

Measuring the Effects of a School and Community-Based
Dietary Change Intervention on the Home Food Environment among
Parents with School-Aged Children

by

Rachel Cassinat

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Graduate Supervisory Committee:

Sonia Vega-López, Chair
Meg Bruening
Noe Crespo

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ABSTRACT

Availability and accessibility of foods in the home influence dietary behaviors. However, much of the literature involving measurement of the home food environment (HFE) has examined only self-reported data, and home food inventory tools have not been used to assess behavior change intervention efficacy. Thus, this quasi-experimental study was conducted to test the preliminary efficacy of a 10-week dietary behavioral intervention on the HFE, measured through the presence of fruits, vegetables, and sources of sugars in the household. Participants included 23 parents (21 females; age=36±5.5) of children 6-11 years old living in an ethnically diverse community within a Southwestern metropolitan area. Sociodemographic information was collected at baseline using a survey. A modified version of the Home Food Inventory was completed in the homes of participants by trained research assistants at baseline and following termination of the intervention. Relative to baseline, the intervention resulted in significant increases in availability of different types of fruits (7.7±3.2 vs. 9.4±3.1; $p=0.004$) and high fiber/low sugar cereal (2.3±1.4 vs. 2.7±1.4; $p=0.033$). There was a significant reduction in availability of sugar-sweetened beverages (3.2±1.9 vs. 1.7±1.3; $p=0.004$), and an increase in the number of households with accessible 100% fruit juice (3 vs. 17 households; $p=0.001$) and bottled/contained water (9 vs. 22 households; $p<0.001$). Moreover, there were meaningful changes in the number of households with accessible chocolate milk (7 vs. 0), strawberry milk (3 vs. 0), and diet soda pop (2 vs. 0). There was a significant increase in the number of households with accessible ready-to-eat vegetables (8 vs. 19 households; $p=0.007$), and ready-to-eat fruit (8 vs. 17; $p=0.022$), and a significant reduction in available prepared desserts (3.0±2.0 vs. 1.7±1.3; $p=0.005$), and candy

(2.0 ± 1.7 vs. 0.6 ± 0.7 ; $p < 0.001$). There were no significant changes in availability of vegetables and sugar-laden cereals, or accessibility of fresh fruit, fresh vegetables, dry cereal, candy, soda pop, desserts, and sports/fruit drinks. Overall, results suggest that the current dietary behavior change intervention resulted in positive changes in the HFE. Further research to confirm these results in a randomized controlled trial is warranted.

DEDICATION

This thesis is dedicated to the families who let a strange graduate student stick her hands in their fridge and her head in their cupboards. Thank you for letting me, for a small moment, be a part of your home.

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CHAPTER 1

INTRODUCTION

The United States is in a space of history where for the first time, a generation of children is being raised who may live shorter and sicker lives than their parents.¹ To help address this issue, probable culprits like poor dietary quality have quickly become priority public health concerns in the country. A poor diet, particularly one low in fruits and vegetables and high in sugar-laden beverages and foods, plays a role in the huge network of health problems that has led to obesity and chronic disease in Americans.²

While fresh fruits and vegetables aid in the prevention of chronic diseases such as cardiovascular disease,^{3,4} diabetes,^{5,6} and certain types of cancer,⁷ clinical studies in both human and animal models confirm that sugar (particularly fructose) can trigger weight gain and may play a catalytic role in cardiovascular disease, diabetes, kidney disease, hypertension, and obesity and the metabolic syndrome.⁸

Unfortunately, research has shown that neighborhoods with limited access to fresh fruits and vegetables are usually those classified as minority communities in urban settings, even when compared to people living in rural areas.⁹ Individuals may be predisposed to these diseases, conditions, and metabolic states due to genetics, but typically it is not biological susceptibility for which these health disparities occur.¹⁰ Social factors, including but not limited to socioeconomic and environmental barriers,¹¹ are a large research focus not just because the impression on health is deeper, but also because they are preventable and innately unfair.⁹ These health-limiting factors are illustrated when we see that fruit and vegetable intake is poor among those living in low-income neighborhoods.^{11,12}

To help address the disparity, many community-based dietary change interventions have been created and implemented.¹³ The focus of these interventions has varied from nutrition education to behavioral change, but a noteworthy endeavor in the fight against obesity and its accompanying complications has been to additionally measure, monitor and improve the home food environment.

With the validation of measurement tools, data collected directly in participants' households has become more meaningful, illuminating the presence of environmental influence on dietary behavior both in adult-only as well as adult-and-child interventions. Though studies addressing the influence of other environmental and social factors are crucial, the home food environment has a localized and direct impact on food choice, and consequently health.¹⁴ Studies continually illustrate that availability relates to consumption, and when certain foods are easily obtainable, it increases the likelihood they will be eaten.¹⁴ For example, among adults in a study examining home food accessibility and diet, those who surrounded themselves in high-fat food atmospheres were less likely to have or adopt lower fat diets than those who carried fewer high-fat foods in their kitchens.¹⁵ Additionally, in a study conducted in the homes of low-income African American mothers, there was a positive correlation between availability of fruits and vegetables and the mother's intake of these items.¹⁴

This principle translates to children as well, as one might anticipate their nutritional characteristics to consequently vary with the food supply created by those they depend on.¹⁶ A study examining multiple aspects of the family food environment and eating patterns in 5-6 year old children showed that not only does food availability in the home shape food intake, but also food preference.¹⁷ Those living in a home structure of

obesity-promoting dietary behaviors such as negative parental modeling of eating and meal preparation, television exposure and specifically poor food availability tended to have an increased index of sweet snack and high-energy food and drink consumption and decreased vegetable intake.¹⁷ However, if an intervention can take a family-centered approach to altering environment and consequently behavior, the magnitude of change can be significant and long lasting. During a follow-up interview after a school and community-based intervention utilizing garden and nutrition education that involved both children and their family, parents reported significant increase in their children requesting fruits and vegetables at home, in turn enhancing parental support of fruit and vegetable consumption as well.¹⁸

Despite the validation of home food environment measurement tools¹⁹⁻²³ as well as one notable modification to a prominent tool for low-income Spanish and Somali-speaking households,²⁴ to the best of our knowledge a validated inventory has never been designed or shortened to look specifically at kitchen accessibility, availability and variety of fruits, vegetables, and sugar-sweetened products in the home. Additionally, no home food environment studies have been conducted in the Phoenix Metropolitan area among parents with school-aged children. In this diverse population individuals can be found of different ethnicities, income and education levels Furthermore, much of the literature involving measurement of the home food environment has examined only self-reported data. Open inventories, home visits in which home food environment information is recorded by research staff and not self-reported by participants, are a rarity.²⁵ Finally, these tools have not been used to assess efficacy of a behavior change intervention, which in addition to targeting the home food environment, addresses the importance of physical

activity, limiting screen time, recipe modification, emotional eating, meals in the home, grocery budgeting, and family involvement in prioritizing health, all which can impact food kept in the home and eating practices.

It has been debated that home availability simply mirrors children's consumption, (i.e. parents who actually see their children eating and enjoying fruits and vegetables will be more inclined to purchase them and keep them in the home). However, even this counterargument suggests the home food environment influences, and is the reflection of, fundamental dietary choices made daily.²⁶ This insight warrants a cause for further research into how to improve diet quality through an intervention, with a primary outcome measure being change in the home food environment.

Though dietary content is an important dynamic that influences adherence to a diet behavior change program,²⁷ there are additional intervention components that in past research have been associated with high level of effectiveness. It is key be mindful of social, biological, behavioral, and environmental factors²⁷ and arm study participants with tools, not merely education or printed materials, to combat the barriers to wellness and sustain dietary behavior change. From a social ecological perspective, this is extremely relevant as research shows both child and parent characteristics are influenced not only by household food environment but additionally perception of the neighborhood environment, as well as the actual community food and physical activity environments.²⁷ Other elements shown successful in interventions include a program length no less than ten weeks^{3,28-30} school and community settings,³¹⁻³⁵ goal setting,³⁰ and nutrition education sessions specifically targeted to address the needs of participants (i.e. how to modify traditional dishes relevant to those in the intervention).³⁶

Lastly, much of the work involving measurement of the home food environment has been self-reported by participants, and this significantly limits accuracy of data. Therefore the purpose of this work was to test if a school and community-based dietary behavior change intervention delivered to parents of school-aged children living primarily in the Phoenix Metropolitan area was effective in participants modifying their home food environment. This was accomplished through trained research staff-conducted home visits pre- and post-intervention, with a shortened and modified version of the validated Home Food Inventory¹⁹ to specifically measure kitchen accessibility and availability of fruits, vegetables, and sugar-sweetened products. With successful integration of fruits, vegetables and other preventive dietary practices against chronic disease,³⁷ the healthy choice can be the easiest choice and it can begin right at home.

Research Aim

The primary objective of this study was to test the preliminary efficacy of a 10-week dietary behavior change intervention on the home food environment through the presence of fruits, vegetables, and sources of sugar in the household pre- and post-intervention among parents with school-aged children recruited primarily from the Phoenix Metropolitan area.

Hypotheses and Specific Aims

Hypothesis 1

There will be an increase in kitchen and refrigerator accessibility and availability of fruits and vegetables post-intervention in the homes of parents with school-aged children recruited primarily from the Phoenix Metropolitan area, relative to baseline.

Specific Aim 1:

To explore whether a community-based dietary behavior change intervention has an effect on kitchen and refrigerator accessibility and availability of fruits and vegetables kept in the homes of parents with school-aged children recruited primarily from the Phoenix Metropolitan area through collection of pre and post data during a home visit.

Hypothesis 2

There will be a decrease in the kitchen and refrigerator accessibility and availability of sugar-containing products (sweetened dry cereal, candy, sugar-sweetened beverages, and prepared desserts) post-intervention in the homes of parents with school-aged children recruited primarily from the Phoenix Metropolitan area, relative to baseline.

Specific Aim 2

To explore whether a community-based dietary behavior change intervention has an effect on kitchen and refrigerator accessibility and availability of sugar-containing products kept in the homes of parents with school-aged children recruited primarily from the Phoenix Metropolitan area through collection of pre and post data during a home visit.

Definition of Terms

1. Availability: Whether or not a food or drink item is at all present in the home, regardless of where it is found or how easy it is to see and/or access.
2. Behavior Change: Related to diet and health, behavior change is the transformation in a participant from one practice to another and has become a very indicative component of public health and the building of interventions. The curriculum created for this project to inspire behavior change involves nutrition and physical activity education, group and individual activities, goal-setting, and a small incentivized reward system to encourage participants without them depending on prizes for future change and maintenance.
3. Community-Based Intervention: An intervention conducted within and with members of a community. This particular project will take place in the Phoenix Metropolitan area, at two community sites. It is also being done in conjunction with third party organizations, with the intent to improve the health of participants enrolled.
4. Diet Quality: The direct consequence of food choices made daily. It can be influenced by price, family, religious beliefs, food preferences and time constraints to name a few.
5. Efficacy: The power to create an intended or hypothesized outcome.
6. Home Food Environment: The home food environment includes the dietary choices (food and beverage) available and accessible within the kitchen and other food storage areas of a home including pantries, an additional refrigerator or freezer and other assorted small cabinets. It can also include how those choices

are utilized at family mealtime, and environmental factors within a household that impact food purchasing and meals such as media exposure, time constraints and food beliefs.

7. Home Food Inventory: The Home Food Inventory is a validated measurement tool that has been used to evaluate the Home Food Environment. The tool has been shortened to include fruits, vegetables and sugar-laden foods and beverages and has also been modified to include culturally relevant foods, such as “aguas frescas”, as the Phoenix Metropolitan area is a very diverse area.
8. Kitchen Accessibility: Items that are visible and readily accessible on the kitchen countertop, on top of the refrigerator, and on the table.¹⁹
9. Open Inventory: A home visit in which home food environment information is recorded by research staff and not self-reported by participants.
10. Promotora: Also called a community health worker (CHW), individuals working in this capacity are locally based health workers who bridge the space often experienced between health care and groups that have in the past lacked appropriate access to it. Typically, promotoras share a common cultural background with those they are serving, and they work as mediators in intervention programs between participants and researchers.
11. Refrigerator Accessibility: Items that can be seen without moving other items around in the refrigerator.¹⁹
12. Social Desirability: The tendency of participants to want to please research staff in a manner that is viewed favorably, causing respondents to over-report “good behavior” and under-report “bad” or undesirable behavior. In the context of this

research, participants may grocery shop prior to a home visit and buy healthy items they believe we are looking for on the inventory, creating bias.

13. Sugar-Sweetened Products/Beverages: Sugar-sweetened and sugar-laden (used interchangeably in this research study) refer to specific food and beverage products listed within the modified Home Food Inventory. This includes assorted prepared desserts, dry cereal (two categories: cereal with more than 6 g of sugar per serving and cereal with no more than 6 g or sugar and/or at least 5 g or more of fiber per serving), a variety of drinks (including soda pop, sports drinks, fruit drinks, flavored milk, energy drinks, “aguas frescas”), candy, and assorted sweet snacks.

Delimitations

The study population was not limited to any ethnic group, income level, or location of household. However, most participants were residing in the Phoenix Metropolitan area because recruitment took place at Arizona State University (ASU) Preparatory Academy and the South Mountain Community Center (SMCC), which are both located in this area. This study was however limited to parents who were at least 18 years old, with at least one child between 6-11 years of age. Participants had to be available to participate in the study each week, could not have a medical condition that required following a specific diet, could not currently be participating in a diet modification program, could not be pregnant, and could not be consuming more than 5 servings of fruits and vegetables daily.

