was the only one to assess fruit and vegetable availability in the home environment. We found that the availability of fruits and vegetables in the home was limited in variety but relatively stable (Table 10). Unfortunately, these findings cannot be related changes in consumption at home as fruit and vegetable intake was not evaluated.

Taken as a whole, our study yielded relatively similar results to previous youth-based CG studies, which indicate promising, yet mixed findings, across a variety of theoretical and behavioral outcomes (Robinson-O'Brien, Story et al. 2009).

Potential limitations of this study include the absence of a control group, small sample size, wide age range, and varying level of attendance. These factors may explain some of the discrepancies with the prior literature. Other studies with larger samples have demonstrated that groups with education and experience have better outcomes when compared to a control group (Morris, Neustadter et al. 2001, Morgan, Warren et al. 2010). Additionally, many studies cluster youth by two or three grades (Reynolds, Franklin et al. 2000, Poston, Shoemaker et al. 2005, Parker, Siewe et al. 2006). In our study, to accommodate the goals and objectives of the housing authority youth centers aimed at providing enjoyable and enriching activities to youth under 18, youth in our program had a much larger age range (i.e. 5-17 years). However, to promote appropriateness of lesson content and age-appropriate measures, this approach may be revised for future programming and age eligibility will be reduced to a tighter range as seen in other similarly designed studies (Morris, Neustadter et al. 2001, Lewis 2009,
Morgan, Warren et al. 2010). The availability of some items did change significantly. However this could be due to changes in availability of seasonal crops as these items were not grown in the gardens and cannot be attributed to our program. Despite these limitations, this study served its purpose in further establishing community-academic partnerships and providing feasibility data from which to revise, improve, and expand the program. To disseminate results from the summer 2012 program back to the community, the 3rd Annual CG forum occurred in the spring 2013.

Due to positive reception of the program from community members, site leaders, youth, and parents, efforts are underway to improve the program and expand to involve more youth and stakeholders using the CBPR approach. In conjunction with the literature and findings from this feasibility study, areas for future direction include, but are not limited to: a stronger study design with a control arm; redefine the age range eligibility (e.g. 8-13 years); refine program curriculum (e.g. increase food sampling activities in each weekly module); revise measures (e.g. refine theory-based measures based on item statistics, add measures of FV intake/behavior, reduce number of items); and develop targeted recruitment and retention strategies (e.g. offer alongside the USDA summer feeding program). Due to interest among parents and their desire to participate, incorporating specific parent components may also improve the success of the program outcomes. Likewise, determining and promoting the capacity of the housing authorities or other community-based organizations to implement the program will be critical to long-term sustainability.

Importantly, we only used 4 of the focus areas set forth in the guidelines by Bowen and colleagues for designing feasibility studies (2009). Demand, acceptability, implementation, and limited-effectiveness were deemed the most relevant given the early stages of development for this community garden initiative and they allowed us to determine the potential utility of a garden enhance nutrition education program. Additional areas of focus such as adaptation, integration, and expansion may be used to guide the development and evaluate the second phase of this study. Adaptation examines
program performance when implemented with modifications or to a different population. Some modifications, such as refining the program curriculum, have been described above. Integration reflects the extent that a new program can be incorporated into an existing system and expansion measures the degree to which a tested program can be expanded to provide a new program. Expanding to include additional areas of focus as presented by Bowen (2009) will allow for further pilot testing to determine the effect of implementing the program in additional sites. Collectively, the addition of these three areas of focus will allow us to evaluate the effectiveness of the program after modifications have been made to the design and curriculum.

Given the documented lack of FV intake and accessibility among low socioeconomic youth across numerous health disparate regions, other health and nutrition-related practitioners and researchers may apply the lessons learned in this feasibility study to investigate theory-driven attempts to target youth with CG programs. Results and lessons learned from this feasibility study provide insights to continue exploring CG as a culturally relevant CBPR approach to address FV access, knowledge, and health behaviors within low income youth in the Dan River Region.
Throughout history, community gardens have served to provide families with food in times of economic hardship, as a means to increase agriculture production and support local agriculture, and as an educational tool for youth (Lawson 2005). Modern versions of community gardens, still serve in this capacity with renewed focus on health and increasing access to nutritious fruits and vegetables, particularly in programming targeting youth. While some success has been observed from youth in targeted garden based programs the conclusions regarding long-term health impacts are limited. To better understand the impact of such programs, two changes are necessary: (1) future studies specifically using the SCT should better integrate all three factors of reciprocal determinism and (2) long term studies are needed to determine changes over time and the degree to which those changes are maintained. Current best practices in behavior change recognize the importance of theory-based interventions and programming. However, theory-based approaches are still not used consistently in research studies. Specific to the SCT, some studies have used the SCT to guide program development for garden based nutrition education programs and have produced positive outcomes including but not limited to vegetable preference and nutrition knowledge (Morris, Neustadter et al. 2001, Morris and Zidenberg-Cherr 2002, Ratcliffe, Merrigan et al. 2011). However, not all outcomes improved. When considering the SCT, reciprocal determinism is arguably one of the most central tenants, however all three of the constructs within that idea are not consistently used together. Most studies focus on personal and behavioral factors and are able to achieve success in changing some outcomes. Other studies attempt to change only the environment with expectations that changes to personal and behavioral factors will inevitably ensue. The model is described and depicted as all factors in an interrelationship where each one influences the other and each are equally important to change health
behavior. Thus, studies should not address these factors in isolation but should integrate each into studies. This approach to SCT aligns with larger social ecological frameworks that account for multiple levels of influence that are appropriate for complex health behavior changes. In some cases, it may not be practical or feasible to develop and implement a study that incorporates each factor. In such a case, a multi-phase approach may be appropriate. The CBPR approach can be used to address this issue as well as facilitate longitudinal studies.

A secondary issue is the timeframe in which most community-gardening programs and projects occur. The impacts on behavior may be short-lived or the potential impact on health, particularly among youth may not be recognized for many years (i.e. healthier eating patterns into young adulthood and adulthood). Most studies, including ours do not address these factors. Some issues related to longitudinal designs in community gardens are related to the nature of gardens. They are often temporary or seasonal contacts with youth, the youth may not be associated with the garden/programming year-to-year and the ability of gardening to substantially improve diet quality is not understood. These are complex issues that are not easily addressed through research studies.

On way to potentially address this issue of long term contact with garden participants may be through CBPR. The nature of CBPR and the longevity of a partnership is conducive to efforts to the execution of multiphase and longitudinal studies to understand the long term impact of intervention and prevention programs. The CBPR approach has allowed researchers to establish and maintain a strong and trusting relationship with the DRR community. Through the DRPHC, multiple projects involving gardens and other health promotion initiatives have occurred over the past several years. Community garden programs have seen some success in the DRR however there is still room for improvement. The harvest logging project has shown the productivity of gardens, however the actual public health impact is still unclear. Concerted, long-term efforts are needed to fully understand if
community gardens have the capability of improving community- and individual-level food security (Anderson 1990, Gottlieb and Fisher 1996, Edelstein 2010).

The mission of the DRPHC is to reduce obesity in the region, which encompasses increasing fruit and vegetable consumption. Changing the obesity prevalence is not a quick process. Changes in behavior precede this outcome. Thus, fruit and vegetable intake is a behavior that can be targeted. Factors that predict behavior, such as willingness to try and self-efficacy for eating fruits and vegetables are appropriate to assess. With this in mind, new approaches to evaluating the partnership’s progress toward changing the behavior of DRR residents are needed. Being able to better account for who is receiving food harvested from community gardens, the degree to which these foods change the availability of fruits and vegetables in their homes, and the degree to which this availability changes behavior would further demonstrate the effectiveness of community gardens.

Youth present a unique situation as study participants as their ability to change their behavior is both high and limited. Youth possess some level of autonomy though are still under the influence of their parents. They spend a significant amount of time in school, in afterschool programs, and at home which are all environments that affect them and serve as opportunities for change. By combining SCT and CBPR comprehensive programs can be developed to address these nuances. A program cannot be tailored for each individual, however some factors can be taken into consideration. Through the CBPR approach community members can provide insight regarding how potential participants may respond to certain recruitment tactics and how program components can be tailored to be more appealing to increase retention and the effectiveness of the program. Even if personal and behavioral factors are modified the effect of this change may be negated if the environment is not conducive to supporting new behaviors. Thus, community members can identify appropriate settings for program implementation and contribute to the delivery and facilitation of programs. On a larger scale, community members can exercise their power to elicit change of their environments through their local
government. This study is one of part of a larger effort to improve the health of a community and built on the knowledge of previous studies targeting youth and studies initiation by the DRPHC and simultaneously provided a path for future health promotion efforts in the DRR.
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### Table 1. Overview of Studies Measuring Fruit and/or Vegetable Preference

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<th>Study population (n)</th>
<th>Design (duration)</th>
<th>Curriculum description</th>
<th>Tool</th>
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<td>In-school</td>
<td>4&lt;sup&gt;th&lt;/sup&gt; grade students G+NE (81) NE (71) C (61)</td>
<td>Pre-post (17 weeks)</td>
<td>Developed using SCT 9 lessons delivered over 17 weeks</td>
<td>Questionnaires</td>
<td>NE+G and NE ↑ VP</td>
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<td>Morris and colleagues (2001)⁹</td>
<td>In-school</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; grade students NE+G (48) C (49)</td>
<td>Quasi (based on garden availability), Pre-post, (Delivered throughout school year)</td>
<td>Teacher developed curriculum using SCT NE+G: Nutrition lessons incorporated into class material and delivered throughout the year, C: No curriculum</td>
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<td>Study Authors and Year</td>
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<td>Ratcliffe and colleagues (2011)&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>6&lt;sup&gt;th&lt;/sup&gt; grade students</td>
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<td>Quasi, pre-post</td>
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<td>↑ VP</td>
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<tr>
<td>Study</td>
<td>Setting</td>
<td>Participants</td>
<td>Intervention</td>
<td>Evaluation Method</td>
<td>FVP</td>
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<td>O’Brien and Shoemaker (2006)†</td>
<td>Afterschool</td>
<td>4th grade students NE+G (17) C (21)</td>
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<td>Questionnaires</td>
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<tr>
<td>Poston and colleagues (2005)†</td>
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<td>Guided by SCT. 20-30 minutes 2x per week. Included weekly food sampling and food preparation.</td>
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</tbody>
</table>

<sup>a</sup> Robinson-Obrien 2009  
<sup>b</sup> Non-duplicate studies from Langellotto and Gupta 2012  
NE, nutrition education only  
NE+G, nutrition education plus gardening  
C, control  
VP, vegetable preference  
FP, fruit preference  
FVP, fruit and vegetable preference
<table>
<thead>
<tr>
<th>Author (year)</th>
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<td>Ø willingness to taste V</td>
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<td>In-school</td>
<td>1st grade students NE+G (48) C (49)</td>
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<tr>
<td>NE, nutrition education only</td>
<td>NE+G, nutrition education plus gardening</td>
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<tr>
<td>C, control</td>
<td>V, vegetables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FV, fruits and vegetables</td>
<td>NR, not reported</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ ^a \text{Robinson-Obrien 2009} \]
\[ ^b \text{Non-duplicate studies from Langellotto and Gupta 2012} \]
<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Setting</th>
<th>Study population (n)</th>
<th>Design (duration)</th>
<th>Curriculum description</th>
<th>Tool</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>McAleese and Rankin (2007)a</td>
<td>In-school</td>
<td>6\textsuperscript{th}-grade students G+NE (45) NE (25) C (25)</td>
<td>Quasi (based on garden availability), Pre-post (12 weeks) “Dose” not described</td>
<td>“Nutrition in the Garden” G+NE: 12 weeks of NE and hands-on garden experience corresponding to the curriculum, NE: 12 weeks of NE, C: No curriculum</td>
<td>3-day 24-hour recall workbooks</td>
<td>NE+G ↑FVC</td>
</tr>
<tr>
<td>Lineberger and Zajicek (2007)a</td>
<td>In-school</td>
<td>3\textsuperscript{rd}-5\textsuperscript{th} grade students (111) NE+G</td>
<td>Quasi (based on volunteered participation), pre-post (10 lessons)</td>
<td>“Nutrition in the Garden” Teachers were required to incorporate information from each of the 10 units. Adaptations were allowed.</td>
<td>24-Hour recall journal</td>
<td>Ø FVC</td>
</tr>
<tr>
<td>Parmer and colleagues (2009)b</td>
<td>In-school</td>
<td>2\textsuperscript{nd} grade students NE+G (39) NE (37) C (39)</td>
<td>Quasi, pre-post</td>
<td>Pyramid Café and Junior Master Gardener</td>
<td>lunchroom observation</td>
<td>NE+G ↑ V choice</td>
</tr>
<tr>
<td>Ratcliffe and colleagues (2011)*</td>
<td>In-school</td>
<td>6\textsuperscript{th} grade students G (170) C (150)</td>
<td>Quasi, pre-post (13 weeks)</td>
<td>Guided by SCT, “Science Content Standards for</td>
<td>GVFQ</td>
<td>↑ VC</td>
</tr>
</tbody>
</table>
California Public Schools: Kindergarten through Grade Twelve”, “The Growing Classroom”, and “Nutrition to Grow On”. Curriculums combine science and health education learning objectives. 1 hour/week. 20 minutes instruction and 40 minutes of gardening.. Sampled from garden at least 3x. Optional 1x Saturday garden work party

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Grade Level</th>
<th>Design</th>
<th>Intervention</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wright and Rowell (2010)^b</td>
<td>In-school</td>
<td>K-5&lt;sup&gt;th&lt;/sup&gt; grade students</td>
<td>Matched by characteristics then randomized. Pre-post (73 days)</td>
<td>“Gardens Reaching Our World” (GROW)</td>
<td>Salad bar data and plate waste</td>
</tr>
<tr>
<td>Herman and colleagues (2005)^a</td>
<td>Afterschool</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;-8&lt;sup&gt;th&lt;/sup&gt; grade students</td>
<td>Pre-post, (not reported)</td>
<td>“Junior Master Gardener”, “Ag in the Classroom”, and “USDA Team Nutrition”</td>
<td>Single-item survey question</td>
</tr>
</tbody>
</table>
Youth received gardening and nutrition education with hands on gardening experience one day per week. Food preparation was incorporated.

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting</th>
<th>Participants</th>
<th>Intervention</th>
<th>Measures</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lautenslager and Smith (2007)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Community</td>
<td>8-15 year olds (96 pre, 66 post)</td>
<td>Pre-post (10 weeks, 3/week)</td>
<td>“Youth Farm Market Project”</td>
<td>Youth Farm Market Project</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Based on the Theory of Planned Behavior. Gardening and nutrition lessons included cooking demonstrations.</td>
<td></td>
</tr>
<tr>
<td>Koch and colleagues (2006)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Community</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;-5&lt;sup&gt;th&lt;/sup&gt; grade students (56)</td>
<td>Pre-mid-post (Range: 1 day/week for 12 weeks to daily for 1 week)</td>
<td>“Health and Nutrition from the Garden”</td>
<td>Interview</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 concepts designed to teach children how to eat healthfully on a budget</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Robinson-Obrien 2009  
<sup>b</sup> Non-duplicate studies from Langellotto and Gupta 2012  
NE, nutrition education only  
NE+G, nutrition education plus gardening  
C, control  
FVC, fruit and vegetable consumption
V, vegetable
VC, vegetable consumption
### Table 4. Overview of Studies Measuring Nutrition Knowledge

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Setting</th>
<th>Study population (n)</th>
<th>Design (duration)</th>
<th>Curriculum description</th>
<th>Tool</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morris and Zidenber-Cherr (2002)a</td>
<td>In-school</td>
<td>4th grade students G+NE (81) NE (71) C (61)</td>
<td>Pre-post (17 weeks)</td>
<td>Developed using SCT</td>
<td>Questionnaires</td>
<td>NE+G and NE ↑</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9 lessons delivered over 17 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morris and colleagues (2001)a</td>
<td>In-school</td>
<td>1st grade students NE+G (48) C (49)</td>
<td>Quasi (based on garden availability), Pre-post, (Delivered throughout school year)</td>
<td>Teacher developed curriculum using SCT</td>
<td>One-on-one interviews</td>
<td>NE+G ↑ food group identification</td>
</tr>
<tr>
<td>Cason (1999)a</td>
<td>In-school</td>
<td>Kindergarten students (NR)</td>
<td>Pre-post (Delivered throughout school year)</td>
<td>4-H, Expanded Food and Nutrition Education Program, and “5 a Day for Better Healthy” 30 minutes of nutrition education and 30 minutes of gardening per week Adapted from programs offered</td>
<td>Interviewer-led survey</td>
<td>↑ FV identification and “best choice”</td>
</tr>
<tr>
<td>Study</td>
<td>Setting</td>
<td>Grade</td>
<td>Sample Size</td>
<td>Design</td>
<td>Intervention</td>
<td>Data Collection</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
<td>--------</td>
<td>--------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Parmer and colleagues (2009)b</td>
<td>In-school</td>
<td>2nd</td>
<td>NE+G (39)</td>
<td>NE (37)</td>
<td>C (39)</td>
<td>Pyramid Café and Junior Master Gardener</td>
</tr>
<tr>
<td>Ratcliffe and colleagues (2011)b</td>
<td>In-school</td>
<td>6th</td>
<td>G (170)</td>
<td>C (150)</td>
<td></td>
<td>Guided by SCT, “Science Content Standards for California Public Schools: Kindergarten through Grade Twelve”, “The Growing Classroom”, and “Nutrition to Grow On”. Curriculums combine science and health education learning objectives. 1 hour/week. 20 minutes instruction and 40 minutes of gardening. Sampled from garden at least 3x. Optional 1x Saturday garden</td>
</tr>
<tr>
<td>Study</td>
<td>Setting</td>
<td>Sample Description</td>
<td>Intervention Details</td>
<td>Evaluation</td>
<td>Results/Outcomes</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
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<td>--------------------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>O’Brien and Shoemaker (2006)</td>
<td>Afterschool</td>
<td>4&lt;sup&gt;th&lt;/sup&gt; grade students (17)</td>
<td>“Junior Master Gardener”&lt;br&gt;8 lessons selected; 4 garden based, 4 nutrition based. 50 minutes of education, 30 minutes of gardening. Based on SCT. Food sampling provided weekly.</td>
<td>Questionnaires</td>
<td>Ø FV knowledge</td>
<td></td>
</tr>
<tr>
<td>Poston and colleagues (2005)</td>
<td>Afterschool</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; to 5&lt;sup&gt;th&lt;/sup&gt; grade students (18)</td>
<td>“Junior Master Gardener”&lt;br&gt;8 lessons selected and delivered for 75-80 minutes with 10-15 minutes of gardening. Control group received a standard NE curriculum: Professor Popcorn.</td>
<td>Questionnaires</td>
<td>Ø NK</td>
<td></td>
</tr>
<tr>
<td>Koch and colleagues (2006)</td>
<td>Community</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;-5&lt;sup&gt;th&lt;/sup&gt; grade students (56)</td>
<td>“Health and Nutrition from the Garden”&lt;br&gt;6 concepts designed to teach children how to eat healthfully</td>
<td>Multiple choice exam, and interview</td>
<td>↑ Knowledge of food guide pyramid</td>
<td></td>
</tr>
<tr>
<td>NE, nutrition education only</td>
<td>NE+G, nutrition education plus gardening</td>
<td>C, control</td>
<td>FV, fruits and vegetables</td>
<td>V, vegetables</td>
<td>NK, nutrition knowledge</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------------</td>
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<td>--------------------------</td>
<td>--------------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>Robinson-Obrien 2009</td>
<td>Non-duplicate studies from Langellotto and Gupta 2012</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