If recruited at ASU Preparatory Academy, the parents(s) had to meet the same criteria as above, except the parent(s) had to have at least one 6-11 year old child enrolled at the school.

Limitations

Though this study attempted to evaluate a potential causal relationship between the intervention program and the home food environment, this study did not have a control group, so any changes even if significant may be scrutinized. In the future, a randomized controlled study is needed to confirm if observed changes were a result of the intervention. The Home Food Inventory is a validated measure of the home food environment; however our shortened and modified version is not currently validated. Future research is needed to validate this edited version of the tool. The inventory was conducted by two trained research assistants in each home at baseline and following termination of the program, but this study only included food kept in main food storage areas (i.e. the kitchen, a spare refrigerator and/or freezer in the garage, and large pantries). We acknowledge this as a limitation, as many households may keep food in additional rooms, cabinets, and other assorted small storage areas separate from where we targeted attention. However, this still allowed for a thorough inventory and since one of our main educational points during the program was to increase the accessibility of ready-to-eat fruits and vegetables in the kitchen, we were able to assess this without entering every room of the household and are confident our inventory reflects an accurate snapshot of the home food environment. The inventory asked participants to answer when their most recent food-shopping trip was, where they shopped on that last food-

shopping trip, if on that grocery shopping trip any unusual purchases were made that were still in the home at the time of the visit, if the home contained the usual amount of food the family would typically keep, where they buy most of their food, how many individuals live in the household, and how often they shop at other grocery stores, markets, etc, but this can still limit data. Prior to a home visit, participants may have grocery shopped for food items they believed we were looking for, but that they do not typically keep in their homes, creating a social desirability bias. While the home food inventory does tell researchers the kind of food that is in a home, the checklist is not quantitative. Since research involving direct measurement of the home food environment through home visits is limited, it was difficult to calculate a proper sample size. Furthermore, most of these studies included only self-reported data to measure the home food environment, so those sample sizes were extremely large and could not be generalized for this study.

CHAPTER 2

REVIEW OF LITERATURE

Public Health Concerns

The United States is failing to reach its health potential,³⁸ ranking as one of the least healthy nations in the world.³⁹ To further illuminate the complex nature of the country's health status, there are Americans who seem to dodge the depressing statistics and overall are healthier than others, while the gaps in health status remain. Research has attempted to understand this wellbeing paradox and its accompanying health inequality, and it continually begs the question "what is the cause?" It has led to action in determining plausible sources, specifically through public health initiatives. One target has been to address diet quality.

Diet Quality

Diet quality itself is the direct consequence of food choices made daily. It is a multidimensional behavior influenced by countless factors, both internal and environmental. A major burden in the field has been to develop harmony related to dietary recommendations and measurement of diet quality.²

How to Measure Diet Quality

Fundamentally, the purpose of diet quality measures have been to assess level of adherence to national dietary guidance, often through the Healthy Eating Index.⁴⁰ This tool has been and continues to be used in monitoring the diet of participants aged 2 years and older in the Continuing Survey of Food Intake by Individuals.⁴¹ Measures to assess

diet quality have evolved over time and have encompassed additional variations to the Health Eating Index (HEI) including the Diet Quality Index,¹⁶ Dietary Variety Score,⁴² Alternate Healthy Eating Index,⁴³ Recommended Food Score,⁴³ Young Healthy Eating Index,⁴⁴ and the same Diet Quality Index as previously mentioned but revised and validated by use of a food-frequency questionnaire.⁴⁵

Studies Assessing Diet Quality

Studies assessing diet quality as a main outcome continually appear in publication and cover a broad range of dietary influence. In a study involving 6212 children and adolescents between 4-19 years of age in the United States, the effects of fast food consumption on energy intake and diet quality were of interest.⁴⁶ As fast food has become a major diet characteristic for Americans,⁴⁷ it was hypothesized that its consumption carried adverse influence upon dietary factors linking back to risk of obesity.⁴⁶ Methodology included a nationally representative Continuing Survey of Food Intake by Individuals carried out from 1994 to 1996 and the Supplemental Children's Survey, also all-inclusive, completed in 1998. Associations between fast-food intake and diet quality were investigated through utilization of between-subject comparisons for the entire cohort, and within-subject comparison in 2080 subjects who ate fast food on one but not both survey days. Results showed that of the participants who ate fast food compared with those who did not, more total energy, more energy per gram of food, more total fat, more total carbohydrate, more added sugars, more sugar-sweetened beverages, less fiber, less milk, and fewer fruits and non starchy vegetables were consumed.⁴⁶ With statistically significant outcomes, the study concluded that fast food intake in children in

the United States appears to have negative impacts on quality of diet in ways that could increase chances for obesity.⁴⁶

Whether young children are meeting dietary intake recommendations for added sugar and dietary fiber has been also been examined, specifically in relation to overall diet quality. In a cross-sectional study, a nationally representative sample of preschool-age children were assessed as meeting the recommendations for added sugar intake and dietary fiber, meeting only one recommendation, and meeting neither.⁴⁸ Researchers discovered that children meeting both recommendations had better diet quality, and that most American preschoolers do not adequately meet the dietary recommendations for added sugar and dietary fiber.⁴⁸

Studies Assessing Diet Quality Measurement Tools

There have also been studies addressing the need for more specific tools to measure dietary quality that have modified existing assessment tools to better capture food quality and monitor risk of chronic disease related to diet. Since the 1990's, the US Department of Agriculture's Healthy Eating Index (HEI) has measured observance of the Dietary Guidelines for Americans. Though the original index has been revised several times to reflect updated versions of the Dietary Guidelines for Americans,⁴⁰ research suggests the index to only be associated with trivial reduction in major chronic disease risk.⁴³ A study in 2002 made the move toward improved dietary guidance through development of two alternate measures of diet quality, the Alternate Healthy Eating Index (AHEI) and the Recommended Food score (RFS) tested for validity and ability to predict chronic disease risk reduction more effectively than did the HEI.⁴³ Both

adaptations were highly more specific than the HEI, and results showed they performed better at predicting risk for chronic disease than did the HEI and that improvement in dietary guidelines can be achieved through precise instruction and assistance.⁴³

This principle was later applied in another study to create the Young Healthy Eating Index (YHEI), another adaptation of the Health Eating Index, but specifically created to assess diet quality in children and adolescents.⁴⁴ Shortened and modified, the new index demonstrated itself as a successful monitor of diet in this population, and again addressed that those served by the HEI might profit from index changes not currently being made.^{40,43}

Evaluating quality of diet has established itself as being difficult to capture. Furthermore, the testing and validation of new modified measurement tools continues and adds to the complicated nature of diet quality. However, attempting to better comprehend adherence to dietary recommendations and its proper measurement has led to better understanding how quality of diet impacts health outcomes.⁴⁴ These studies have helped us recognize dietary trends related to diverse populations, and subgroups more susceptible to health disparities have become better identified and more pronounced from the general population.

Groups Susceptible to Health Disparities

The term “health disparities” has exploded since the 1980s, a decade in which it was used as a key word in only one article, to a consecutive 5-year period following the year 2000 when it appeared in more than 400 such articles.⁴⁹ Despite this surge in awareness and scientific inquiry of health disparities, there is still no agreed upon

definition of health disparities throughout the literature.⁹ While *Healthy People 2010* has declared health disparities to be “differences that occur by gender, race or ethnicity, education or income, disability, geographic location, or sexual orientation”,⁵⁰ a total of 11 unique definitions were identified in another article.⁵¹ Some of the descriptions were mindful of all criteria referenced in *Healthy People 2010*, but others limited the term to being connected with race and ethnicity, and others characterized it exclusively in terms of disparities within health care.⁹

Despite lacking a universal definition, reducing health disparities is a primary goal of public health, both in research and in policy.⁹ Experts have still been able to track and note nutritional patterns occurring within certain groups, as health disparities result from both biological variations and social differences.⁹

There are diseases, conditions, and metabolic states in which genetics play a catalytic role and may predispose individuals for certain dietary and health complications, but most often it is not biological susceptibility for which disparities occur.¹⁰ Serving as an origin for many diseases in which we witness disparities,⁵² social factors are a major research interest not just because the impression on health is deeper, but also because they are preventable and innately unfair.⁹ Additionally, they are related to adherence to lifestyle changes, both dietary and fitness-related.²⁷ These issues include but are not limited to socioeconomic and environmental barriers.¹¹ This is manifested when we see that fruit and vegetable intake is poor among those living in low-income neighborhoods.^{11,12}

In a study assessing availability of fresh produce in underserved communities, it was found that neighborhoods facing the most hurdles to fresh fruit and vegetable access

were those classified as minority communities in urban settings, even when compared with people living in rural areas.⁹ Though there was not an absolute deficiency in food outlets in those urban settings, it was still individuals residing within minority communities who were unable to consume enough fruits and vegetables to meet dietary needs. Overall, there is a cry for help at every income level, at every education level, and within every racial or ethnic group,³⁹ as noted within the Robert Wood Johnson Foundation's *Commission to Build a Healthier America*. Experts noted that within the United States, even children living in the country's most-advantaged groups were not as healthy as they should be when compared to the national standard for achievable health in every state.³⁹ The inevitable consequences of poor health choices can lead to devastating chronic conditions.

Diet and Chronic Disease

The metabolic advantages of fruit and vegetable consumption have been a noted focus in many research studies, both historically and present day. A key component in a balanced diet, fresh fruits and vegetables also aid in the prevention of chronic diseases such as cardiovascular disease,^{3,4} diabetes,^{5,6} and certain types of cancer.⁷

In 2005, it was reported that only two percent of children living in America were consuming nutritionally adequate diets,⁵³ along with only one-third of adults eating fruit at least twice per day and a mere 27 percent eating vegetables at least 3 times per day.⁵⁴ Not coincidentally, in this same year, over 40 percent of Americans described themselves as having at least one chronic condition that limited their ability to perform everyday tasks and/or required ongoing medical management; the fraction with a reported three or

more chronic conditions almost doubled since the mid 1990s, coming in at just over 13 percent.⁵⁵ Through the next year following this report, eight of the chronic conditions documented, including hypertension, heart disease, cancer, diabetes and depression, added up to 25 percent of all visits to doctors' offices, treatment centers and outpatient units, as well as almost a third of all hospital releases.⁵⁶ Excessive intake of sugar has also been linked to adverse health conditions and metabolic abnormalities.⁵⁷ Strongly correlated to low intake of essential nutrients, consumption of added sugar has additionally been shown to contribute to overconsumption of calories in the United States.⁵⁷ As average annual availability of sugar-sweetened products, particularly soft drinks and other sugar-laden beverages, continues to drastically grow, the American average daily energy intake similarly escalates, heightening concerns about extreme dietary sugar intake in the midst of widespread obesity and cardiovascular disease.⁵⁷

The solution seems simple: eat more fruits and vegetables and reduce intake of refined sugar. However, reasons why people do not consume the recommended daily servings of fruits and vegetables are multifaceted and deeply embedded in many factors.¹¹ From environmental limitations such as living in a food insecure area to personal preferences and history, motivation to eat a colorful diet can be difficult to conjure.¹¹ Despite the fact that Americans do not consume the daily recommended amount of fruits and vegetables as it is,¹¹ initiatives such as *Healthy People 2010*⁵⁰ have pulled from recommendations housed within *The Dietary Guidelines for Americans*⁵⁸ to set countrywide goals for increasing the quantity of Americans who consume fruits and vegetables in accordance with the dietary guidelines.¹¹

The solution is never as simple as recommending Americans eat more fruits and vegetables, reduce or eliminate added sugar intake, and erase all fast food consumption, or even reevaluating the tools used to measure diet quality. To combat the one-size-fits-all method usually taken in large federal programs and research ventures, small-scale interventions have been developed to bridge any disconnect and foster health improvements on a more individual level, where needs specific to the population are met. This localized approach allows for more deliberate impact, and is in part how community-based interventions can arm individuals with the skills needed to oppose the country's health and wellness inconsistencies.

Community-Based Interventions

Community-based interventions have the great advantage of conveying the major public health aim of unifying both personal accountability and shared responsibility⁵⁹ without those it is targeting feeling solely blamed for individual dietary choices made. These interventions address the social, environmental, structural, and behavioral factors associated with health disparities through the active collaboration and partnership built with community members and organizational entities.¹³ All parties involved collectively generate the action required to assist the given population in need through a continuous supply of resources, facilities, time and expertise.¹³

These community collaborations can take on many shapes, such as establishing local farmers markets in areas that are or are reflective of being food insecure, and establishing more safe and commuter-friendly built environments.³⁹ At this micro level, advocates can view their communities through a “health lens”³⁹ a term coined in 2009

and representative of the clearer wellness vision realized in the context of a specific population.