a budget
### Table 5. Overview of Studies Measuring Psychosocial Outcomes

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Setting</th>
<th>Study population (n)</th>
<th>Design (duration)</th>
<th>Curriculum description</th>
<th>Tool</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>O’Brien and Shoemaker (2006)*</td>
<td>Afterschool</td>
<td>4th grade students NE+G (17) C (21)</td>
<td>Pre-post, (10 weeks)</td>
<td>“Junior Master Gardener” 8 lessons selected; 4 garden based, 4 nutrition based. 50 minutes of education, 30 minutes of gardening. Based on SCT. Food sampling provided weekly.</td>
<td>Questionnaires</td>
<td>Ø SE to eat FV or SE to garden</td>
</tr>
<tr>
<td>Poston and colleagues (2005)*</td>
<td>Afterschool</td>
<td>3rd to 5th grade students NE+G (18) NE (11)</td>
<td>Pre-post, (8 weeks, 1/week)</td>
<td>“Junior Master Gardener” 8 lessons selected and delivered for 75-80 minutes with 10-15 minutes of gardening. Control group received a standard NE curriculum: Professor Popcorn.</td>
<td></td>
<td>Ø SE for eating FV ↓ Gardening SE</td>
</tr>
<tr>
<td>Lautenshlager and Smith (2007)*</td>
<td>Community</td>
<td>8-15 year olds (96 pre, 66 post)</td>
<td>Pre-post (10 weeks, 3/week)</td>
<td>“Youth Farm Market Project” Based on the Theory of Planned Behavior. Gardening and</td>
<td>Surveys</td>
<td>In boys no constructs were correlated with behavior change. In girls intention and PBC were</td>
</tr>
<tr>
<td>Study</td>
<td>Setting</td>
<td>Age/Group</td>
<td>Intervention Details</td>
<td>Results/Findings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------</td>
<td>------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lautenshlager and Smith (2006)</td>
<td>Community</td>
<td>9-15 year olds NE+G (26) C (14)</td>
<td>Focus groups (10 weeks)  Youth Farm Market Project</td>
<td>Gardening group received nutrition education plus gardening. Cooking group received nutrition education plus kitchen skills.</td>
<td>Focus groups</td>
<td><strong>↑</strong> attitudes related to gardening and FVC</td>
</tr>
</tbody>
</table>

*a* Robinson-Obrien 2009  
*b* Non-duplicate studies from Langellotto and Gupta 2012  
NE, nutrition education only  
NE+G, nutrition education plus gardening  
C, control  
G, garden  
FV, fruits and vegetables  
FVC, fruit and vegetable consumption  
PBC, perceived behavioral control  
SE, self-efficacy
<table>
<thead>
<tr>
<th>Lesson topics</th>
<th>Learning Objectives</th>
<th>SCT constructs</th>
</tr>
</thead>
</table>
| **Week 1: Basic Gardening**      | -To accurately identify plant parts and parts that are eaten.  
                                    -To understand the purpose of plants and what they need to live and grow.  
                                    -To learn & commit to garden rules & duties.  
                                    -To introduce weekly goals for eating FV.                                                                                                           | Self-Efficacy                |
|                                  |                                                                                                                                                      | Environment & situation      |
|                                  |                                                                                                                                                      | Reciprocal determinism       |
|                                  |                                                                                                                                                      | Reinforcement                |
|                                  |                                                                                                                                                      | Goal Setting                 |
| **Week 2: Basic gardening part 2** | -To be knowledgeable in plant spacing & planting in appropriate temperature zones.  
                                    -To gain confidence in ability to select locations to grow gardens.  
                                    -To gain confidence in ability to plant crops during appropriate seasons.                                                                             | Reciprocal determinism       |
|                                  |                                                                                                                                                      | Reinforcement                |
|                                  |                                                                                                                                                      | Goal Setting                 |
|                                  |                                                                                                                                                      | Self-Efficacy                |
|                                  |                                                                                                                                                      | Environment & situation      |
| **Week 3: Gardening techniques** | -To understand processes of water cycle and how it relates to plant needs.  
                                    -To be knowledgeable about the plant life cycle.  
                                    -To gain confidence in ability to garden & harvest FV.                                                                                            | Self-efficacy                |
|                                  |                                                                                                                                                      | Outcome expectations         |
|                                  |                                                                                                                                                      | Reinforcement                |
|                                  |                                                                                                                                                      | Goal Setting                 |
|                                  |                                                                                                                                                      | Behavioral Capability        |
|                                  |                                                                                                                                                      | Reciprocal determinism       |
| **Week 4: Garden maintenance**   | -To be knowledgeable and skilled in organic gardening practices and its importance for sustainability.  
                                    -To gain confidence in ability to solve problems in the garden.                                                                                      | Self-efficacy                |
|                                  |                                                                                                                                                      | Emotional Coping responses   |
|                                  |                                                                                                                                                      | Outcome expectations         |
|                                  |                                                                                                                                                      | Reciprocal determinism       |
|                                  |                                                                                                                                                      | Goal Setting                 |
|                                  |                                                                                                                                                      | Reinforcement                |
| **Week 5: Basic food nutrition** | -To be knowledgeable & confident about basic nutrition, MyPlate, and functions and sources of macro & micro nutrients.  
                                    -To understand the health benefits of eating FV.  
                                    -To gain confidence in ability to try new FV & eat more FV.                                                                                         | Behavioral Capability        |
|                                  |                                                                                                                                                      | Reciprocal determinism       |
|                                  |                                                                                                                                                      | Goal setting                 |
|                                  |                                                                                                                                                      | Self-efficacy                |
|                                  |                                                                                                                                                      | Reinforcement                |
|                                  |                                                                                                                                                      | Outcome expectations         |
| Week 6: Basic food nutrition part 2 | -To understand the importance of portion sizes.  
-To attain positive expectations about eating healthy snacks.  
-To gain confidence in ability to choose healthy options for snacks.  
-To increase willingness to try healthy options for snacks. | Outcome expectations  
Goal Setting  
Self-efficacy  
Behavioral capability  
Observational Learning  
Reciprocal determinism  
Reinforcement |
|---|---|---|
| Week 7: Safe practices | -To understand the importance of safe food practices in preventing illness or injury.  
-To gain confidence in ability to perform safe practices when preparing food. | Self-efficacy  
Behavioral Capability  
Outcome expectations  
Environment & Situation  
Goal Setting  
Reinforcement |
| Week 8: Healthful eating | -To increase willingness to try new FV.  
-To gain positive expectations of consuming FV.  
-To gain confidence in ability to prepare healthy foods & eat them regularly.  
-To improve capabilities of preparing healthy kid-friendly recipes at home. | Self-efficacy  
Goal Setting  
Reciprocal Determinism  
Observational Learning  
Behavioral Capability  
Outcome Expectations |
| Week 9: In class tasting | - To increase willingness to try new FV.  
-To gain confidence in ability to try new FV.  
- To gain positive expectations of consuming FV. | Reciprocal Determinism  
Self-efficacy  
Outcome expectations  
Behavioral Capability  
Goal Setting  
Reinforcement |
| Week 10: Recap and close | --To increase willingness to try new FV.  
-To gain confidence in ability to eat FV and garden.  
-To be knowledgeable about basic nutrition and gardening. | Self-efficacy  
Reciprocal determination  
Outcome expectations  
Reinforcements |
Table 7. Qualitative measures corresponding to feasibility areas of focus

<table>
<thead>
<tr>
<th>Feasibility area of focus</th>
<th>Measure</th>
<th>Sample question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand and acceptability</td>
<td>Youth (n=25)</td>
<td>Post-program interview What did you like most about the program?</td>
</tr>
<tr>
<td></td>
<td>Parents (n=15)</td>
<td>Pre-program questionnaire I would participate in a garden that was in the community where I live. Scale of 0 (strongly disagree)-10 (strongly agree)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-program survey If we offered the program again in the future, talk to me about your interest in allowing your child to participate again.</td>
</tr>
<tr>
<td></td>
<td>Site leaders (n=2)</td>
<td>Post-program interview Do you plan to have a community garden next year?</td>
</tr>
<tr>
<td>Implementation</td>
<td>Researcher evaluations and field notes</td>
<td>What were the barriers or challenges in implementation?</td>
</tr>
<tr>
<td></td>
<td>Attendance</td>
<td>How many children are present that enrolled in the program?</td>
</tr>
<tr>
<td>Limited-effectiveness</td>
<td>Willingness to try FV</td>
<td>Would you be willing to taste a new fruit?</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy for eating FV</td>
<td>For lunch at home do you think you can eat carrot or celery sticks instead of chips</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy for asking for FV</td>
<td>Do you think you can ask someone in your family to have vegetables cut up and out where you can reach them?</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy for gardening</td>
<td>Do you think you can weed and water the garden?</td>
</tr>
<tr>
<td></td>
<td>Gardening knowledge</td>
<td>Can you eat roots?</td>
</tr>
<tr>
<td></td>
<td>Plant parts</td>
<td>Do plants need water to grow?</td>
</tr>
<tr>
<td></td>
<td>Plant needs</td>
<td>Is pollination part of the plant life cycle?</td>
</tr>
<tr>
<td></td>
<td>Plant life cycle</td>
<td>Can you improve the soil by adding compost?</td>
</tr>
<tr>
<td></td>
<td>Garden maintenance</td>
<td>Is dairy represented on the MyPlate image?</td>
</tr>
<tr>
<td></td>
<td>Nutrition knowledge</td>
<td>Is beans have a lot of protein?</td>
</tr>
<tr>
<td></td>
<td>MyPlate</td>
<td>Should you wash your hands before preparing food?</td>
</tr>
<tr>
<td></td>
<td>Macronutrients</td>
<td>Should you wash your hands before preparing food?</td>
</tr>
<tr>
<td></td>
<td>Food safety</td>
<td>Should you wash your hands before preparing food?</td>
</tr>
</tbody>
</table>
## Table 8. Emergent Codes and Quotes Reflecting Youths’ Experiences and Impression of the Gardening and Nutrition Program (n=25)