This review will focus on community-based dietary change interventions and evaluate intervention components associated with a high level of effectiveness. Acknowledging that dietary content is only one of the several dynamics that influence adherence to a prescribed program or regimen,²⁷ the focus will specifically be dietary change interventions that target a wide range of influential factors, including biological, social, behavioral and environmental.²⁷

Length

This brief literature evaluation will compare interventions based on program length, focusing specifically on interventions that are targeted at children/youth though some studies included parents in the program. Studies outlined in this section show that statistically significant change in primary outcomes can be achieved through intervention programs designed to be no less than 10 weeks in length.²⁸ While there is literature claiming that interventions less than 10 weeks in length can still yield statistically significant outcomes, short duration of the intervention is still noted as a limitation. In a school-based intervention to improve heart health in children with multiple cardiovascular disease risk factors, an 8-week classroom-based intervention comprised of a knowledge and attitude program and an adaptation of physical education, researchers' primary outcome measure was cholesterol, in addition to blood pressure, body mass index (BMI), body fat, eating and activity habits, and health knowledge.⁶⁰ The study resulted in "large reductions" in cholesterol, a "small reduction" in body fat, and "higher"

health knowledge than the control group. However, the drop in serum cholesterol was noted by researchers as surprising, especially after a brief 8-week intervention, and it was admitted that the size of the effect might have been overestimated. There were only small reductions in body fat and no change in BMI, and researchers noted this was perhaps due to the intervention's short duration. Health knowledge was only measured at posttest, so arguably the differences between groups can be attributed to unchanged baseline differences and not the effectiveness of the 8-week program.⁶⁰

Where there were consistently significant results in the studies evaluated in the remainder this section, the programs had at minimum a 10 week intervention length, suggesting a similar length may be necessary to observe effects of an intervention.^{29,30,61}

In a recreation center setting in Chicago, 48 participants, 8-16 years old, were recruited for a 10-week healthy lifestyle intervention.²⁸ Primary outcomes included BMI, psychological health and healthy lifestyle behaviors. Participants and their families met weekly for 2-hour sessions with a dietitian and social worker, for 5 one-hour classes on healthy food choices and 5 one-hour classes on the psychosocial aspects of being overweight or obese, respectively. Additionally, there were weekly 1-hour physical activity sessions. Of the 48 participants initially recruited, 40 participants were analyzed. Though psychological and behavioral questionnaires did not change significantly, there was an overall reduction in BMI by 0.5 kg/m^2 , while average weight change was found to be $-0.19 \pm 1.9 \text{ kg}$.²⁹

Based at a wellness center in Arkansas, 51 participants were recruited between the ages of 6-12 years old to participate in a 12-week program.⁶¹ Primary outcomes, assessed pre- and post-intervention, included BMI, blood pressure, cholesterol and physical

performance. Two exercise sessions were held each week, along with one additional fun session a week in which parents were encouraged to attend as well. Parents were required to attend nutrition education classes held by a dietitian and lessons covered topics including a basic nutrition course, nutrition label reading, calorie management skills, understanding internal hunger cues and mindful eating, quick healthy meals, tips for eating away from the home, best practices for school lunches, an overall review, and resources for parents to utilize once the intervention ended. The study analyzed 25 participants, and results showed no significant differences in blood pressure and decreases in BMI that were attributed to weight maintenance while height increased. However, there was a significant decrease in cholesterol, as well as in general flexibility and muscular endurance.³⁰

In the 12-week “Be a Fit Kid” after-school intervention, researchers measured fitness, nutrition knowledge and diet composition, BMI, body fat, lipids and lipoproteins in 75 children between the ages of 6-12.²⁹ Metabolically speaking, greater than one third of children in the sample had high levels of total cholesterol (at or above the 75th percentile rank for U.S. children based on age and gender), low-density lipoprotein cholesterol (LDL-C; at or above the 75th percentile), and triglycerides (at or above the 75th percentile), and two thirds had low levels of high-density lipoprotein cholesterol (HDL-C; at or below the 25th percentile rank for U.S. children based on age and gender) at baseline.²⁹ Though children enrolled in the program and met three times a week for two hours each session, at the orientation lecture prior to the start of the program more than 95% of parents were in attendance. At the end of the intervention, there were significant improvements in all fitness measures, body composition, nutrition information

retention, and some dietary habits. There were significant reductions in HDL-C and in total cholesterol and triglycerides for children who participated in 75% of the program. More than 75% of children increased their consumption of fruits and vegetables, whole grains, healthy fats, and water, while there was a decrease in their intake of cheese, red meat, candy, and soda. At a 6-month follow up, the positive dietary changes were maintained by the majority of the 75 children analyzed.²⁹

In Michigan, a 24-week intervention with measurements at baseline, week 12, and week 24 was introduced.³⁰ The research team was able to retain and analyze all 67 originally recruited participants by the end of the intervention, though only 48 completed every week of the program in full. Primary outcomes were BMI and percent body fat, assessed by objective measures. Group and individual session alternated on a biweekly schedule, concurrently with weekly exercise classes led by a team comprised of a pediatrician, psychologist, dietitian, social worker, and exercise physiologist. Individual sessions were used to guide participants in goal setting. For those who completed the 24-week program (n=48), the mean change in BMI over the 6 months was -2.3 units, with a mean change of -0.7 BMI units for participants who did not complete the program in its entirety. The mean change in percent body fat was -6.1%.³⁰

Sample Size

An adequate sample size for an intervention can be difficult to calculate. In an evidence-based review and secondary analysis of publications from 1975 to 1999 of the efficacy of behavioral interventions to modify dietary fat and vegetable intake, study inclusion criteria required sample size be equal to or greater than 40 subjects at the time

of follow-up measures and/or procedures.⁶² At this size, the majority of studies were successful in reducing total and saturated fat intake, and increasing fruit and vegetable intake in participants.⁶² Study design of the interventions in the analysis included randomized controlled trials or non-randomized controlled trials (nonequivalent control or comparison group designs).

However, previous research has demonstrated improvements in dietary variables (increased fruit and vegetable intake, decreased sugar intake) with less than 15 participants, and concluded that others could expect to be able to identify improvements in main outcomes of interest.⁶³ Additionally, the smaller group makes for a manageable entity to work with, which in the secondary analysis was one of two noted intervention components that seemed to be particularly promising in modifying dietary behavior, the other being goal setting⁶²

Method of Delivery

Though the name implies community-based interventions will take place in a literal community center, delivery of the program itself can occur at a range of local locations. Utilization of community facilities is very common and can include recreation centers, local gyms and other health-related assembly halls. From 2005-2006, a large intervention service for families with children at risk for being overweight or obese was held at a health services building within the city.³¹ With statistically significant results at the end of the program, it indicated that programs held at these types of locations, even with limited resources, can be effective.³¹ An advantage of hosting programs within

community facilities is integration into any existing prevention or otherwise related programs and further strengthened partnerships and collaborations.³¹

An alternative to community facilities is to implement the initiative directly in the homes of participants. In a 6-month nutrition intervention study, food intake and fasting blood measures of nutrients and carotenoids in 70 community-dwelling elders (>69 years) were captured.⁶⁴ The main goal of the intervention was to increase fruit, vegetable, and calcium-rich food consumption. Significant improvements suggested that executing a program within the home environment of this population aided in successfully increasing dietary intake of the intervention's target foods.⁶⁴ Additionally, the participants were functionally impaired, and implementation in a home allows for a population to benefit from an intervention that may not otherwise be able to attend sessions in a community facility.⁶⁴

A school setting has become a popular mode of delivery in health promotion,³² as schools provide a streamlined approach to reaching a large and diverse population of children, adolescents, teachers, staff members, parents, and those within the surrounding community.^{33,34} In one particular study set in a school with a large Gypsy population, the program the director of the school, the foodservice workers, and school health professionals were all involved in the effort to modify the eating habits of the low income school children, and this was achieved largely because intervention components could be weaved into the school menu, which increased exposure to fruits and vegetables, and integrated into the school curriculum, which reinforced the nutrition education. Though programs in other settings can be similarly tailored to meet the cultural and educational needs of the population. It is within the school environment that the family,

school and community component is especially well employed.³² This is particularly important because involving the entire family enhances the intervention's efficacy for young children.³² In an evaluation of 12 school-based nutrition education programs across the world, every single one had a family component in the intervention.³² The successful programs concentrated on increasing parental support of a well-balanced diet for the family and cultivating a healthy nutrition environment within the home to sustain it.³⁷

Within the aforementioned settings, a program's curriculum can be implemented within the whole or partial group, but it also can be administered individually or a combination of whole group, partial group, and individual sessions. In a clinical multidisciplinary weight loss program for adolescents, the program included both group sessions and individual visits weekly through the 24-week program.³⁰ The individual session included goal setting, and the group sessions involved both parents and children to address several nutrition topics. There was a significant reduction in BMI and percent body fat, and discussion mentioned that the individual sessions included in the program allowed for tailoring of content during the weekly session to address specific needs and goals,³⁰ perhaps lending to more purposeful intervention experiences. To expand, in the evidence-based review and secondary analysis of publications from 1975 to 1999 of the efficacy of behavioral interventions to modify dietary fat and vegetable intake mentioned previously, two intervention elements that showed to be extremely effective in modifying dietary behavior were goal setting and small groups.⁶² A smaller breakaway size, goal setting as a primary activity, or the two coupled together are worthwhile details to explore.

Community Health Workers

In an effort to counter the ever-increasing worry related to health disparities in the county, community health workers (CHW) have become more prominent in intervention work.⁶⁵ CHWs, also called promotoras depending on the study, are locally based health workers who bridge the space often experienced between health care and groups that have in the past lacked appropriate access to it.⁶⁵ Typically, the CHWs and promotoras share a common cultural background with those they are serving in the program.⁶⁶

In an electronic database search of US-based randomized controlled trials using CHWs from January 1990 to June 2007, 12 eligible studies were reviewed.⁶⁵ Of those studies, 10 established that outcomes were enhanced with the use of CHWs. Significantly impacted outcomes included recruitment and sustained enrollment in research and nutritional eating habits.⁶⁵

In 2011, household food availability among low-income Mexican residents was measured and promotoras played a crucial role in the intervention and its outcomes.⁶⁶ Over a 30-day period, five in-home food inventories were completed within a convenience sample to better understand household food resources and consumption patterns. Two trained, Spanish speaking promotoras were assigned to each household to carry out assessments in the household, record a household's grocery shopping trips and additional food-related activities for each week prior to the home assessment, and oversaw the initial questionnaire after recruitment, which was also handled by the promotoras.⁶⁶

The study notes the promotoras, similar to research completed within the same geographical area, as the “essential link” to participant recruitment and retention of households willing to complete all in-home assessments.^{66,67} The study also acknowledges that data accuracy is in part dependent on whether or not intervention subjects trust the researchers,⁶⁸ a potential limitation that promotora use can lessen or eliminate through their cultural sensitivity and understanding of traditions and beliefs.

Many crucial intervention elements covered in this section were found in the evidence-based review and secondary analysis of publications from 1975 to 1999 of the efficacy of behavioral interventions to modify dietary fat and vegetable intake referenced before. Overall, the majority of those interventions reviewed resulted in noteworthy improvements in both dietary factors and behaviors related to chronic disease prevention, especially if the participant was at an elevated disease risk at baseline.⁶² In a more recent systematic review covering research published over the last decade, it was noted that in interventions designed to increase adult fruit and vegetable intake, consistent positive effects were seen in studies that utilized in-person education and counseling and in multicomponent community-based interventions.⁶⁹ Incorporating the described intervention components into a program is advantageous, but it is key to remember that a behavioral intervention’s success, whether the outcome is to change dietary habits or to cultivate an active lifestyle, will only be significant when treatment is multidimensional and the intervention is approached not as a quick diet fix, but a tool for a more healthy lifestyle²⁷

Primary Foci in Interventions and Outcomes

The fundamental objective behind all nutrition and public health research and initiatives is to provide individuals with the knowledge necessary to not only make wise health choices, but to also empower them with the skills to sustain a healthy lifestyle for a lifetime.³⁶ We know it is ideal for positive nutrition and wellness habits to begin early in life, but certain dietary changes are also appropriate later in life to accommodate physical and metabolic shifts that accompany age.⁴⁶ This section will first address interventions specifically structured for adults and will be followed by intervention designs that involve children and adults together. For purposes of this review, existing published interventions are further divided based on the focus of their content: nutrition education, behavior change, or environment change. In general, behavioral interventions focused on elements of behavior change theories including the Health Belief Model³⁶, Social Cognitive Theory³⁶, Theory of Meaningful Learning³⁶, Transtheoretical Change Model^{36,70}, and Social Learning Theory⁷⁰.

Adult Only Interventions

Nutrition Education

Though dietary recommendations are uniform around the world in encouraging high fruit and vegetable consumption,⁷¹ this does not always translate to consumer choice and actual nutrient intake. It has been addressed previously in this review that Americans do not meet US recommended minimal dietary goals, but in other countries this pattern exists as well. In the UK, a slight decline in purchasing of fruits and vegetables occurred over a four year period in the mid 1990's, from 2193 g/person per week to 2081 g/person

per week,⁷¹ and researchers developed a nutrition education focused intervention to increase fruit and vegetable intakes in a randomized controlled intervention trial called “Take Five”.⁷¹ Subjects were 16-65 year old randomly recruited adults who took place in the 8-week intervention. Within the treatment group, there were significant effects on weighed intakes of fruit and vegetables as well as follow-up measures at 6 and 12 months, which indicated some maintained results.⁷¹

On a broader spectrum, a literature exploration of articles published between January 1990 and April 2003 set out to establish the significant components and results of nutrition education programs aimed at older adult populations.³⁶ Within the 25 studies reviewed, positive effects seemed more feasible when the nutrition messages within the education program were straightforward, sensible, and targeted to the specific needs of the given population of participants.³⁶ Also within those sessions, the probability of behavior change increased if there was valuable interaction between subjects and the health professionals.⁷¹ Another piece related to positive outcomes was the offering of incentives. Overall, the most successful outcome reported was an increase in nutrition information and understanding, though behavior change was inconsistent across the board.

Behavioral Interventions

As previously cited, the evidence-based review and secondary analysis of the efficacy of behavioral interventions to modify dietary intake requires mention again, as it captured the nature of successful behavioral change interventions.⁶² Specifically, a study within the review, an evaluation of a socio-behavioral intervention for changing health

behaviors of older adults, is of great relevance to this section of literature review. The health promotion program included peer support, involvement from health professionals and “behavioral contracting”. Participants in the treatment group better changed their eating habits, incorporated exercise into their life and began to practice stress management formally in their daily routine.⁷²

In the systematic review of literature cited previously, interventions designed to increase fruit and vegetable intake among adults were examined for effectiveness.⁶⁹ One study in particular, involving behavioral counseling to increase fruit and vegetable intake, was of interest for this section. The 12-month intervention included individual behavioral counseling based on the state of the behavior change model.⁷⁰ From baseline to the end of the program, there was a significant increase in consumption of fruits and vegetables by 1.5 portions per day, and the percentage of participants eating five servings or more portions a day increased by 42%. The study was able to conclude that a behavioral counseling component can aid in significant increase in consumption of fruits and vegetables in low-income adults in the general population.⁷⁰

Environment

There are several environmental determinants of health. Factors external to an individual can serve to encourage healthy practices or diminish them. Research has shown that home availability of fruits and vegetables, a component of the home food environment, can increase the likelihood they will be eaten.¹⁴ This home food environment concept is multi-factorial and will be explored more fully in an upcoming section. In a systematic review of environmental determinants of fruit and vegetable

consumption among adults, the literature discussed that one's proximity to a neighborhood supermarket may relate to the accessibility of fruits and vegetables, placing a fruit bowl on the table may solicit increased fruit intake, and culture-specific eating patterns practiced in the home may determine the amount of vegetables eaten during meals.³⁷ Furthermore, married adults in one systematic review exhibit higher intakes of fruits and vegetables than those who are single, and people with lower household incomes consistently have a lower fruit and vegetable consumption.³⁷ Conversely, in another study single women had fewer-high-fat foods in their homes compared to single men, couples, or households with children.¹⁵

Adult and Child Interventions

Nutrition Education

Adult-specific interventions and studies help us understand established eating practices and food beliefs, but when an adult is a parent, studies focusing on the entire family show researchers the relationship between these aforementioned adult practices and beliefs and a child's food experience. A parent serves as a complete mediator between a dependent child and food,³² and parental understanding of nutrition directly influences the food that ends up in a child's mouth. Nutrition itself serves as an external influence on internal growth and progression, specifically at the beginning of the life cycle; even in infancy, one's eventual food preferences and attitudes are shaped.³² Because of this and the impact good nutrition has on mental ability, academic performance, and overall wellbeing,³² there can be little argument against the need for nutrition education.

Nutrition education plays an encouraging role in healthy eating and physical activity practices and should begin promptly in life.⁷³ Though the act of eating is inherently simple, food habits are complex and numerous elements intermingle in the development of eating patterns and food beliefs.^{74,75} Those in early infancy and childhood rely on a parent to choose and prepare their food and consequently, the family environment contributes to early-learned food behaviors. This evidence and related research suggest nutrition education with a focus on the development of healthy eating habits and lifestyle to be a crucial element in health promotion programs.^{32,76,77}

In a comprehensive review examining the efficacy of 265 nutrition education research interventions among parents of and caregivers to preschool children and/or school-aged children, nutrition education was a contributor to improving dietary practices when behavior change was an education strategy and component of the curriculum.⁷⁸

Behavioral Interventions

In an evidence-based review and secondary analysis of existing literature previously cited in this chapter, the efficacy of behavioral interventions to modify dietary fat and vegetable intake was evaluated. Over three-quarters of the studies analyzed stated significant increases in fruit and vegetable consumption (average increase of 0.6 servings per day), and consistently meaningful decreases were seen in saturated and total fat intake (7.3% reduction in the percentage of calories from fat).⁶² Because the behavioral dietary interventions evaluated were diverse in intervention strategy, program design, data analysis, and primary outcome measures, this lack of cohesiveness does not paint a clear picture about the most successful behavioral dietary intervention. However, it does

suggest programs with behavior change strategies, including components like family homework assignments and involving spouses in cooking, hold promise in improving diet quality.⁶² Furthermore, research shows combined dietary-behavioral-physical activity interventions, specifically those designed to include obese children and adolescents, demonstrate both short and long-term benefits including significant weight loss, decreased BMI, smaller body fat percentages, increased consistent physical activity, and increased fitness as well as reduced total and LDL cholesterol levels.⁷⁹

Environment

Many multidisciplinary interventions like those combining dietary, behavioral, and physical activity elements will address the environmental determinants of health. Several studies have explored how the external environment impacts not only adults but also parents, children, and the entire family unit. The home food environment has been suggested as the most influential environmental factor on a child's eating,⁷⁴ so several interventions have investigated this localized piece of the environment. Many of these community-based programs have successfully increased home availability and accessibility of fruits and vegetables, as well as provided children with skills to better ask their parents for increased fruit and vegetable presence in the home.⁸⁰

Similar school-based programs have been less conclusive, increasing lunchtime fruit intake and combined fruit and vegetable intake among children but not overall vegetable consumption, seeing only female children more willing and responsive to change, and no change in the home fruit and vegetable availability, parental encouragement to eat the recommended servings of fruits and vegetables, or value placed

on balanced eating of fruits and vegetables.⁸¹ Other studies have positively concluded that children may indeed eat more fruits and vegetables overall for lunch at schools that offer more fruits and vegetables,²⁶ that providing activities to engage parents may positively encourage improvement of the environment at home,¹⁸ and that a school-based intervention may help parents of students to make healthier choices when grocery shopping.⁸²

In the effort to increase fruit and vegetable intake, the home food environment has both scientific relevance and furthermore a localized effect on eating behaviors and consequently health. With scientific evidence that meals eaten outside of the home are typically more energy-dense, higher in fat content and served in larger portions,³⁷ it is of great interest to encourage decreased away-from-home dining as well as improve the food kept in the home. Targeting the home food environment in an effort to improve diet quality and decrease total energy intake is noted throughout the literature as a noteworthy endeavor, as this influential space created in a household can guide dietary behavior in both adults and children.

Home Food Environment

To witness a change in disease prevalence, it has been hypothesized that interventions altering one's environment will often be the quickest way to see a positive difference.⁵⁹ This is supported by the belief that building a health-promoting environment is a more promising enterprise than depending on an individual to not only independently identify agents in opposition to that kind of setting, but also to avoid them.⁵⁹ Personal

health responsibility, when coupled with conditions that foster it, is key to public health,⁵⁹ and it can begin within the home.

The home food environment is comprised of the dietary choices available and accessible within the kitchen of a home. It also includes how those choices are utilized at family mealtime, and environmental factors within a household that impact food purchases and meals such as media exposure, time constraints and food beliefs. In addition to food availability, it is comprised of who buys most of the groceries, who prepares the food, how meals are served and what time meals are eaten.³⁷

Social Ecological Model

The Social Ecological Model (SEM) examines the interplay between factors like family, home, school, and community and their potential impact on a given individual, subject, or trend. It has been widely used to help describe the compounding influence on childhood obesity.⁸³ Though less understood than more primary layers such as gender, race, and parent characteristics, recent SEM adaptations have listed “household characteristics” as an influence on child BMI.⁸³

It has been argued that the home food environment may be the environmental factor with the largest influence on a child’s eating, and that fruit and vegetable availability and accessibility in the home, parental modeling of fruit and vegetable consumption, family feeding and meal practices, and child involvement in food preparation are all associated with children’s fruit and vegetable intake.¹⁸ It is key be mindful of all social, biological, behavioral, and environmental factors²⁷ and arm individuals, specifically those serving as study participants, with tools, not merely

education or printed materials, to combat the barriers to wellness and sustain dietary behavior change. From a social ecological perspective, this is extremely relevant as research shows both child and parent characteristics are influenced not only by household food environment but additionally perception of the neighborhood environment, as well as the actual community food and physical activity environments.²⁷

Parental Modeling

An adult's home food environment can be very separate from that of a child, but a child's home food environment is very heavily influenced and controlled by a parent. In a study conducted in the homes of low-income African American mothers, there was a positive correlation between availability of fruits and vegetables and the mother's intake.¹⁴ The same was concluded for energy-dense foods. The study's results indicated that increasing the availability of fruits and vegetables in the home could likewise increase their consumption by infants, not just the new mothers. To expand, the study suggested caregivers may need to be encouraged to not only prepare fruits and vegetables for their children, but for the parents' own consumption.¹⁴

With a large component of the food environment within a home being parental modeling, these habits parents have or share can have an impact on the eating behaviors of children, especially those children who are not able to shop or cook for themselves. This concept explains much about how food ends up in a child's mouth, but it cannot be merely parents dictating what foods a child should eat and not being a dietary role model. Parents are very central to providing context for eating and food enjoyment, not to mention set the "emotional tone" for the family eating environment and consequent

attitudes and experiences surrounded it.⁸⁴ In one study, results showed significant correlations between parent and child for reported snack intake, eating motivations, and body dissatisfaction. The study concluded this to be an indicator for the important role of parental modeling improving the diet of a child over attempts at dietary control.⁸⁵

Measuring the Home Food Environment

While it is clear that environmental interventions may be among the most effective strategies for creating improvements in eating,⁸⁶ capturing the complex nature of the home food environment and measuring change can be complicated. To illustrate, in a study measuring household food availability among low-income Mexican residents in Texas colonias, unregulated settlements viewed as semi-rural areas, one household presented with 8 individuals, and bananas were present during each of the four home evaluations. However, the amount varied from 1-5 bananas. This example suggests that while bananas were available in the home, there were not enough present for everyone in the home.⁶⁶ While there are inevitable limitations in exploring the home food environment, there are also many strengths depending on the tool or data collection strategy used.

Receipt Collection

To better comprehend the extensive nature of the household food environment, it is important to measure household food purchase behavior.⁸⁷ One approach for characterizing food purchases is to utilize grocery store receipt data. Placing minimal burden on research staff, it is highly feasible and allows for large sample sizes. One study

was able to track purchasing behaviors of 363 people at specified supermarkets through a collection period of six weeks.⁸⁸ The staff plotted how specific grocery items were contributing to total fat, fiber, and energy of food within the home environment of participants. However, this method of grocery store receipt collection will only capture food purchased at a grocery store. This study did not account for any fast food, vending machine, beverage and snack, or full-service restaurant purchases.

There are additional studies that have removed this limitation through including receipts from all food sources, including both grocery stores and restaurants. This is a logical pursuit, as there has been a shift in the last few decades from purchasing food from a market and cooking a homemade meal, to buying prepared and ready-to-eat items from full-service or fast food restaurants, convenience stores, and other small eateries.⁸⁹ In a study that collected all food-related receipts annotated by participants for four weeks, researchers found home sources to account for 45% of receipts and eating-out sources comprised 55%.⁸⁹ This supports the need to include receipts collected beyond the grocery store to fully understand individual dietary intake and the home food environment. Still feasible, 61% of participants reported the need required for receipt collection and annotation was not a problem, with 20% categorizing it as a small problem and 18% stating it was a significant burden. Though it tracks more food data than a supermarket-only receipt research study, this strategy of collecting personal grocery and food-related receipts still fails to capture if a participant dined out and the meal was paid for by a friend or if it was a business-related meal covered by a company card.⁸⁹ Additionally, the longer the collection period, the higher participant burden becomes, which can lead to incomplete receipt collection.

Though receipt collection may serve to improve grocery store-based interventions targeted at improving nutritional quality of purchased food, identifying problematic food groups or demographic groups in need of an intervention, and tracking shopping patterns over time, receipt collection does not tell us enough about the home food environment.⁸⁸ It also cannot measure total food consumption, as the 1994/1995 Continuing Survey of Food Intakes By Individuals notes that 30% of total food energy comes from food consumed away from the home⁹⁰ and the trend of eating out has shifted toward this even more so in the last two decades. While receipt collecting is believed to decrease social desirability since receipts typically will list foods yet no identification of who was consuming each food item,⁸⁹ there are other more adequate methods of directly measuring the home food environment.

Self-Reporting

The majority of studies measuring food availability in the home utilize self-reported data, through either a mailed or provided checklist with pre-defined items.²⁵ These checklists can vary in length as well as items included, but all illustrate food products present or absent in the home. In addition to participants filling out and submitting checklists, phone interviews are also utilized. In one study, a parent telephone interview was conducted to assess home availability and accessibility of fruits and vegetables, which was then related to a seven day food record of the parent's children to explore the relationship of food availability and consumption.²⁶ Further, random-digital surveys have been completed, specifically in one study to measure the presence in the house of different high-fat foods.¹⁵ In this study, whoever answered the phone could

be surveyed, which resulted in greater response rates and reduced probability of nonresponse bias.¹⁵ This study and others similar in nature highlight that it is feasible to validate self-reports of food and beverage items present in the kitchen and phone interviews specifically are a practical measurement.²⁵ However, open inventories in contrast serve as more accurate representations of food availability.

Open Inventories

An open inventory is not a self-reported endeavor but is instead conducted by a research staff team, who visit the homes of participants and record home food environment information. The practice of a home visit is not a novel method and has been previously employed to address beginning of life changes and address childhood obesity in disadvantaged populations.⁹¹ From measuring types and quality of foods served at home meals to visiting university dorms to assess the caloric environment,^{23,92} open inventories allow for a unique look into the household food environment. However, these home visits are rarely seen in the literature, as the technique has been reported to have low feasibility.²⁵ Unlike a self-report checklist or phone interview, home visits can be intrusive, labor intensive, and expensive.