<table>
<thead>
<tr>
<th>Interview Question</th>
<th>Code</th>
<th>Number of Mentions</th>
<th>Sample Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>What did you like most about the program</td>
<td>Trying food</td>
<td>10</td>
<td>“Trying vegetables”</td>
</tr>
<tr>
<td></td>
<td>Gardening experience</td>
<td>8</td>
<td>“Learning how to plant and about fruits and vegetables”</td>
</tr>
<tr>
<td></td>
<td>Curriculum content</td>
<td>4</td>
<td>“It fun and we get to learn about new stuff and eat new stuff”</td>
</tr>
<tr>
<td></td>
<td>Program in general</td>
<td>3</td>
<td>“I liked the program questions”</td>
</tr>
<tr>
<td></td>
<td>Playing games &amp; activities</td>
<td>2</td>
<td>“Games and trying different foods”</td>
</tr>
<tr>
<td>What did you like least about the program?</td>
<td>Did not dislike anything</td>
<td>7</td>
<td>“Liked everything”</td>
</tr>
<tr>
<td></td>
<td>Trying food</td>
<td>2</td>
<td>“Trying spinach”</td>
</tr>
<tr>
<td>What ideas do you have for us to make the program more fun or exciting in the future?</td>
<td>Increase games</td>
<td>8</td>
<td>“More games”</td>
</tr>
<tr>
<td></td>
<td>Increase food sampling</td>
<td>3</td>
<td>“Have more samples”</td>
</tr>
<tr>
<td></td>
<td>Increase variety of plants</td>
<td>3</td>
<td>“New seeds”</td>
</tr>
<tr>
<td>How has the program helped you with gardening?</td>
<td>Increased knowledge of gardening</td>
<td>9</td>
<td>“Taught [me] how to keep bugs/pests away”</td>
</tr>
<tr>
<td></td>
<td>Increased interest in gardening</td>
<td>5</td>
<td>“Now I know I want to garden because it seems exciting and its tasty.”</td>
</tr>
<tr>
<td></td>
<td>Increased knowledge of healthy eating</td>
<td>3</td>
<td>“It’s helped me learn. I can stop eating so much junk food and start eating fruit.”</td>
</tr>
<tr>
<td>How has the program helped you with nutrition and eating fruits and vegetables?</td>
<td>Learned about nutrition in general</td>
<td>6</td>
<td>“It did; gave me more knowledge”</td>
</tr>
<tr>
<td></td>
<td>Increased fruit and vegetable intake</td>
<td>4</td>
<td>“It’s helped me eat fruits and vegetables”</td>
</tr>
<tr>
<td></td>
<td>Tried new foods</td>
<td>4</td>
<td>“Tried new vegetables”</td>
</tr>
<tr>
<td></td>
<td>Increased knowledge of healthy eating</td>
<td>3</td>
<td>“It has made me know about different FV that I didn't think about before”</td>
</tr>
<tr>
<td>If any, what are some new</td>
<td>New fruit</td>
<td>8</td>
<td>“Strawberries, grapes”</td>
</tr>
<tr>
<td>Fruits and vegetables you've tried since starting the program?</td>
<td>New vegetables</td>
<td>8</td>
<td>“Spinach, tomatoes, and squash”</td>
</tr>
<tr>
<td></td>
<td>New fruit and vegetables</td>
<td>6</td>
<td>“String beans, corn, peas, oranges, apples, grapes”</td>
</tr>
<tr>
<td>Do you think you will continue to set goals to eat the recommended amount of fruits and vegetables after the program ends?</td>
<td>Yes</td>
<td>21</td>
<td>“Yes”</td>
</tr>
<tr>
<td></td>
<td>Not sure</td>
<td>3</td>
<td>“Maybe”</td>
</tr>
<tr>
<td>How do you think we can get more kids from your neighborhood to come to the program?</td>
<td>Distribute printed material</td>
<td>7</td>
<td>“Give more flyers”</td>
</tr>
<tr>
<td></td>
<td>Have large recruitment event</td>
<td>4</td>
<td>“Come outside with a microphone and talk”</td>
</tr>
<tr>
<td></td>
<td>Door-to-door solicitation</td>
<td>4</td>
<td>“Knock on their door and ask their mom if they can come if they are not in it. Let them know they can be in the program if they live nearby”</td>
</tr>
<tr>
<td></td>
<td>Encourage word of mouth through children</td>
<td>2</td>
<td>“We can ask friends”</td>
</tr>
</tbody>
</table>
Table 9. Limited Effectiveness Measures Before and After Participation in the Gardening and Nutrition Program Using Last Observation Carried Forward (n=43)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cronbach’s α</th>
<th># of Items</th>
<th>Mean Scores Pre (SD)</th>
<th>Mean Scores Post (SD)</th>
<th>Effect size</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willingness to try FV&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.86</td>
<td>26</td>
<td>1.43 (.42)</td>
<td>1.47 (.42)</td>
<td>0.10</td>
<td>NS</td>
</tr>
<tr>
<td>Self-efficacy for eating FV&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.75</td>
<td>13</td>
<td>1.61 (.35)</td>
<td>1.68 (.31)</td>
<td>0.21</td>
<td>NS</td>
</tr>
<tr>
<td>Self-efficacy for asking for FV&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.72</td>
<td>8</td>
<td>1.70 (.37)</td>
<td>1.83 (.29)</td>
<td>0.39</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Self-efficacy for gardening&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.47</td>
<td>6</td>
<td>1.75 (.31)</td>
<td>1.81 (.28)</td>
<td>0.20</td>
<td>NS</td>
</tr>
<tr>
<td>Gardening knowledge&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>25</td>
<td>14.53 (3.45)</td>
<td>15.74 (3.90)</td>
<td>0.33</td>
<td>.01</td>
</tr>
<tr>
<td>Plant parts&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>6</td>
<td>2.16 (1.36)</td>
<td>2.56 (1.30)</td>
<td>0.30</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Plant needs&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>6</td>
<td>4.37 (.98)</td>
<td>4.37 (1.45)</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Plant life cycle&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>9</td>
<td>5.53 (1.75)</td>
<td>5.35 (1.77)</td>
<td>-0.10</td>
<td>NS</td>
</tr>
<tr>
<td>Garden maintenance&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>4</td>
<td>2.05 (1.07)</td>
<td>2.14 (1.04)</td>
<td>0.09</td>
<td>NS</td>
</tr>
<tr>
<td>Nutrition knowledge&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>23</td>
<td>12.65 (2.29)</td>
<td>12.86 (1.97)</td>
<td>0.10</td>
<td>NS</td>
</tr>
<tr>
<td>MyPlate&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>10</td>
<td>5.65 (1.54)</td>
<td>6.26 (1.47)</td>
<td>0.40</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Macronutrients&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>9</td>
<td>3.70 (1.24)</td>
<td>3.65 (1.54)</td>
<td>-0.04</td>
<td>NS</td>
</tr>
<tr>
<td>Food safety&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>4</td>
<td>3.30 (.64)</td>
<td>2.95 (.21)</td>
<td>-0.82</td>
<td>.001</td>
</tr>
</tbody>
</table>

FV, fruits and vegetables; SD, standard deviation

<sup>a</sup>(average pre-test scores-average post-test scores)/ average standard deviation

<sup>b</sup>Responses were on a 3 point scale; 0, not willing; 1, maybe willing; 2, willing

<sup>c</sup>Responses were on a 3 point scale; 0, no; 1, maybe; 2, yes

<sup>d</sup>Responses coded as 1= correct; 0=incorrect
### Table 10. Home Availability of Fruits and Vegetables

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Baseline</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>Bananas</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Apples</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Applesauce</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Grapes</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Oranges</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Strawberries</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Watermelon</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Pineapple</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Peaches/nectarines</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Pears</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Fruit salad</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Cantaloupe/melon</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Kiwi</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Plum</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Blueberries/blackberries</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Mango</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>Corn</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Potatoes</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Greens</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Lettuce</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Green beans</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Onion</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Broccoli</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Peas</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Cabbage</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Cucumber</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Mixed vegetables</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Bell pepper</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Carrots</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Beans</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Mushroom</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Celery</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Squash</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Beets</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Brussels sprouts</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Asparagus</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

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REFERENCES


Boudreaux, K. and D. Sacks (2009). "MERCATUS ON POLICY."


U.S. Department of Health and Human Services Health Resources and Services Administration Medically Underserved Areas/Populations, U.S. Department of Health and Human Services, Health Resources and Services Administration.


Appendix A: IRB Approval

MEMORANDUM

DATE: February 28, 2014
TO: Jamie M Zoellner Dr, Jennie L Hill
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires April 25, 2018)
PROTOCOL TITLE: Housing Authority Junior Master Garden Project
IRB NUMBER: 12-225

Effective February 28, 2014, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the Continuing Review request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

http://www.irb.vt.edu/pages/responsibilities.htm

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: Expedited, under 45 CFR 46.110 category(ies) 7
Protocol Approval Date: March 26, 2014
Protocol Expiration Date: March 25, 2015
Continuing Review Due Date*: March 11, 2015

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.
Appendix B: Informed Consent

Informed Consent

Title of Research Project: Danville Housing Authority’s Junior Master Gardener Project

Investigators: Dr. Jamie Zoellner, Karissa Grier, Felicia Reese; Department of Human Nutrition, Foods and Exercise; Virginia Polytechnic Institute and State University

I. Purpose of this Research/Project
The purpose of this project is to determine the effects of a gardening and nutrition program among youth and their caregivers/parents who live at Cedar Terrace and Cardinal Village in Danville, Virginia.