In a review that examined 23 studies in which either a researcher conducted an open inventory or a self-report checklist was used to assess food availability in the home, only three were open inventories.²⁵ Sample sizes in these three studies varied, and none were conducted at baseline and follow-up in an intervention program as a measure of program efficacy.²⁵ In one study, 65 white middle class families allowed home food

inventories to be conducted by research staff, in order to examine the relationship between body weight and foods available and accessible in the home.⁹³ In another study, food availability and its relationship with socioeconomic status was evaluated in 576 families of the Expanded Food and Nutrition Program. The study used food purchase records and pantry inventories, both recorded by staff. It was noted that for both staff and study participants, the pantry inventory was burdensome and the data gathered were described by the researchers as estimations.⁹⁴

In addition to participant and researcher burden, the third open inventory documented in the aforementioned review demonstrates another limitation to staff-completed inventories. Social desirability bias, the tendency of participants to want to please research staff, may not be possible to entirely diminish in these types of inventories. This causes respondents to over-report what they believe to be favorable behavior and under-report undesirable behavior. In the context of open inventories, participants may grocery shop prior to a home visit and buy items they believe to be healthy and what research staff is looking for on the inventory. In the third reported open inventory completed by Terry and Beck, researchers recorded both availability and accessibility of foods in the homes of 8 obese and 8 non-obese families as well as eating styles.⁹⁵ It appeared that after obese family members recognized the targeted eating behaviors being observed (specific food items easily accessible and visible in the home, portions sizes placed on plate at dinner), this spurred participants to behave in a way they believed to be more acceptable (displaying less food, eating smaller amounts at mealtime) during the second home visit and observation.⁹⁵

Because food and eating are both sensitive and highly emotional topics, social desirability bias related to both can be a limitation despite collection strategy. Regardless, these types of home visits are important, as they provide a direct observation and measurement of food items and practices in the home. To help keep home visits consistent, tools have been validated to aid in data accuracy.

Use and Validation of Food Inventory Tools

Predefined inventories serve as not only a checklist of selected food items that can be identified as present or absent in the home, but can also function as an objective proxy measure of food consumption habits of the family.²⁵ Though these inventories can be used directly by participants, self-reported by phone or mail-in questionnaire, many more checklists have been validated for use in open inventories. This section provides a brief overview of widely used inventories, their strengths and weaknesses, and a justification for the most promising home food inventory to use in community-based dietary behavior change interventions.

There are several inventories that in more than one study have shown to be user friendly as well as demonstrate sensitivity and specificity. The Home Fruit and Vegetable Availability Checklist used in the 5-A-Day project contains 22 items, 11 fruits and 11 vegetables, which since its original development has been used and modified in numerous other papers.²⁶ Modified versions have expanded the original instrument's parameters to further assess childhood diet, measure the impact of guided supermarket tours, and explore the relationship between food availability and intake.²⁵ While the tool is strengthened by its ability to capture what is available in the home, it is not a

quantitative measure. Further, the original tool was evaluated for internal consistency of the inventory, but criterion validity was not measured. However, Marsh et al.²⁰ have since demonstrated sensitivity and specificity of a modified version.

In a more generalized questionnaire, three questions were placed within the Project EAT (Eating Among Teens) survey, which measured home fruit and vegetable availability.⁹⁶ Using a 4-point scale ranging from “never” to “always”, three questions about usual fruit and vegetable availability, fruit juice availability, and whether vegetables were served at dinner in the home helped researchers to understand food availability and practices in the homes of participants. Though the questions were more broad, in conjunction with the 149-item youth and adolescent food-frequency questionnaire in the survey, researchers were able to show that availability was the strongest single predictor of intake.⁹⁶ Criterion validity of this measure was not assessed. In a modified version of the original Project EAT home food environment questions by Hanson et al.⁹⁷, the same three questions were repeated, except that fruit juice was changed to “soft drink” availability in the home, and an additional question about milk availability at dinner was included. Using the same 4-point scale, researchers found mixed results, including that fruit and vegetable intake was related to availability in girls, but not boys.⁹⁷

In a 80-item checklist created by Crockett et al.⁹⁸, the Crockett Inventory of Foods Reflecting Guidelines to Reduce Cancer showed to have a high sensitivity and specificity. Though it measures the availability of hypothesized cancer-reducing foods in the home, the checklist was originally designed as only a self-report survey. Later, 86 items were added to the checklist and this modified inventory was validated to evaluate

household food purchases among adults with diabetes mellitus.²¹ Both the original and modified version of this checklist revealed high validity with the criterion method.²⁵

In addition to the aforementioned widely used, recognized, and modified inventories, there are several other inventories that, while not necessarily validated or as commonly utilized, have been created for use in the home. These inventories have varying strengths and weaknesses and help to capture the multidimensional nature of the home food environment. In a brief household food inventory mentioned in a previous section, Patterson et al.¹⁵ created an inventory to be delivered via telephone, and the inventory was used as an environmental indicator of participant dietary practices. Though it showed that household food inventories are a practical approach to monitoring dietary behaviors in community-based studies, it did not include information about food purchased outside of the home, and there was an error involved in extrapolating information about household food availability.¹⁵

There are other inventories that have targeted specific populations, including a household food inventory strongly associated with current dietary behavior for North American Chinese households, an inventory used on multiple occasions to measure household food availability among low-income Mexicano residents in Texas colonias, and a Universal Product Code (UPC) scanner used to record home food availability and food use patterns in low-income families to name a few.^{66,99,100} Due to being directed at such specific groups, results were potentially not generalizable beyond the respective samples. Conversely, one instrument's validation process could be replicated with other population groups; the Home Food Inventory, which will be discussed at the end of this section, was revised for low-income Spanish and Somali-speaking families.²⁴ Though it

did not correlate the Home Food Inventory with dietary intake or weight, it established itself as a valid assessment tool for use among Spanish and Somali households.²⁴

Expanding upon the idea of a scanner, other studies have aimed to utilize UPC and barcode scanning as an exhaustive measurement of home food items.^{14,101} While using a UPC scanner was a feasible way to record all foods and drinks in the home in one study, at the time a complete UPC code database had not been created and further development was needed.¹⁰¹ In another study, barcode scanning was used as an exhaustive home food inventory. The tool showed that availability of fruits and vegetables in the home was associated with intake of those foods. These results further support that making changes to the home food environment can help to promote positive dietary change. However, this tool did not attempt to adjust for eating out behaviors.¹⁴

In addition to these abovementioned inventories, both the widely used and the culturally specific, there are also many inventories that have been specifically validated for use in the home to measure household food environments. Because accurate representations of food availability in the home can tell much about dietary quality and habits, validated inventories are the gold standard when assessing the home food environment.

Marsh et al.²⁰ modified an inventory tool and validated it to look at fruit, juice, and vegetable availability in the home.²⁰ Based off the original Home Fruit and Vegetable Availability Checklist mentioned in a previous section, results showed that a shelf inventory can be an effective instrument for use in assessing the availability of fruit juice and vegetables in the home. However, these results may not be generalizable due to low participation rate for African American parents.²⁰ Miller et al.²¹ also modified an existing

tool and validated it as a shelf inventory to evaluate household food purchases among adults with diabetes mellitus. The shelf inventory showed to be a sensitive, specific, and valid tool for assessing household food purchases. Though promising to evaluate food choice interventions among Type 2 Diabetic adults, the inventory alone does not quantify food or nutrient intake.²¹

To help capture not just food presence but also quantity, home food inventories can also include a food-weighing component. Iwaoka et al used an approximated portion method to estimate nutrient intake by family members through a household-based food-weighing survey.²² This new method combines food weighing in directly in the home and estimating the amount of food family members shared from a dish or food item in the household. Unfortunately, this method likely underestimates average energy intake, and it demonstrated to be challenging to approximate foods that were shared by a family.²²

Measuring availability and quantity of foods in the home helps paint a picture of actual food intake, but the development and validation of screening instruments to assess the types and quality of foods served at home meals goes beyond and truly assesses food preferences and practices. A tool created by Fulkerson et al.²³ exhibited high validity and though invasive, allows for a more far-reaching assessment of the home food environment. Though response burden was minimized, the screener does not measure what was eaten outside the home and only assesses foods that are prepared in the home, so even a takeout meal eaten in the home cannot be assessed.²³

In addition to this family meal-screening tool, Fulkerson et al.¹⁹ have been instrumental in developing and validating other home food environment inventories, including the Home Food Inventory, which demonstrated excellent sensitivity and

specificity. While the validation study did not assess test-retest reliability, rendering the study unable to address consistency of foods available in homes over a period of time, Fulkerson notes this may be a trivial concern seeing as Raynor et al.¹⁰² conducted two-week test-retest reliability of total high- and low-fat foods in the home and showed significant stability.¹⁰² Though unable to assess time since last shopping trip or quantity of food, the Home Food Inventory includes an inclusive range of both healthful and less healthful foods that are associated with obesity. This inventory was valid, participant friendly, and showed promise for community-based behavioral nutrition and obesity prevention research.¹⁹

Conclusion

As Americans face worse health than people in other affluent nations despite the United States being a world leader in medical care spending,¹ diet quality has become a priority public health concern in the country. Studies continually illustrate that availability relates to consumption, and when certain foods are easily obtainable, it increases the likelihood they will be eaten.²⁵ The home food environment has a direct impact on food choice, and consequently health.¹⁴ Further, it has been suggested as the most influential environmental factor on a child's eating.¹⁸

Studies of the home food environment may enhance our knowledge of obesogenic home food practices and how those relate to energy overconsumption. Additionally, these studies can potentially guide the conception and implementation of effective obesity prevention interventions,²⁵ and help assess efficacy of obesity prevention interventions through home visits at baseline and following termination of these programs. To measure

change, household food inventories serve as a feasible and valid approach to monitoring dietary behaviors, particularly in community-based studies,¹⁵ however much of the work involving measurement of the home food environment has been self-reported by participants, and this significantly limits accuracy of data. Therefore the purpose of this work was to test the preliminary efficacy of a 10-week dietary behavior change intervention on the home food environment through the presence of fruits, vegetables, and sources of sugar in the household pre- and post-intervention among parents with school-aged children recruited primarily from the Phoenix Metropolitan area.

CHAPTER 3

MATERIALS AND METHODS

The data for this thesis were collected from two studies being conducted concurrently at different study sites from February 24th, 2014 to May 1st, 2014: participants at Arizona State University (ASU) Preparatory Academy received information through the Families for Health program, and participants at the South Mountain Community Center (SMCC) received information through the Athletes for Life 2 program. Both programs delivered comparable behavior change interventions; the curriculum content and corresponding activities were consistent for both studies. Both studies were approved by the Institutional Review Board at Arizona State University (Families for Health at ASU Preparatory Academy: IRB ID STUDY00000267; PI: Sonia Vega-López, and Athletes for Life 2 at the South Mountain Community Center: IRB ID STUDY00000427; PI: Noe Crespo). The approval notices for Families for Health and Athletes for Life 2 are in Appendices A and B, respectively.

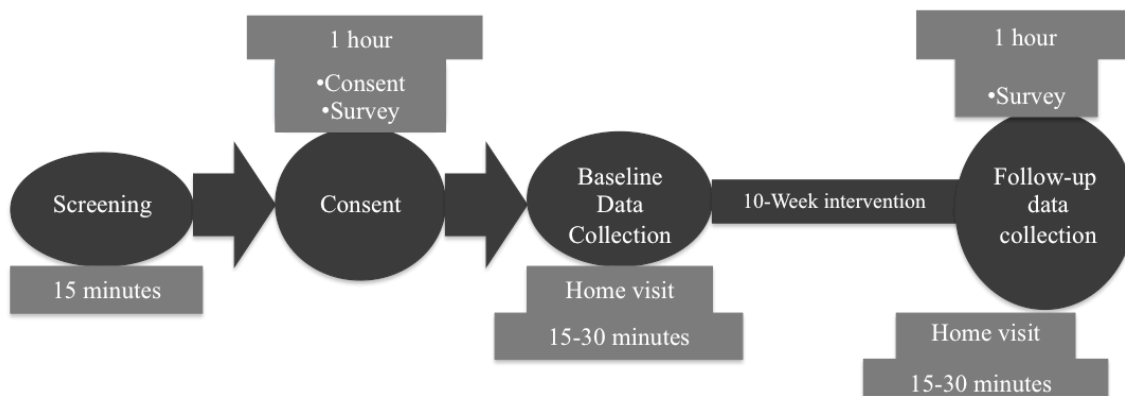
Study Design

The study had a quasi-experimental design with pre and post measurements occurring at baseline and at the conclusion of the 10-week intervention (described in detail below). The intervention dose was comparable between study locations. The Families for health program was comprised of 10 weekly 90-min group sessions. The Athletes for Life 2 program was comprised of 20 group sessions, held twice per week for 45-min. The main focus of these sessions was improving participants' dietary habits, particularly targeting an increase in fruits and vegetable consumption and a reduction in

sugar intake. Though the main focus was improving dietary quality, the program also encouraged increasing regular participation in physical activity. A variety of behavioral modification techniques grounded in principles from social-cognitive theory¹⁰³ and, operant conditioning¹⁰⁴ were used. These techniques have been shown successful in previous research, and include goal setting and tracking, creating a network of social support and skill practice, to name a few. These techniques, combined with nutrition education, provided parents with the tools and knowledge needed to sustain a healthy diet.

For a comprehensive study timeline, which encompasses both Families for Health and Athletes for Life 2, please see Figure 1 below.

Figure 1: Study Timeline



Participants

Study participants were parents of at least one 6-11 year old child, and had to be at least 18 years old. Exclusion criteria were as follows: medical conditions requiring specialized dietary restrictions and/or regimens (i.e. severe food allergies, kidney disease,

phenylketonuria), current participation in a separate diet modification program, current consumption of equal to or greater than 5 servings of fruits/vegetables per day, inability to attend sessions on the provided days and times, and pregnancy. Athletes for Life 2 sessions were conducted in Spanish to accommodate the high percentage of Latino participants, but participants enrolled in the Families for Health program had to be able to enlist in English language sessions. Additionally, participants at this location had to have at least on 6-11 year old attending ASU Preparatory Academy.

Sample Size

Sample size was estimated based on the main dietary outcomes for the parent studies (increased fruit and vegetable intake, decreased sugar intake). Based on previous research experience, up to a 40% attrition rate could be anticipated, so by recruiting up to 25 participants, it secured 15 participants to take place in either program. Previous research demonstrates significant change in our same primary dietary variables with less than 15 participants,⁶³ so it was anticipated that we would be able to identify improvements in our main outcomes of interest within this sample size. Additionally, this number provided for a manageable group size, which was ideal for the intervention's team-focused sessions.

The total number of home visits completed at baseline was 27, 8 of those visits conducted among participants enrolled in the Families for Health program and 19 of the visits conducted among participants enrolled in the Athletes for Life 2 program. Upon termination of the program, the total number of home visits completed as a follow-up

measure was 23, 6 of those visits conducted among participants enrolled in the Families for Health program and 17 of those visits conducted among participants enrolled in the Athletes for Life 2 program. The final sample size used for statistical analyses was $n=23$.

Recruitment

Potentially interested participants were identified through recruitment efforts at the ASU Preparatory Academy including advertisement (see Appendix C) in the weekly newsletter, fliers posted throughout the school with faculty approval, and invitations sent home with children. Additionally, relationships formed with the PTO and teachers further spread the program through word of mouth. Participants were then uniformly screened using a screening script (see Appendix D). Because of limited exclusionary criteria, it was expected that more than 50% of screened individuals would be eligible.

Potentially interested participants were also identified through recruitment efforts at the South Mountain Community Center through flier advertisement in both English and Spanish (see Appendices E and F, respectively). Additionally, parents who participated in a previous pilot program and expressed interest in participating again were contacted. Participants were screened over the phone using telephone scripts in both English and Spanish (see Appendices G and H, respectively).

The purpose in pulling participants from both locations was to increase the potential number of home visits completed pre- and post-intervention to better understand the feasibility of conducting these visits in this population.

Participant Enrollment

After potential subjects were screened over the phone and after their eligibility was confirmed, meetings were scheduled with parents to describe the study outline and obtain written informed consent to participate in the program. Depending on study site, this meeting took place at either ASU Preparatory Academy or South Mountain Community Center. Participants received an in-depth explanation of the study purpose and procedures, including the home visit, and were allowed time to address any questions or concerns about the program structure. Participation in the home visits was optional; participants enrolled in the two programs could still participate in the program if they did not consent to the home visits. If they did agree to home visit, participants filled out a separate home visitation consent form.

All participants gave written consent to participate, and a consent form in English was available to those enrolled in Families for Health (see Appendix I) and in English and Spanish to those enrolled in Athletes for Life 2 (see Appendices J and K, respectively).

For Families for Health, the goal was to contact and screen up to 50 participants over the phone. The intention was to both enroll and consent at least half of individuals who were telephone screened, but not to exceed 30 participants enrolled and consented. In total, 22 participants were contacted via telephone, while 16 participants were screened, enrolled, and completed the pre-survey. Twelve participants began the program and out of these participants, four were lost to follow-up. Two participants dropped out during the study, both because of time conflicts.

For Athletes for Life 2, the goal was to contact and screen up to 50 children, with no set number of families given that many families have more than one child. Parent participants were initially contacted over the phone with the telephone draft in Spanish. In total, 71 unique families provided their contact information. Of these, two were invalid numbers. Of the remaining 69, 22 indicated they were no longer interested after they were called and explained the study. Of the remaining 47, 20 were not eligible based on inclusion/exclusion criteria. Of the remaining 27, 25 were consented and 24 began the program.

In total, 31 participants consented to and were scheduled for the home visit from both intervention sites. One participant from Athletes for Life 2 and three participants from Families for Health dropped out prior to data collection. The remaining 27 participants, 8 from the Families for Health program and 19 from the Athletes for Life 2 program, completed the baseline home visit. At follow-up, 23 participants completed the home visit (one participant was lost to follow-up, two had time conflicts and could not complete the follow-up visit, and one participant's family was sick, though unrelated to study protocol). Of these 23 participants, 6 were from the Families for Health program and 17 were from the Athletes for Life 2 program.

Intervention Program

The program was comprised of 10 sessions occurring weekly at ASU Preparatory Academy and 20 sessions occurring biweekly at the South Mountain Community Center (see above) and was delivered successively unless there was a school recognized holiday, at which time the sessions were postponed and resumed the following week after the

holiday or break. The content delivered in one session (90 minutes in duration) for Families for Health was equivalent to the content delivered in two sessions (45 minutes each) for Athletes for Life 2. Delivered in a group format, each of these sessions aimed to improve the dietary habits of participants, with a specific focus on increasing intake of fruits and vegetables and reducing intake of sugar. Athletes for Life 2 participants received education on two topics on the Monday and Wednesday of the week, both days in Spanish. Participants in Families for Health likewise received education on the same two topics each week, but attended only once a week on Tuesday and the sessions were held in English. Topics covered during each week are summarized in **Table 1**.

The sessions taught basic information related to health, nutrition and exercise. Each session was coupled with important behavioral strategies participants needed for sustained dietary change. In this respect, our nutrition intervention program is unique because it utilizes several behavioral modification techniques that have in past research shown to be successful, such as goal setting and accountability, generating social support, skills practice, and so on. In addition to all the materials being culturally relevant and applicable to our population of interest, participants were strongly encouraged to engage their entire family in what they learned. This was another strategy utilized in which to help participants better maintain the healthy lifestyle changes they began to make within the context of the intervention.

Table 1: Outline of Intervention Topics

Week	Monday	Wednesday
1	Introductions Introducción	Chronic Disease: Reduce your Risk Enfermedades crónicas: reduzca su riesgo
2	Overview of a Healthy Diet Generalidades de una dieta saludable	Planning for health Un plan de salud
3	Hidden truth of added fats and sugars Verdades ocultas de grasas y azúcares	Reading a label: What does it all mean? Interpretar una etiqueta: ¿Qué significa?
4	Redesigning your favorite foods Rediseñando su comida favorita	Redefining portions Redefinir las porciones
5	Moving your body: The science Mueva su cuerpo: La ciencia	Cheap and Healthy: The best foods that are inexpensive and good for you Barato y saludable: las mejores comidas que son baratas y buenas
6	Changing your surroundings: Making the healthy choice the easy choice Cambie su entorno: Haciendo elecciones saludables de la manera más fácil	Healthy eating starts at the grocery store Comer saludable comienza en el supermercado
7	Getting your whole family involved Involucrar a toda la familia	Mealtime is family time La hora de la comida es tiempo en familia
8	Why we eat: Beyond hunger ¿Por qué comemos?: más allá del hambre	Open discussion Discusión de grupo
9	Tune into your health: Dangers of too much television Peligros de ver mucha televisión	Active by design: How to create an environment and habits to keep moving Diseñado para ser activo: Cómo crear un medio ambiente y hábitos para ser activo
10	Open discussion Discusión de grupo	Graduation

Data Collection

Data collection took place at baseline and at the end of the intervention (follow-up). Data was gathered using a survey (see below) and through home visits to collect information regarding the home food environment (see below). All baseline data collection procedures occurred based on when the participant was deemed eligible, but

were completed before the start of the program. All post-intervention data collection procedures, including the home visit, were completed within four weeks following the end of the intervention.

Survey

At baseline and follow-up, participants completed a survey to gather the information described below. The specific survey questions used for this research project have been extracted and compiled from both the English and Spanish version of the survey in Appendices L and M, respectively.

Socio-demographic characteristics of participants were reported in this survey through questions about gender, age, income, number of people living in the household, employment status, education level, ethnicity, and if a household currently received any public food assistance.

Home Visits

Home visits were scheduled at a convenient time for the families and the study team. The baseline home visit occurred after providing informed consent and no later than the first week of the intervention. The follow-up home visit took place no later than four weeks after the termination of the program.

Prior to both the baseline and follow-up home visit, participants received a reminder call no less than 24 hours before the scheduled home visit to be reminded of their scheduled timeslot, have any questions answered, reschedule if necessary, and/or cancel the visit if the participant no longer wished to allow the visit. A second call was

also made the same day as the visit before arriving to confirm that the adult participant enrolled in the study was home, and the participant was asked to inform all household members that two research assistants were coming.

At the time of the home visit, two trained research assistants entered participants' homes with permission and asked to take an inventory of the foods that were available in the home, covering foods found in main storage areas (i.e. food in the kitchen including the main refrigerator, and food in a second fridge or pantry outside of the kitchen). Participants were reminded that the inventory was not a judgment, that our search would not be invasive, and that they would be de-identified from the inventory by use of their participant identification number. At least one adult participant was required to be present through the entirety of the home visit. The inventory was taken using the Home Food Inventory¹⁹ (see below).

Home Food Inventory

The inventory protocol and procedures were based on a previously validated tool, the Home Food Inventory.¹⁹ The tool has been suggested as potentially being useful for community-based behavior change interventions focused on nutrition and obesity prevention.¹⁹ The inventory measures both kitchen accessibility (items that are visible and readily obtainable on the kitchen countertop, on top of the refrigerator, and on the table) and refrigerator accessibility (items that can be seen without moving other items around in the refrigerator). The inventory was modified for the purposes of this study to focus primarily on kitchen accessibility and availability of fruits and vegetables, as well as sources of sugar.

The inventory captured data on 26 different fruits (apples, apple sauce, apricots, avocado, bananas, blueberries, cranberries, dates, grapes, grapefruit, kiwi, lemons or limes, mango, melons, mixed fruit/fruit cocktail, nectarines, oranges, pears, peaches, pineapple, plums, prunes, raisins, raspberries, strawberries, and tangerines/clementines) and 20 different vegetables (asparagus, beets, bell peppers, broccoli, cabbage, cauliflower, carrots, celery, corn, cucumbers, green beans, lettuce, mushrooms, peas, potatoes, spinach/other greens, squash, sweet potatoes, tomatoes, and mixed vegetables). Sugar-sweetened products measured with the inventory and analyzed included beverages (regular and diet soda pop, prepared iced teas and lemonade, sports drinks, fruit drinks, flavored milks, aguas frescas, energy drinks, and 100% fruit juice), prepared desserts (regular cookies, reduced-fat cookies, regular cake-cupcakes, reduced-fat cakes/cupcakes, regular muffins, brownies, other snack cakes, pastries/sweet rolls/donuts, flan, pan dulce, ice cream, and pudding/jello), and candy (chocolate except chocolate exclusively for baking, hard candy, gummy candy varieties, fruit rollups/fruit snacks or other fruit based candy, and chewy candy).

Since a major source of refined sugar is dry cereal, a section devoted to categorizing cereal based on Arizona WIC guidelines was added.¹⁰⁵ Dry cereal was categorized as high fiber/low sugar if it had no more than 6 grams of sugar and/or at least 5 grams or more fiber per serving. Dry cereal was categorized as high sugar/low fiber (sugar-laden) if it had more than 6 grams of sugar per serving, regardless of fiber content, since decreased sugar-sweetened products was a main outcome measure. Additionally, culturally relevant food items were also added such as “aguas frescas”, “pan dulce”,

“flan”, and chewy tamarind fruit-based candy (e.g., “tamarindo”). This shortened and modified tool can be found in Appendix N.

Open inventories conducted pre- and post-intervention to measure change in the home food environment are not common in the literature, but related studies with a home visit component note pantry inventories being a “high burden for both staff and participants”.²⁵ To address the research gap, process evaluation questions were added to the end of the inventory to track overall experience participating in the home visit, family’s attitude toward participation in the home visit, and likelihood to allow a home visit in the household again. Participants were asked “How was your overall experience about participating in the home visit?”, “What was your family’s attitude towards your participation in the home visit?”, and “How likely would you be to allow a home visit in your household again?”. Values for overall experience with the home visit and family’s attitude toward participation in the home visit were as follows: 1= strongly disliked, 2= disliked, 3= neutral, 4= liked, 5= strongly liked. Values for likelihood to allow a home visit again in the future was as follows: 1= very unlikely, 2= unlikely, 3= unsure, 4= likely, 5= very likely. An open response section was also included following the process evaluation questions to allow participants to write in comments and suggestions.

In addition, length of inventory was tracked by recording start and end time, a text message had to be sent to a principal investigator before entering the home and upon leaving for safety purposes, and all home visit team members were adequately trained and completed the home food inventory in both small and large kitchens to foster strong communication and efficient inventory skills for each scheduled home visit.

Statistical Analyses and Interpretation

Statistical analyses were conducted using SPSS 21.0 for Windows and the Mac equivalent (SPSS Inc., Chicago, IL). A p -value ≤ 0.05 was considered statistically significant.

Data were summarized using descriptive statistics to capture baseline characteristics of participants including gender, age, household size (adults and children), ethnicity, education, income, employment, and public food assistance.

All continuous variables were reported as mean values \pm standard deviation (Mean \pm SD) or frequency where appropriate. Normality of the outcome measurements was assessed and data were transformed if necessary prior to the analysis. To analyze changes in home food availability from the baseline home visit to the 10-week follow-up, a paired samples t -test was used to compare mean values for normally distributed variables (fruits and vegetables), or a Wilcoxon Signed Rank test for all other variables which were not normally distributed and/or could not be transformed (sugar-sweetened beverages, prepared desserts, candy, sugar-laden cereal, and high fiber/low sugar cereal). While potatoes are a great source of vitamins, minerals, and fiber,¹⁰⁶ they are categorized as a starchy vegetable, the second most commonly consumed vegetable in the United States,¹⁰⁷ and the most popular vegetable consumed by WIC participants,¹⁰⁸ so vegetables were analyzed separately to include and exclude potatoes.