II. Procedures
The gardening and nutrition program is free and will be available to youth. The program includes about 10 classes that each last about 60-90 minutes. The caregivers/parents will receive newsletters about gardening and nutrition. The program will be offered during the 2012 gardening season (April-August 2012). To participate in this research, both the caregiver/parent and child will complete an evaluation before the program begins and at the end of the program. The caregiver/parent evaluation is a survey that includes questions about fruits, vegetables and gardening and will take about 30 minutes to complete. The child evaluation is a survey that will be read aloud to the child and includes questions about willingness to try fruits and vegetables and attitudes about nutrition and gardening and will take about 30 minutes to complete. Height and weight measurements will also be taken on the child.

III. Risks
The risks associated with this study are low. The only known risk is the inconvenience of time that it takes to complete the surveys.

IV. Benefits
The main benefit of this study is that youth will learn more about gardening and nutrition through the hands-on programs and activities. Caregivers/parents will learn more about gardening and nutrition through the newsletters.

V. Extent of Anonymity and Confidentiality
Caregiver’s/parent’s and child’s identities will be kept confidential at all times and will only be known by the research investigators. An identification number will be assigned to the caregivers/parents and children. Only the investigators and trained researchers at Virginia Tech will have access to caregiver’s/parent’s and child’s data. At no time will the researchers release...
the results of the study to anyone other than individuals working on the project without the caregiver’s/parent’s written consent.

VI. **Compensation**
After both the caregiver/parent and child complete the evaluation before the program begins they will receive one $15 gift card. After both the caregiver/parent and child complete the evaluation at the end of the program they will receive one additional $15 gift card.

VII. **Freedom to Withdraw**
I am free to withdraw myself and my child from the study at any time without penalty. If I choose to withdraw myself or my child, I will be compensated for the portion of the time of the study. If I choose to withdraw myself or my child, I will not be penalized. I am free not to answer any questions on the evaluation form. My child is also free not to answer any questions on the evaluation form and free to choose not to participate in any of the study activities. There may be circumstances under which the investigator may determine that I should not continue as a participant. I must be compensated for the portion of the project completed.

VIII. **Participant’s Responsibilities**
I voluntarily agree to participate in this study and give permission for my child to participate in this study. I understand that participation in this study includes my child participating in a gardening and nutrition program and that my child and I will complete an evaluation before the program begins and at the end of the program.

IX. **Participant’s Permission**
I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

Name of Child Participating in the Study: ____________________________________________
Printed name of Parent: __________________________________________________________
Signature of Parent: ___________________________________ Date: __________
Signature of Researcher: _____________________________ Date: __________

Should I have any pertinent questions about this research or its conduct, and research subjects’ rights, and whom to contact in the event of a research-related injury to the subject, I may contact:

Karissa Grier  Investigator  540-231-1267  kgrier@vt.edu

Felicia Reese  Investigator  540-231-1267  freese@vt.edu
Jamie Zoellner  540-231-3670
Faculty Advisor  zoellner@vt.edu

Susan Hutson  540-231-8766
Department Head  susanh5@vt.edu

David M. Moore  540-231-4991
Chair, Virginia Tech Institutional Review Board for the Protection of Human Subjects
Office of Research Compliance
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, VA 24060

moored@vt.edu
Appendix C: Child Assent

**Assent Statement for Children**

Parental Permission on File: □ Yes □ No  
*(If “No”, do not proceed with assent or research procedures.)*

Hi, my name is __________________ and I’m a student at Virginia Tech. We are going to have the Junior Master Gardener program here for a few weeks. The good thing about this program is that it will help us teach children like you about gardening and eating fruits and vegetables.

If you would like, you can be in the program. If you decide you want to be in the program I will ask you a few questions and take your height and weight. There is no right or wrong answer to the questions. The only people who will see your answers are the other researchers at Virginia Tech.

Also, if you join the program you will come to the Housing Authority once a week to learn about gardening and nutrition.

Your <Mom/Dad/Guardian> knows about the program and has already said that its okay for you to be in it but you don’t have to if you don’t want to. You can stop being in the program at any time. No one will be mad if you don’t want to be in the program.

Do you have any questions for me?

If you have any questions that you think of later you can call Karissa or Felicia or you can ask your parents to call one of them. Their number is 540-231-1267. Their number is also on the flyer that your <Mom/Dad/Guardian> has.

Would you like to be in the program?

Child’s Voluntary Response to Participation: □ Yes □ No

Name of Child: ____________________________________________________________

Signature of Researcher: __________________________________________________

(Optional) Signature of Child: _____________________________________________

Date: ________________________________
Appendix D: Youth Pre/Post Questionnaire

**Willingness to Try Fruits and Vegetables (WillTry)**

Instructions for Survey Administrator: You will need your flashcards for Part I. Please read aloud each of the following questions to the child while showing them the appropriate picture. Check or mark the answer that the child provides.

*Interviewer says:* There are 3 possible answers for each question: yes, no or maybe. Please answer for yourself. It is not a test, so I can repeat any question or answer that you need.

<table>
<thead>
<tr>
<th>WillTry1</th>
<th>Would you be willing to taste a new food if offered?</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
</table>

*Interviewer says:* The following questions refer to where you might be willing to taste a new food. Again, please answer yes, no or maybe.

<table>
<thead>
<tr>
<th>WillTry2</th>
<th>Would you be willing to taste a new food...</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>WillTry3</td>
<td>At home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry4</td>
<td>At a friend’s home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry5</td>
<td>At a restaurant?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry6</td>
<td>At church?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Interviewer says:* There are 3 possible answers for the following questions. Please answer the following questions for yourself.

<table>
<thead>
<tr>
<th>WillTry7</th>
<th>Would you be willing to taste...</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>WillTry8</td>
<td>A new vegetable?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry9</td>
<td>A new fruit?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry10</td>
<td>A new dish? (eg casserole)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry11</td>
<td>An apricot?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry12</td>
<td>Baby carrots?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry13</td>
<td>Blueberries?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry14</td>
<td>Broccoli?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry15</td>
<td>Cauliflower</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry16</td>
<td>Celery sticks with dip?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry17</td>
<td>A cucumber?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry18</td>
<td>A grape tomato?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry19</td>
<td>Green squash?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry20</td>
<td>Honeydew melon?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry21</td>
<td>Mandarin oranges?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry22</td>
<td>A plum?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WillTry23</td>
<td>Yellow squash?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WillTry24</th>
<th>In general, do you consider yourself a healthy eater?</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In general, do you consider your parent a healthy eater</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Interviewer says: There are 3 possible answers for the following questions. They are a little different than before. Please answer for yourself.

| WillTry25 | Which of these best describes you? |
| WillTry26 | Which of these best describes your parent? |

### Outcome Expectations for Eating FV (ExpectFV)

Interviewer says: There are 3 possible answers for each question: yes, no or maybe. Please answer for yourself.

<table>
<thead>
<tr>
<th>ExpectFV</th>
<th>Expectation</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>ExpectFV1</td>
<td>You will have more energy for playing (sports, recess or after school) if you eat fruits and vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ExpectFV2</td>
<td>You will get sick more often if you don’t eat fruits and vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ExpectFV3</td>
<td>Eating fruits and vegetables will help you grow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ExpectFV4</td>
<td>You will have healthier skin if you eat fruits and vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ExpectFV5</td>
<td>If you eat fruits and vegetables, you will have stronger eyes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ExpectFV6</td>
<td>If you eat fruits and vegetables at breakfast, you will be able to think better in class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ExpectFV7</td>
<td>Eating fruits and vegetables may help keep you from getting cavities</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Self-Efficacy for Eating Fruits and Vegetables (SEFV)

**Interviewer says:** There are 3 possible answers for the following questions. Please answer the following questions for yourself.

<table>
<thead>
<tr>
<th>SEFV1</th>
<th>For breakfast, do you think you can...</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Drink a glass of your favorite juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Add fruit to your cereal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEFV2</th>
<th>For lunch at school, do you think you can...</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Eat a vegetable that’s served</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Eat a fruit that is served</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEFV3</th>
<th>For lunch at home do you think you can...</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Eat carrot or celery sticks instead of chips</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Eat your favorite fruit instead of your usual dessert</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEFV4</th>
<th>For a snack do you think you can choose...</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Your favorite fruit instead of your favorite cookie</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Your favorite fruit instead of your favorite candy bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Your favorite raw vegetable with dip instead of your favorite cookie</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Your favorite raw vegetable with dip instead of your favorite candy bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Your favorite raw vegetable with dip instead of chips</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEFV5</th>
<th>For dinner do you think you can...</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Eat a big serving of vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Eat your favorite fruit instead of your usual dessert</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

# Self-Efficacy for Asking and Shopping for Fruits and Vegetables (SEFVAsk)

**Interviewer says:** There are 3 possible answers for the following questions. Please answer the following questions for yourself.

<table>
<thead>
<tr>
<th>SEFVask1</th>
<th>Do you think you can:</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Write your favorite fruit or vegetable on the family’s shopping list</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEFVask2</td>
<td>Ask someone in your family to buy your favorite fruit or vegetable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEFVask3</td>
<td>Go shopping with your family for your favorite fruit or vegetable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEFVask4</td>
<td>Pick out your favorite fruit or vegetable at the store and put it in the shopping basket</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEFVask5</td>
<td>Ask someone in your family to make your favorite vegetable dish for dinner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEFVask6</td>
<td>Ask someone in your family to serve your favorite fruit at dinner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEFVask7</td>
<td>Ask someone in your family to have fruits and fruit juices out where you can reach them</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEFVask8</td>
<td>Ask someone in your family to have vegetables cut up and out where you can reach them</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Gardening Knowledge (GarKnow)**

**Interviewer says:** I want you to think about different fruits and vegetables and think about what part of the plant they come from. I’m going to ask you about what parts of plants you think you can eat. You can answer “yes”, “no” or “I don’t know”.

<table>
<thead>
<tr>
<th>Can you eat...</th>
<th>Yes</th>
<th>No</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>GarKnow1 Roots</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow2 Stems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow3 Leaves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow4 Flowers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow5 Fruits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow6 Seeds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Interviewer says:** I want you to think about all the things that a plant needs to grow. I’m going to ask you if plants need different things to grow and you can answer “yes”, “no” or “I don’t know”.

<table>
<thead>
<tr>
<th>Do plants need...</th>
<th>Yes</th>
<th>No</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>GarKnow7 Air to grow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow8 Water to grow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow9 Sunlight to grow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow10 Nutrients to grow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow11 Soil</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Interviewer says:** I am going to ask you about what type of soil is best for plants to live and grow in. You can pick the answer you think is right or you can say “I don’t know”.

**GarKnow12:** Which of these do plants grow best in?

- [ ] Sand
- [ ] Silt
- [ ] Clay
- [ ] A mixture of sand, silt and clay
- [ ] I don’t know

**Interviewer says:** I’m going to ask you questions about the plant life cycle. I will name different stages and you will tell me if it is part of the plant life cycle. You can answer “yes”, “no” or “I don’t know”.

<table>
<thead>
<tr>
<th>Is ___ part of the plant life cycle?</th>
<th>Yes</th>
<th>No</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>GarKnow13 Germination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow14 The development of roots, stems and leaves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow15 Hatching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GarKnow16 Flowering</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Interviewer says: Is spraying chemicals the only way to get rid of weeds and pests in the garden?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>GarKnow22</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Interviewer says: I’m going to ask you about ways to improve gardening soil. I’m going to name different things and you can tell me if it is a way to improve the soil. You can answer “yes”, “no” or “I don’t know”.

<table>
<thead>
<tr>
<th>Can you improve the soil by...</th>
<th>Yes</th>
<th>No</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding compost?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adding sugar?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adding fertilizer?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Self-efficacy for Gardening (SEGar)**

Interviewer says: I’m going to ask you how you feel about being able to garden. You can answer “yes”, “no” or “maybe”.

<table>
<thead>
<tr>
<th>Do you think you can...</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEGar1  Find a space for a garden at your home?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEGar2  Prepare the soil and plant seeds or young plants for a garden?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEGar3  Choose plants or seeds that will grow in your garden?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEGar4  Weed and water the garden?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEGar5  Pick and eat the vegetables that you have grown in your garden?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEGar6  Find the time and energy to have a garden?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Nutrition Knowledge (NutKnow)

Interviewer says: MyPlate has replaced the food pyramid as a guide for the different foods you should eat. I’m going to ask you some questions about MyPlate.

NutKnow1. How many food groups are represented on the MyPlate image? (Show handcard)

- □ 1
- □ 2
- □ 3
- □ 4
- □ 5
- □ 6
- □ Don’t know
- □ Refuse

I’m going to name some items and I want you to tell me if they are represented on the MyPlate image. You can answer “yes”, “no” or “I don’t know”.

<table>
<thead>
<tr>
<th>NutKnow</th>
<th>Item</th>
<th>Yes</th>
<th>No</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>NutKnow2</td>
<td>Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow3</td>
<td>Dairy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow4</td>
<td>Fruit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow5</td>
<td>Sugar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow6</td>
<td>Oil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow7</td>
<td>Protein</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow8</td>
<td>Grains</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow9</td>
<td>Vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NutKnow2. How many servings of fruits and vegetables should you eat every day? (Show handcard)

- □ 1
- □ 2
- □ 3
- □ 4
- □ 5
- □ 6
- □ Don’t know
- □ Refuse

Interviewer says: I’m going to ask you some questions about what foods have different nutrients. I’m going to list different foods and you can tell me if that food has the nutrient that I ask about. You can answer “yes”, “no” or “I don’t know”.

<table>
<thead>
<tr>
<th>NutKnow</th>
<th>Does ___ have a lot of protein?</th>
<th>Yes</th>
<th>No</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>NutKnow10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow11</td>
<td>Olive oil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow12</td>
<td>Potatoes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow13</td>
<td>Beans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow14</td>
<td>Does ___ have a lot of carbohydrates?</td>
<td>Yes</td>
<td>No</td>
<td>I don’t know</td>
</tr>
</tbody>
</table>
Interviewer says: I’m going to ask you some questions about being safe with food. You can answer “yes”, “no” or “I don’t know”.

<table>
<thead>
<tr>
<th>NutKnow15</th>
<th>Olive oil</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NutKnow16</td>
<td>Potatoes</td>
<td></td>
</tr>
<tr>
<td>NutKnow17</td>
<td>Beans</td>
<td></td>
</tr>
<tr>
<td>NutKnow18</td>
<td>Do(es) ___ have a lot of fat?</td>
<td>Yes</td>
</tr>
<tr>
<td>NutKnow19</td>
<td>Olive oil</td>
<td></td>
</tr>
<tr>
<td>NutKnow20</td>
<td>Potatoes</td>
<td></td>
</tr>
<tr>
<td>NutKnow21</td>
<td>Beans</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Should you…</th>
<th>Yes</th>
<th>No</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>NutKnow22</td>
<td>Wash your hands before preparing food?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow23</td>
<td>Wash fruits and vegetables before you eat them?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow24</td>
<td>Clean the surface before preparing food?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NutKnow25</td>
<td>Cut raw meat and vegetables on the same cutting board?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Demographics (Dem)**

Interviewer instructions: Do not read 1 and 2 aloud; just select appropriate answer.

Dem01. Race (Please circle one): White Black Hispanic Other

Dem02. Gender (please circle one): Female Male

*Interviewer: Read aloud and record responses*

Dem03. How old are you?___________

Dem04. How many sisters & brothers do you have? #sisters_____ # brothers_____

**Anthropometrics (Anthro)**

Anthro1a: Height (cm): | ___ | ___ | ___ | . | ___ |

Anthro2a: Weight (kg): | ___ | ___ | ___ | . | ___ |
Appendix E: Parent Pre/Post Questionnaire

Parent Survey
Junior Master Gardener Program

Please answer the following items as best you can.

Your personal responses will be confidential and we will not be shared with anyone. All of your answers are very important for this research study. However, remember that you do not have to answer any questions that you do not want to.

This survey will take you about 30 minutes to finish.

If you are unsure about what a question means please ask Karissa Grier or Felicia Reese.

Contact information:

Karissa Grier
Email: kgrier@vt.edu
Phone: 540-231-1267

Felicia Reese
Email: freese@vt.edu
Phone: 540-231-1267
PART A: Beliefs about Gardening.
The following questions ask what you think about maintaining a garden. Pick the best number for each question and draw a circle around it.

1. For you, working in a garden would be:

   1  2  3  4  5  6  7
   extremely unenjoyable  Quite unenjoyable  Slightly unenjoyable  neutral  Slightly enjoyable  Quite enjoyable  Extremely enjoyable

2. For you, working in a garden would be:

   1  2  3  4  5  6  7
   extremely unhealthy  quite unhealthy  slightly unhealthy  neutral  slightly healthy  quite healthy  extremely healthy

3. For you, working in a garden would be:

   1  2  3  4  5  6  7
   extremely unpleasant  quite unpleasant  slightly unpleasant  neutral  slightly pleasant  quite pleasant  extremely pleasant

4. For you, working in a garden would be:

   1  2  3  4  5  6  7
   extremely unwise  quite unwise  slightly unwise  neutral  slightly wise  quite wise  extremely wise

5. For you, working in a garden would be:

   1  2  3  4  5  6  7
   extremely boring  quite boring  slightly boring  neutral  slightly exciting  quite exciting  extremely exciting

6. For you, working in a garden would be:

   1  2  3  4  5  6  7
   extremely harmful  quite harmful  slightly harmful  neutral  slightly beneficial  quite beneficial  extremely beneficial
PART B: Gardening Practices.
The next questions ask you specifically about gardening practices. Use the numbers that match the words below to answer each question.

For you, how likely is it that working in a garden each day would...

7. Make you feel good?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely

8. Take too much of your free time?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely

9. Help you lose weight?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely

10. Reduce your chances of disease?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely

11. Give you more energy?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely

12. Increase the amount of vegetables you eat?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely
13. Increase the amount of fruit you eat?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely

14. Increase the amount of vegetables your family and/or children eat?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely

15. Increase the amount of fruit your family and/or children eat?

1 extremely unlikely 2 quite unlikely 3 slightly unlikely 4 neutral 5 slightly likely 6 quite likely 7 extremely likely

PART C: Gardening Confidence.
For these questions, we would like to ask you specific questions about your confidence towards gardening. Use the numbers that match the words below to answer each question.

How confident are you in being able to...

16. Find a space for a garden at your home?

1 not at all confident 2 slightly unconfident 3 neutral 4 slightly confident 5 very confident

17. Prepare the soil and plant seed or young plants for a garden?

1 not at all confident 2 slightly unconfident 3 neutral 4 slightly confident 5 very confident

18. Choose plant or seed varieties appropriate for your garden?

1 not at all confident 2 slightly unconfident 3 neutral 4 slightly confident 5 very confident
19. Weed, water and maintain a garden?

1  not at all confident
2  slightly unconfident
3  neutral
4  slightly confident
5  very confident

20. Harvest and use the vegetables you have grown in your garden?

1  not at all confident
2  slightly unconfident
3  neutral
4  slightly confident
5  very confident

21. Find the time and energy to have a garden?

1  not at all confident
2  slightly unconfident
3  neutral
4  slightly confident
5  very confident

22. Drive or take a bus to a community location to garden?

1  not at all confident
2  slightly unconfident
3  neutral
4  slightly confident
5  very confident

PART D: Gardening Practices & Interest

The next few questions are about your interest in gardening. Please respond to the statements by circling your answer.

23. Have you ever gardened?  Yes  No
23a. If yes, where? ________________________________________________________________

Please mark how much you agree or disagree with the following statements.