To analyze changes in kitchen and refrigerator accessibility from the baseline visit to the 10-week follow-up visit, frequency of participants having an item accessible in the kitchen or refrigerator was compared using a McNemar Test (Chi Square).

To compare overall experience, family's attitude toward participation in the home visit, and likelihood to allow a home visit again in the future, mean values were compared using a Wilcoxon Signed Rank test.

CHAPTER 4

RESULTS

Participant Sociodemographic Characteristics

Participant baseline characteristics detailed in this section are summarized in **Table 2**. A total of 23 households were enrolled and completed both data collection measures at baseline and follow-up in this study. The majority of participants were female (n=21, 91.3% female). The mean age for participants was 36 ± 5.5 years with an average household size of 2.4 ± 1.0 adults and 2.7 ± 1.1 children. The majority of participants identified themselves as Latino (n=18, 78.3%), while remaining participants classified as Caucasian (n=2, 8.7%), African American (n=1, 4.3%), Native American (n=1, 4.3%) and Somali (n=1, 4.3%).

The highest level of education completed by participants are as follows: 30.4% completed less than high school (n=7), 21.7% completed high school or a high school equivalent, 26% completed vocational school or some college (n=6) and 21.7% were college graduates (n=5). Overall, the level of education was high school, a high school equivalent, or lower for 52% of parents in this sample.

At baseline, 21.7% of participants reported to be employed full-time, working 25 hours or more per week (n=5), and 17.4% were employed part-time, working less than 25 hours per week (n=4). While most of the remaining participants identified as being a homemaker (39.1%, n=9), there were two participants employed in seasonal labor (8.7%), two who had been out of work for more than one year (8.7%), and one participant was enrolled as a full-time student.

Three participants (13%) had a household monthly income of less than \$1000, 11 participants had a household monthly income of \$1000-\$1999 (21.7%), 7 participants had a household monthly income of \$2000-\$2999 (30.4%), and 2 participants had a household monthly income of \$3000 or more (8.6%). Overall, 61% of households had an income less than \$2000 a month.

Thirty-nine percent of households reported to be receiving public food assistance. Of those, 17.4% of households were participating in the Supplemental Nutrition Assistance Program (SNAP), previously known as food stamps (n=4). The other households participating in public food assistance were enrolled in the Woman, Infant, Children (WIC) program (n=5, 21.7%). While 56.5% of households reported not to be receiving public food assistance (n=13), one household reported to be unsure about receiving public food assistance. Overall, more than half of the households involved with a supplemental nutrition program were participating in WIC.

Table 2. Baseline sociodemographic characteristics of study participants

(n=23)		Mean±SD	n (%)
Gender	Female		21 (91.3)
	Male		2 (8.7)
Age		36±5.5	
Household Size	Adults	2.4±1.0	
	Children	2.7±1.1	
Ethnicity	Latino/a		18 (78.3)
	African American		1 (4.3)
	Native American		1 (4.3)
	Caucasian		2 (8.7)
	Somali		1 (4.3)
Education	Less than highschool		7 (30.4)
	Highschool or equivalent		5 (21.7)
	Vocational school or some college		6 (26)
	College graduate		5 (21.7)
Household Monthly Income	Less than \$1000		3 (13)
	\$1000 to \$1999		11 (47.8)
	\$2000 to \$2999		7 (30.4)
	\$3000 or more		2 (8.6)
Employment	Employed full-time, 25 hours or more per week		5 (21.7)
	Employed part-time, less than 25 hours per week		4 (17.4)
	Employed in seasonal labor		2 (8.7)
	Out of work for more than 1 year		2 (8.7)
	Student		1 (4.3)
	Homemaker		9 (39.1)
Public Food Assistance	SNAP/EBT/Food Stamps		4 (17.4)
	WIC		5 (21.7)
	None		13 (56.5)
	Don't know		1 (4.3)

Food Availability

To measure changes in food availability within the home from baseline to 10-week follow-up, mean values were compared using a paired samples t-test for normally distributed variables (fruits and vegetables) or a Wilcoxon Signed rank test for all other variables. Values indicate the amount of different items present in a household at baseline, follow-up, and the difference between the two time points.

Fruits and Vegetables

Fruit and vegetable availability changes in the home from baseline to 10-week follow-up detailed in this section are summarized in **Table 3**. The number of available fruits per household significantly increased from 7.7 ± 3.2 items at baseline to 9.4 ± 3.1 items at follow-up ($p=0.004$).

Vegetable availability was analyzed twice to include and to exclude potatoes. The number of available vegetables per household, including potatoes, was 9.3 ± 2.9 items at baseline and 10.3 ± 2.7 items at follow-up. This increase was not statistically significant ($p=0.080$). Comparably, when vegetables were analyzed to exclude potatoes, the number of available vegetables per household was 8.7 ± 2.9 at baseline and 9.5 ± 2.8 at follow-up ($p=0.111$).

Sugar-Sweetened Products

Sugar-sweetened product availability changes in the home from baseline to 10-week follow-up detailed in this section are summarized in **Table 3**.

The number of available sugar-sweetened beverages per household significantly decreased from 3.2 ± 1.9 items at baseline to 1.7 ± 1.3 items at follow-up ($p=0.004$). The number of available prepared desserts per household significantly decreased from 3.0 ± 2.0 items at baseline to 1.7 ± 1.3 items at follow-up ($p=0.005$). The number of available types of candy per household significantly decreased from 2.0 ± 1.7 at baseline to 0.6 ± 0.7 at follow-up ($p<0.001$).

Dry Cereal

Dry cereal availability changes in the home from baseline to 10-week follow-up detailed in this section are summarized in **Table 3**.

The number of available types of sugar-laden dry cereal per household was 2.4 ± 2.1 at baseline and 1.8 ± 1.5 types at follow-up. This decrease was not statistically significant ($p=0.090$). The number of available types of high fiber/low sugar cereal per household significantly increased from 2.3 ± 1.4 at baseline to 2.7 ± 1.4 types at follow-up ($p=0.033$).

Table 3. Changes in home food availability from baseline to 10-week follow-up^a

(n=23)	Baseline	Follow-up	Difference	p-value
Fruit	7.7±3.2	9.4±3.1	1.7	0.004
Vegetables				
Including potatoes	9.3±2.9	10.3±2.7	1.0	0.080
Without potatoes	8.7±2.9	9.5±2.8	0.8	0.111
Sugar-sweetened beverages ^b	3.2±1.9	1.7±1.3	-1.5	0.004
Prepared desserts ^c	3.0±2.0	1.7±1.3	-1.3	0.005
Candy	2.0±1.7	0.6±0.7	-1.4	<0.001
Sugar-laden cereal ^d	2.4±2.1	1.8±1.5	-0.6	0.090
High fiber/low sugar cereal ^d	2.3±1.4	2.7±1.4	0.4	0.033

^aValues are presented as Mean±SD and represent the number of items within each category present in the household. Mean values were compared using a paired samples t-test for normally distributed variables (fruit and vegetables), or a Wilcoxon Signed rank test for all other variables

^bSugar-sweetened beverages include regular and diet soda pop, prepared iced teas and lemonade, sports drinks, fruit drinks, flavored milks, aguas frescas, energy drinks, and 100% fruit juice

^cPrepared desserts include regular cookies, reduced-fat cookies, regular cake/cupcakes, reduced-fat cakes/cupcakes, regular muffins, brownies, other snack cakes, pastries/sweet rolls/donuts, flan, pan dulce, ice cream, and pudding/jello

^dSugar-laden cereal is defined as dry cereal with more than 6 grams of sugar per serving. High fiber/low sugar cereal is defined as dry cereal with no more than 6 grams of sugar and/or at least 5 grams of fiber per serving. Cereal sugar cut offs are based on Arizona WIC guidelines

Kitchen and Refrigerator Accessibility

To measure changes in accessibility within the home from baseline to 10-week follow-up, frequency of participants (households) having an item accessible in the kitchen or refrigerator was compared using a McNemar Test. Values represent the number of households with each item being accessible at baseline and at follow-up. Kitchen and refrigerator accessibility changes in the home from baseline to 10-week follow-up detailed in this section are summarized in **Table 4**.

Kitchen Accessibility

At baseline, 19 households had fresh fruit accessible in the kitchen. Following termination of the intervention, 22 households had fresh fruit accessible in the kitchen ($p=0.250$). There was no significant change in the number of households that had fresh vegetables accessible ($p=1.000$). There was a non-significant reduction in accessibility of dry cereal (from 11 households at baseline to 8 households at follow-up; $p=0.375$). There were no significant changes in accessibility of regular soda pop ($p=1.000$) and candy ($p=0.688$). The observed increase of regular prepared desserts, which included cookies, cake, cupcakes, and muffins, from 3 households at baseline to 7 households at follow-up was not statistically significant ($p=0.289$).

Refrigerator Accessibility

At baseline, flavored milk, both chocolate and strawberry, were accessible within the refrigerator in 7 households and 3 households, respectively. At follow-up, no household had any flavored milk products accessible in the kitchen. Though a meaningful

result, because the frequency at follow-up was zero for both chocolate and strawberry flavored milks, a p -value was not generated for either. Households with refrigerator accessible 100% fruit juice significantly increased from 3 households at baseline to 17 households at follow-up ($p=0.001$). There was a non-significant reduction in the number of households with fruit drinks and sports drinks accessible in the refrigerator from 13 households at baseline to 6 households at follow-up ($p=0.065$). The change in number of households with refrigerator accessible regular soda pop was not statistically significant ($p=0.453$). There was a statistically significant increase in the number of households with refrigerator accessible bottled/contained water ($p<0.001$), with an increase from 9 households with accessible bottled/contained water at baseline to 22 households at follow-up. Finally, there was a statistically significant increase in the number of households with refrigerator accessible ready-to-eat fruits and vegetables. With the accessible ready-to-eat vegetables, 8 households had them at baseline and this increased to 19 households at follow-up ($p=0.007$). Accessible ready-to-eat fruit was present in 8 households at baseline, with an increase to 17 households at follow-up ($p=0.022$).

Table 4. Changes in kitchen and refrigerator accessibility of select foods from baseline to 10-week follow-up^a

(n=23)	Pre (n)	Post (n)	<i>p</i> -value
Kitchen accessibility			
Fresh fruit	19	22	0.250
Fresh vegetables	5	6	1.000
Dry Cereal	11	8	0.375
Regular soda pop	3	2	1.000
Candy	5	3	0.688
Regular prepared desserts ^b	3	7	0.289
Reduced-fat prepared desserts ^c	0	1	n.a.
Refrigerator accessibility			
Flavored milk (chocolate)	7	0	n.a.
Flavored milk (strawberry)	3	0	n.a.
100% fruit juice	3	17	0.001
Fruit drinks/sports drinks	13	6	0.065
Regular soda pop	9	6	0.453
Diet soda pop	2	0	n.a.
Bottled/contained water	9	22	<0.001
Fresh ready-to-eat vegetables	8	19	0.007
Fresh ready-to-eat fruit	8	17	0.022

^aValues represent the frequency of households in which each item was accessible in the kitchen or refrigerator. The frequency of households having an item accessible in the kitchen or refrigerator was compared using a McNemar Test

^bAccessible regular prepared desserts include cookies, cake, cupcakes, and muffins

^cAccessible reduced-fat prepared desserts include cookies, cake, cupcakes, and muffins labeled as reduced-fat on the product

Home Visit Experiences and Attitudes

At the end of the Home Food Inventory, participants were asked a set of added questions to better understand feasibility of a home visit to measure the home food environment. Mean values were compared using a Wilcoxon Signed rank test. Changes in response to the end of inventory home visit questions from baseline to 10-week follow-up detailed in this section are summarized in **Table 5**.

Overall experience was rated on a scale of 1 to 5, with 5 being strongly liked. When asked to categorize overall experience about participating in the home visit, the mean value was 4.2 ± 0.7 at baseline. At this time point, the minimum response was a value of 3 or “neutral”, and the maximum response was a value of 5 or “strongly liked”. At follow-up, the mean value was 4.5 ± 0.5 . At this second time point, the minimum response was a value of 4 or “liked”, and the maximum response was a value of 5, or “strongly liked”. While at follow-up there was not a response lower than “liked”, it was not a statistically significant change ($p=0.153$).

Family’s attitude toward participation in the home visit was rated on a scale of 1 to 5, with 5 being strong liked. When asked to categorize family’s attitude toward participation in the home visit, the mean value was 4.0 ± 0.9 at baseline. At this time point, the minimum response was a value of 2 or “disliked”, and the maximum response was a value of 5 or “strongly liked”. At follow-up, the mean value was 4.4 ± 0.7 . At this second time point, the minimum response was a value of 3 or “neutral”, and the maximum response was a value of 5 or “strongly liked”. At follow-up there was not a response lower than “neutral”, and this was a statistically significant change ($p=0.025$).

Participants' likelihood to allow a home visit in the future was on a scale of 1 to 5, with 5 being very likely. When asked to categorize participant likelihood to allow home visit in the future, the mean value was 4.5 ± 0.5 at baseline. At this time point, the minimum response was a value of 4 or "likely", and the maximum response was a value of 5 or "very likely". At follow-up, the mean value was 4.7 ± 0.5 . At this second time point, the minimum and maximum response values remained the same as at baseline (4 or "likely" and 5 or "very likely", respectively). This was not a statistically significant change in responses ($p=0.157$).