24. I would like to plant and maintain a garden at home.

Strongly Disagree

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Strongly Agree
25. I would eat the food grown out of my garden at home.

Strongly Disagree

0   1   2   3   4   5   6   7   8   9

Strongly Agree

10

26. I would participate in a garden that was in the community where I live.

Strongly Disagree

0   1   2   3   4   5   6   7   8   9

Strongly Agree

10

27. I would eat the food grown out of a community garden.

Strongly Disagree

0   1   2   3   4   5   6   7   8   9

Strongly Agree

10

For the next 4 questions, please circle the answer that best describes your opinion.

28. How important is it for you to garden?

Not at All

0   1   2   3   4   5   6   7   8   9

Very

10

29. How important is it for you to eat more fruits and vegetables?

Not at All

0   1   2   3   4   5   6   7   8   9

Very

10

30. How important is it for you to get more exercise?

Not at All

0   1   2   3   4   5   6   7   8   9

Very

10

31. How important is it for your child or children to eat more fruit and vegetables?

Not at All

0   1   2   3   4   5   6   7   8   9

Very

10
### PART E: Fruit and Vegetable Availability

Thinking of the past 30 days, please answer the following questions about the types of foods you had in your house. Please circle the appropriate number for each food item.

#### How often did you have the following fruits (fresh, canned, or frozen) in your home?

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Apples</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. Applesauce</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. Bananas</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. Blueberries/blackberries</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. Cantaloupe/Melon</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. Fruit salad</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. Grapes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. Kiwi</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. Mango</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. Oranges</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. Peaches/nectarines</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. Pears</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. Pineapple</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. Plum</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. Strawberries</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. Watermelon</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. Other:__________________</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

#### How often did you have the following vegetables (fresh, canned, or frozen) in your house?

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cauliflower</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Corn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. potatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Tomatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Carrots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Radish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Beet</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. Zucchini</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Cucumber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Broccoli</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Kale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Collard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Kohlrabi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Endive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Arugula</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Radicchio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Other:______________</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Asparagus</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>19.</td>
<td>Beans (baked, lentils, kidney, etc.)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20.</td>
<td>Beets</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>21.</td>
<td>Bell pepper</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>22.</td>
<td>Broccoli</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>23.</td>
<td>Brussel sprouts</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>24.</td>
<td>Cabbage</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>25.</td>
<td>Carrots</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>26.</td>
<td>Cauliflower</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>27.</td>
<td>Celery</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>28.</td>
<td>Corn</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Cucumber</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>30.</td>
<td>Green beans</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>31.</td>
<td>Greens (mustard, collard, kale, spinach, swiss chard etc.)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>32.</td>
<td>Lettuce</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>33.</td>
<td>Mixed vegetables</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>34.</td>
<td>Mushroom</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>35.</td>
<td>Onion (green, red, white, yellow)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>36.</td>
<td>Peas</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>37.</td>
<td>Potatoes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>38.</td>
<td>Squash (acorn, zucchini, etc.)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>39.</td>
<td>Sweet potatoes/Yams</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
**PART F: General Food Availability**

The next few statements are about the availability of food in general in your house. Please respond to the statements by circling your answer.

1. **In the past year, the food that I bought just didn’t last and I didn’t have enough money to get more.**
   - □ Often true
   - □ Sometimes true
   - □ Never true
   - □ I Don’t know

2. **In the past year, I couldn’t afford to eat balanced meals**
   - □ Often true
   - □ Sometimes true
   - □ Never true
   - □ Don’t know

3. **In the past year, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn’t enough money or food?**
   - □ Yes
   - □ No
   - □ I Don’t know
   
   If “no”, skip to number 5

4. **How often did this happen?**
   - □ Almost every month
   - □ Some months but not every month
   - □ I don’t know

5. **In the past year, did you ever eat less than you felt you should because there wasn’t enough money for food?**
   - □ Yes
   - □ No
   - □ I Don’t know
6. In the past year, were you ever hungry but didn’t eat because there wasn’t enough money for food?
   □ Yes
   □ No
   □ I Don’t know

7. In the past year, did you or anyone in your household get SNAP or food stamp benefits?
   □ Yes
   □ No
   □ I Don’t know

8. In the past year, did you or anyone in your household get food or services through the WIC program?
   □ Yes
   □ No
   □ I Don’t know

**PART G: Food Frequency Questionnaire**
For the next six questions please think about the different kinds of food you ate or drank during the PAST MONTH, that is, the past 30 days. When answering, please include meals and snacks eaten at home, at work or school, in restaurants, and anyplace else.

1. During the past month, roughly how many times did you drink 100% fruit juices, not including fruit-flavored drinks with added sugar or drinks you add sugar to?
   □ Never
   □ 1-3 times last month
   □ 1-2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 times per day
   □ 3 times per day
   □ 4 times per day
   □ 5 or more times per day
2. Not counting juice, during the past month, roughly how many times did you eat fresh, frozen, or canned fruit?
   □ Never
   □ 1-3 times last month
   □ 1-2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 times per day
   □ 3 times per day
   □ 4 times per day
   □ 5 or more times per day

3. During the past month, roughly how many times did you eat cooked or canned beans, such as kidney, lima, pinto, refried, baked beans, beans in soup, black beans, garbanzo beans, soybeans, tofu or lentils? Do not include green or long beans.
   □ Never
   □ 1-3 times last month
   □ 1-2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 times per day
   □ 3 times per day
   □ 4 times per day
   □ 5 or more times per day

4. During the past month, roughly how many times did you eat dark green vegetables for example dark green leafy lettuce including romaine, cooked or raw spinach, broccoli, chard, choy, or collard or mustard greens? Do not include iceberg lettuce.
   □ Never
   □ 1-3 times last month
   □ 1-2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 times per day
   □ 3 times per day
   □ 4 times per day
   □ 5 or more times per day
5. During the past month, roughly how many times did you eat orange-colored vegetables such as sweet potatoes, pumpkin, winter squash or carrots?
   □ Never
   □ 1-3 times last month
   □ 1-2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 times per day
   □ 3 times per day
   □ 4 times per day
   □ 5 or more times per day

6. Not counting any vegetables you just told me about or any fried potatoes, during the past month, roughly how many times did you eat other vegetables or vegetable juice?
   □ Never
   □ 1-3 times last month
   □ 1-2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 times per day
   □ 3 times per day
   □ 4 times per day
   □ 5 or more times per day

---

PART H: Perception of Neighborhood Interaction

The next three statements are about how neighbors should interact with each other. Please indicate how much you agree or disagree with the statements by circling your answer.

1. Neighbors should mind their own business about their neighbors’ children.
   Mostly false
   Mostly true
   1 2 3 4 5 6 7 8 9 10

2. Nowadays someone will verbally correct a child’s behavior if the parents are not around.
   Mostly false
   Mostly true
   1 2 3 4 5 6 7 8 9 10

3. Any adult has the right to verbally correct a neighborhood child if the parents are not around.
   Mostly false
   Mostly true
   1 2 3 4 5 6 7 8 9 10
### PART I: Perception of Neighborhood Response

The next few statements are about how neighbors might react or respond. Please indicate how you feel about the statements by circling your answer.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mostly false</th>
<th>Mostly true</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Children in this neighborhood might yell or swear at someone who verbally corrects their behavior.</td>
<td>Mostly false</td>
<td>Mostly true</td>
</tr>
<tr>
<td>5. Teenagers in this neighborhood might yell or swear at someone who verbally corrects their behavior.</td>
<td>Mostly false</td>
<td>Mostly true</td>
</tr>
<tr>
<td>6. Parents in this neighborhood might yell or swear at someone who verbally corrects their children.</td>
<td>Mostly false</td>
<td>Mostly true</td>
</tr>
<tr>
<td>7. Children might retaliate physically against a neighbor who verbally corrects their behavior.</td>
<td>Mostly false</td>
<td>Mostly true</td>
</tr>
<tr>
<td>8. Teenagers might retaliate physically against a neighbor who verbally corrects their behavior.</td>
<td>Mostly false</td>
<td>Mostly true</td>
</tr>
<tr>
<td>9. Parents might retaliate physically against a neighbor who verbally corrects their child’s behavior.</td>
<td>Mostly false</td>
<td>Mostly true</td>
</tr>
<tr>
<td>10. Parents should be angry if neighbors verbally correct their children.</td>
<td>Mostly false</td>
<td>Mostly true</td>
</tr>
</tbody>
</table>
The next few statements are about how you feel about the neighborhood you live in. Please indicate how you feel about the statements by circling your answer.

11. My neighborhood is a good place to live.  
   | Mostly  | Mostly  |
   | false   | true    |
   | 1 2 3 4 5 6 7 8 9 10 |

12. My neighborhood is a good place to raise children.  
   | Mostly  | Mostly  |
   | false   | true    |
   | 1 2 3 4 5 6 7 8 9 10 |

13. The people moving into the neighborhood in the past year or so are good for the neighborhood.  
   | Mostly  | Mostly  |
   | false   | true    |
   | 1 2 3 4 5 6 7 8 9 10 |

14. I would like to move out of this neighborhood.  
   | Mostly  | Mostly  |
   | false   | true    |
   | 1 2 3 4 5 6 7 8 9 10 |

15. There are some children in the neighborhood that I do not want my children to play with.  
   | Mostly  | Mostly  |
   | false   | true    |
   | 1 2 3 4 5 6 7 8 9 10 |

16. The people moving into the neighborhood in the past year or so are bad for the neighborhood.  
   | Mostly  | Mostly  |
   | false   | true    |
   | 1 2 3 4 5 6 7 8 9 10 |

17. For the most part, the police come within a reasonable amount of time when they are called.  
   | Mostly  | Mostly  |
   | false   | true    |
   | 1 2 3 4 5 6 7 8 9 10 |

18. There is too much traffic in my neighborhood.  
   | Mostly  | Mostly  |
   | false   | true    |
   | 1 2 3 4 5 6 7 8 9 10 |
19. There are enough bus stops in my neighborhood.
Mostly false
1 2 3 4 5 6 7 8 9 Mostly true
10

20. My neighborhood is conveniently located in the city/town.
Mostly false
1 2 3 4 5 6 7 8 9 Mostly true
10

21. If I had to move out of this neighborhood, I would be sorry to leave.
Mostly false
1 2 3 4 5 6 7 8 9 Mostly true
10

PART K: Perception of Neighborhood Condition
The next few statements are about the condition of your neighborhood. Please indicate how frequently these items are present by circling your answer.

22. Litter or trash on the sidewalks and streets
Rarely
1 2 3 4 5 6 7 8 9 Frequently
10

23. Graffiti on buildings and walls
Rarely
1 2 3 4 5 6 7 8 9 Frequently
10

24. Abandoned cars
Rarely
1 2 3 4 5 6 7 8 9 Frequently
10

25. Vacant, abandoned, or boarded up buildings
Rarely
1 2 3 4 5 6 7 8 9 Frequently
10

26. Drug dealers or users hanging around
Rarely
1 2 3 4 5 6 7 8 9 Frequently
10

27. Drunks hanging around
Rarely
1 2 3 4 5 6 7 8 9 Frequently
10
PART L: Perception of Neighborhood Crime
The following statements are about crime. Please indicate how worried you are about the following statements by circling your answer.

36. Having property damaged
   Not worried at all
   Rarely
   1 2 3 4 5 6 7 8 9 10
   Frequently
   Very worried
   1 2 3 4 5 6 7 8 9 10

37. Having property stolen
   Not worried at all
   Rarely
   1 2 3 4 5 6 7 8 9 10
   Frequently
   Very worried
   1 2 3 4 5 6 7 8 9 10
38. Walking alone during the day
Not worried at all

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
</table>

39. Walking alone after dark
Not worried at all

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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</table>

40. Letting children go outside alone during the day
Not worried at all

<table>
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<tr>
<th></th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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</table>

41. Letting children go outside alone after dark
Not worried at all

<table>
<thead>
<tr>
<th></th>
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<th>3</th>
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<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
</table>

42. Being robbed during the day
Not worried at all

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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</table>

43. Being robbed at night
Not worried at all

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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</thead>
</table>
## PART M: Social Cohesion
The following questions ask how you feel about the people who live in your neighborhood. Please circle your level of agreement with each statement.

1. **People around my neighborhood are willing to help their neighbors**
   - Strongly disagree
   - Somewhat disagree
   - Somewhat agree
   - Strongly agree
   - Don’t know

2. **I live in a close-knit neighborhood**
   - Strongly disagree
   - Somewhat disagree
   - Somewhat agree
   - Strongly agree
   - Don’t know

3. **People in my neighborhood can be trusted**
   - Strongly disagree
   - Somewhat disagree
   - Somewhat agree
   - Strongly agree
   - Don’t know

4. **People in my neighborhood generally don’t get along with each other**
   - Strongly disagree
   - Somewhat disagree
   - Somewhat agree
   - Strongly agree
   - Don’t know

5. **People in this neighborhood do not share the same values**
   - Strongly disagree
   - Somewhat disagree
   - Somewhat agree
   - Strongly agree
   - Don’t know
PART N: Social Capital
The following questions ask about activities in your neighborhood. Please mark your response.

6. Do you belong to any neighborhood or community organizations such as block clubs, parent teacher associations?
   □ Yes
   □ No

7. Do you get together with any social clubs or groups for activities such as music, playing cards, sports or other hobbies?
   □ Yes
   □ No

8. Do you belong to any church or religious organization?
   □ Yes
   □ No

PART O: Caregiver and home information.
Please answer the following demographic and home information questions to the best of your knowledge. Demographics are characteristics that describe you.

1. What is your age? ________

2. What is your gender?
   □ Male
   □ Female

3. How would you describe your race? (Please mark your response)
   □ Black or African American
   □ White
   □ American Indian/Alaskan Native
   □ Asian
   □ Mixed race
   □ Native Hawaiian or other Pacific Islander
   □ Not sure
   □ Other ________________________________
4. How would you describe your ethnicity? (Please mark your response)
   □ Hispanic or Latino
   □ Not Hispanic or Latino
   □ Not sure

5. What is your marital status? (Please mark only one)
   □ Married
   □ Divorced
   □ Widowed
   □ Separated
   □ Never married
   □ Member of an unmarried couple

6. What is the highest grade of school that you have completed? (Please mark only one)
   □ Grades 0-8
   □ Grades 9-11
   □ High school diploma or GED
   □ Some college specialized training- no degree
   □ Received Associate’s degree (2-year college graduate)
   □ Received Bachelor’s degree (4-year college graduate)
   □ Graduate school (Master’s degree or PhD)

7. Which of the following best describes your occupation? (Please mark your response)
   □ Employed for wages full-time
   □ Employed for wages part-time
   □ Self-employed
   □ Out of work for more than a year
   □ Out of work for less than a year
   □ Stay at home mom/dad
   □ A student
   □ Retired
   □ Unable to work
8. What is your family’s annual household income? (Please mark your response)
   □ Less than $5,000
   □ $5,000-9,999
   □ $10,000-14,999
   □ $15,000-19,999
   □ $20,000-24,999
   □ $25,000-29,999
   □ $30,000-34,999
   □ $35,000-39,999
   □ $40,000-44,999
   □ $45,000-49,999
   □ $50,000-54,999
   □ More than $55,000

9. What is your height? _________________________

10. What is your weight? _________________________

11. How many children (under 18 years of age) live in your home? _________

Please give this survey packet to Constance Henderson-Covington or bring it with you when you bring your child to enrollment.
Appendix F: Parent Permission for Participation in Exit Interview

Parent permission for exit interview

We appreciate you allowing your child to participate in our gardening and nutrition program. As stated in the permission form presented before the start of the program you and your child will answer survey questions now that the program is over. We have additional questions that we want to ask your child about their opinion and experience in the program. These additional questions will take about 10 minutes and are optional. If you or your child declines participating in the exit survey it will not affect your receipt of the gift card. Information obtained from these questions may help us improve the program in the future.

Do you give your permission to allow us to ask your child these additional questions?

☐ Yes, you may ask my child these additional questions
☐ No, do not ask my child additional questions

Name of child: _______________________________________________________________

Name of parent: _____________________________________________________________

Signature of parent: __________________________ Date: ______

Signature of researcher: __________________________ Date: ______

Appendix G: Parent Exit Survey

Parent Exit Questions

1. Did you notice any changes in your child’s food preference since starting the program?

2. When your child came home from the sessions what were some of the things they said they liked?

3. When your child came home from the sessions what were some of the things they said they didn’t like?

4. What did your child learn from the program?

5. Did you notice any changes in your child’s willingness to try fruits and vegetables?

6. What requests has your child made regarding fruits and vegetables?

7. Were there any changes in your child’s confidence in their ability to garden?

8. Was the day and time of the program convenient?

9. If we offered the program again in the future talk to me about your interest in allowing your child to participate again.
10. How many newsletters did you receive from the program?

11. How many of the newsletters did you read?

12. What did you like about the newsletters?

13. What didn’t you like about the newsletters?

14. Were there any topics that you wish were covered that weren’t?
Appendix H: Child Assent for Exit Interview

Exit interview assent for child

Parent permission for exit interview on file?

☐ Yes, proceed
☐ No, do not read assent statement or ask exit interview questions

Read aloud to the child:

Thank you for answering the nutrition and gardening survey questions. I have a few more questions that I would like to ask that will only take about 10 minutes. You don’t have to answer these questions if you don’t want to. If you choose not to answer these questions it will not prevent you from receiving your gift card. These questions are about your opinion and experience in the program. Your answers could help us improve the program in the future. Do you have any questions for me?

Do you want to answer a few more questions?

Child’s response: ☐ Yes ☐ No

Interviewer signature: _______________________________________________________________

Child signature (optional): __________________________________________________________

Date: _____________________
Appendix I: Site Leader Consent for Exit Interview

Site leader consent for exit interview

We appreciate you allowing us to implement our program at your site. We have questions that we want to ask you about your opinion of the program. These questions will take about 10 minutes and are optional. Information obtained from these questions may help us improve the program in the future.

Will you answer the exit interview questions?

☐ Yes
☐ No

Name of site leader: __________________________________________________________

Signature of site leader: __________________________________ Date: _______

Signature of researcher: __________________________________ Date: _______
Appendix J: Site Leader Exit Interview

Questions for site leaders

1. Talk to me about your experience in trying to recruit your residents to enroll in the program.

2. What resources do you think were most important and do you feel you had enough of that resource for your garden site?

3. Do you plan to have a community garden next year?
   a. What things might you change or modify for your garden next year?

4. Do you plan to use the gardening and nutrition curriculum in the future for the youth?

5. Did you notice any changes in the relationship or cohesiveness of the residents who participated in the program?

6. What benefits to the community did you notice from the program?

7. Did you notice any changes in asking for fruits and vegetables from the kids?

8. Did you notice any changes in willingness to try fruits and vegetables?

9. What was your perception of the data collection component of the program?
Appendix K: Implementation Evaluation Form

**Evaluators:**
Karissa Grier
Felicia Reese
Lorien MacAuley

**Program Components**

Who:

What:

When:

Where:

How:
Evaluation Questions: General

1. Was the lesson delivered/completed as intended?

2. What were the strengths of the implementation?

3. What were the barriers or challenges in implementation?

4. Did the children understand the lessons?

5. What was the nature of the interaction between the instructors and the children?

Evaluation Questions: Specific

Who

1. How many children are enrolled?

2. How many children attended the session?

4. How satisfied were the children with the session?

What
1. What are the methods of delivery?

When
1. When is the session conducted?
2. What is the length/duration of the session?

Where
1. Where was the session held?

Why
1. Why were these activities used?
2. Why were children not participating?