Participants were also able to express comments freely about the home visit after the added process evaluation questions were answered. At baseline participants commented that their children were "intrigued", "very excited", and one participant who participated in the pilot study of the program stated the home visit to be "a good addition to the program" While one participant noted the initial visit felt "nerve-racking", others stated the visit was not invasive. At the follow-up home visit, one participant shared that "the home visit makes [my family] mindful of what we have", and another participant expressed "I learned a lot and I believe my fridge reflects that".

Table 5. End of inventory home visit questions at baseline and 10-week follow-up^a

(n=23)	Baseline		Follow-up		<i>p</i> -value
	Baseline	min-max	Follow-up	min-max	
Overall Experience ^b	4.2±0.7	3-5	4.5±0.5	4-5	0.153
Family's attitude toward participation ^b	4.0±0.9	2-5	4.4±0.7	3-5	0.025
Likelihood to allow home visit in the future ^c	4.5±0.5	4-5	4.7±0.5	4-5	0.157

^aValues are presented as Mean±SD. Mean values were compared using a Wilcoxon Signed rank test

^bValues for overall experience and family's attitude toward participation in the home visit are: 1= strongly disliked, 2= disliked, 3= neutral, 4= liked, 5= strongly liked

^cValues for likelihood to allow a home visit in the future are: 1= very unlikely, 2= unlikely, 3= unsure, 4= likely, 5= very likely

CHAPTER 5

DISCUSSION

Despite the United States being a world leader in medical care spending, Americans face worse health than people in other affluent nations.¹ As the country fails to reach its health potential,³⁸ Americans find themselves in a space of history where for the first time, a generation of children is being raised who may live shorter and sicker lives than their parents.³⁹ Overweight/obesity during childhood is a strong predictor of obesity and chronic disease in adulthood, and encouraging a healthful diet beginning at a young age is believed to reduce the risk of obesity in children.¹⁰⁹ Public health professions and researchers alike have quickly deemed diet quality a priority concern, addressing it specifically in numerous community-based dietary behavior dietary change interventions. Although many factors contribute to childhood obesity and poor diet quality, current models designed to understand root causes propose the home food environment as having a key influence.¹⁰⁹ However, much of the literature involving measurement of the home food environment is limited to self-reported data, and home food inventory tools have not been used to assess efficacy of behavior change interventions. Therefore, the primary objective of this study was to test the preliminary efficacy of a 10-week dietary behavior change intervention on the home food environment through the presence of fruits, vegetables, and sources of sugar in the household pre- and post-intervention among parents with school-aged children recruited primarily from the Phoenix Metropolitan area. The relevance of this work lies on the need to address efficacy of community-based programs designed to increase home availability and accessibility of fruits and vegetables while decreasing sugar-containing

products. Our objective was achieved by focusing on dietary behavior change, measured through open inventories in the home before and after an intervention program and not relying on self-reported data from participants enrolled in the study.

Home Food Availability and Accessibility

Home food availability and accessibility are meaningful to examine because the home food environment has such a localized and direct impact of food choice, and consequently health.¹⁴ The Home Food Inventory was a useful tool for the purposes of this study because it identifies both home food availability and documents home food accessibility, or items that without having to move surrounding objects around are visible and readily reachable on the kitchen countertop, top of the refrigerator, on the table, and inside the refrigerator. This is a crucial component to include when conducting a home visit because while overall food availability relates to consumption, if certain foods are easily obtainable it further increases the likelihood they will be eaten.¹⁴

Looking specifically at home food availability and accessibility, especially among parents of school-aged children, is of special interest for several reasons. In a systematic review of environmental determinants of fruit and vegetable consumption among adults, it was concluded that in order to improve intake of fruits and vegetables, particularly among low-income households, interventions focused on improving opportunities for adequate fruit and vegetable consumption were warranted.³⁷ Several studies reviewed addressed factors such as average income of neighborhood,¹¹⁰ living in a deprived area,^{111,112} and household income^{113–118} in relation to fruit and vegetable intake. In the study looking at a low-income neighborhood environment, men and women in the most

impoverished communities were more likely to have low fruit intake than their counterparts in more privileged neighborhoods.¹¹⁰ Of the two studies that examined deprived areas, one found those living in a disadvantaged area were eating fewer fruit servings per week in comparison to more socially advantaged areas, even when controlled for income.¹¹¹ The second study found both men and women to be eating less fruits and vegetables when compared to their most advantaged peers.¹¹² While three of the studies looking at household income as an environmental determinant of fruit consumption collectively found fruit intake to be lower in individuals living in low income households when compared to respective high-income groups,^{113,114,118} Laaksonen et al.¹¹⁷ found both male and female participants to be eating fewer vegetables than those in higher income homes. Interestingly, low-income men consumed less fruits and vegetables a day than high-income men, but low-income women consumed more fruits and vegetables a day than high-income women.^{115,116} While discussed that the disparity in fruit and vegetable consumption among low-income families may be due to a common perception that fruits and vegetables are expensive and they therefore buy them in limited quantities or not at all,³⁷ environment was predominantly examined as a potential barrier to fruit and vegetable intake. While our study did not account for sociodemographic information in our current analysis of home food environment data, 61% of participants reported a monthly household income of less than \$2,000, and 39% reported to be receiving public food assistance. Our findings suggest there is a need to target interventions on low-income households, focused on improving opportunities for adequate fruit and vegetable consumption. Our study also did not look at dietary intake data to compare to the observed changes in the home food environment, but previous

research suggests that our home food availability and accessibility of food and beverages in this setting plays a role in dietary consumption behaviors.²⁵

Though the home food environment is scarcely studied as an environmental determinant of intake, two studies have focused on having a home garden as an environmental determinant of fruit and vegetable intake, since home-grown produce was available and accessible at the homes of participants.^{119,120} Devine et al.¹¹⁹ found that having a home garden was positively and significantly associated with both fruit and vegetable consumption in 592 adults. Similarly, Billson et al.¹²⁰ found that eating home-grown produce was significantly related to increased fruit and vegetable intake. While this study did not take note of produce growing in a home garden if there was one present, several families mentioned and showed research staff at the time of the visit a full backyard garden growing seasonal produce, small plants either outside or in the home (mainly peppers and leafy greens), and trees (mainly citrus). Though not analyzed in this study, previous research suggests a relationship between access to a garden and fruit and vegetable consumption,¹²¹⁻¹²³ and participants in our study who were growing produce at home and had it available and accessible in the home could potentially have higher fruit and vegetable consumption compared to those in our study who did not have a home garden.

While home food availability and accessibility are influential determinants for food intake in adults, a study examining multiple aspects of the family food environment and eating patterns in 5-6 year old children suggested that not only does food availability in the home shape food intake in children, but also food preference.¹⁵

Since there is a strong correlation between diet and chronic disease,³⁻⁷ these findings suggest a special need for healthier home food environments in this population.

Fruits, 100% Fruit Juice, and Vegetables

In our study individuals who participated in the intervention increased their fruit availability within their homes. The number of available fruits per household significantly increased from baseline to follow-up, as captured by the Home Food Inventory. There was a difference of 1.7 more different types of fruit present in the kitchen of a household following termination of the intervention. In our study there was also an increase in households with accessible 100% fruit juice, ready-to-eat fruits, and ready-to-eat vegetables. While 100% fruit juice is still a sugary beverage, in comparison to a fruit-flavored juice or sports drink it is lower in added sugar and our intervention focused on importance of diluting 100% fruit juice if it was in the home. Keeping in mind that participants in our sample had at least one child whose food preferences are still developing and who need exposure to a variety of nutritious food choices,¹⁵ this was an extremely meaningful finding. These findings suggests that theory-based, multicomponent dietary change interventions show promise for increasing fruit availability and accessibility of 100% fruit juice, ready-to-eat fruits, and ready-to-eat vegetables in the homes of participants.

The current intervention involving parents of 6-11 year old children positively promoted an increase of available fruits and accessible 100% juice, ready-to-eat fruits, and ready-to-eat vegetables in the homes of participants. Though studies assessing home availability and accessibility of fruits and vegetables are scarce, existing literature

supports our findings. Heim et al.¹⁸ likewise attempted to improve availability and accessibility of fruits and vegetables in the homes of participants, but through a gardening program. While our intervention ran for 10 weeks and participants at both study sites received 90 minutes of education each week, this study was 12 weeks in length, with only 20-30 minute sessions occurring twice a week. This community-based intervention took place at a grade school and enrolled students 8-11 years old. While our study enrolled parents of school-aged children and encouraged participants to involve their entire family in the behavior change, this study encouraged the young children to share their gardening experiences at home, and their parents were prompted to improve fruit and vegetable availability and accessibility through weekly newsletters with tips, recipes, and take-home activities. Though their home food data were self-reported while ours was collected via open inventories, there was similarly a statistically significant increase in fruits and vegetables in the homes of participants. However, this study interestingly analyzed “availability/accessibility” as one variable,¹⁸ while our study defined a difference between the two terms and analyzed them separately.

Blanchette et al.¹²⁴ examined effective intervention strategies to increase intake of fruits and vegetables among 6-12 year old children. Among others including parental modeling, influence from peers, media exposure, and access to snacks at school, availability and accessibility of fruits and vegetables were potential environmental determinants examined most frequently in the literature.¹²⁴ This is consistent with our study, as we targeted not only home food environment, but also encouraged parental modeling and decreased screen time at home with participants in an effort to increase fruit and vegetable intake. Hearn et al.²⁶ collected baseline data from two school nutrition

education programs and explored relationships between availability and accessibility and intake of fruits and vegetables. According to seven day food records in one group, children's intake of fruits and vegetables was related to home availability and accessibility, and in the second group children who were provided greater amounts of fruits and vegetables in the cafeteria ate more of these foods.²⁶ In an effort to increase consumption of fruits and vegetables per day, Reynolds et al.¹²⁵ sought to understand the determinants of consumption, and suggested a model based on the Social Cognitive Theory to explain fruit and vegetable intake in children. Based on data from over 400 third-grade students, availability was the most consistently associated with consumption, along with motivation (described by the researchers to include food preference, self-efficacy, and so on). Described by Kratt et al.¹²⁶, homes with more fruits and vegetables available were overall more motivating and supportive for both adult and child fruit and vegetable intake when compared to homes with low fruit and vegetable availability. Cullen et al.¹²⁷ collected data from 225 fourth through sixth grade children and their parents, discovering that availability as reported by children and accessibility as reported by parents were both significantly associated with children fruit, juice, and vegetable consumption. When a child had a high preference for these items, their availability was the sole significant predictor. This specific study concluded that interventions need to focus around the home environment, if targeting child dietary practices.¹²⁷ Cumulatively, these four studies suggested that interventions involving parents show promise for fruit and vegetable promotion among children.¹²⁴ Our study's role with this existing research is to further indicate that interventions focused on home availability and accessibility may be effective in positively influencing foods kept in the homes of participants. Targeted

attention on home food availability and accessibility may impact dietary consumption, specifically that of young families with school-aged children.

While rare to find in the literature that the home food environment was assessed as an outcome of an intervention, studies have researched presence of fruits, vegetables, and juice in other settings and had comparable results. Many of these studies have gone further than the parameters of our current study to relate availability to intake. In a 10 session (5-week) psychoeducational program called “Squire’s Quest!”, 1578 fourth-grade students received educational sessions based on the Social Cognitive Theory with the goal to increase child preferences for fruits, juice, and vegetables. The intervention resulted in an increase of 1.0 servings more of fruits, juice, and vegetables more than the children not receiving the intervention.¹²⁸ Relatable to our findings, we see that theory-based nutrition education has a positive impact on intake, or in our study a positive impact on home food availability and accessibility, which in previous research its relationship with intake has been explored. The Alabama High 5 program was a school-based intervention program to increase fruit and vegetable intake among fourth-grade students.¹²⁹ The intervention was behavioral in nature and included a classroom component of taste testing and other related learning methods, a parents component in which parents received an overview of High 5 and were asked to positively support behavior change through necessary activities and assigned homework, and a food service component where school food managers and staff were trained how to promote fruit and vegetables to meet the High 5 guidelines. Relative to baseline, results collected at 1 and 2 years post-intervention showed that mean daily consumption of fruit and vegetables was higher for the intervention children when compared to the control condition, +1.68

servings/day and +1.0 servings/day, respective to the two data collection time points.¹²⁹ Interestingly, the study found that parents who encouraged their children to eat fruits and vegetables had a positive effect on the child's intake of those items, but these results were not seen in households with low home fruit and vegetable availability.¹²⁹ This suggests the importance of combining parental encouragement for children to eat fruits and vegetables while also providing a home environment to encourage this behavior, which our study emphasized heavily in the sessions. In another study, a theory-based intervention called "Gimme 5" implemented as a randomized controlled intervention trial within a school resulted in increased consumption of fruit, juice, and vegetables in the children.¹³⁰ Data were measured at three time points. There were significant differences in home fruit, juice, and vegetable availability and accessibility at time two and three, but no differences at baseline. Though the study concluded that a similar theory-based education program could help change children's fruit, juice, and vegetable consumption and impact factors at home that encourage fruit, juice, and vegetable consumption, the changes were noted to be small.¹³⁰ Interestingly, the increase in fruit and vegetable servings in this study was mostly attributed to the increase in vegetable intake on its own.¹³⁰

Although our study did not result in greater availability or accessibility of vegetables in participants' homes, other interventions have suggested greater vegetable availability and intake post-intervention. Baranowski et al.¹³¹ demonstrated an increase in home availability and accessibility of fruits and vegetables in the 8-week 5-a-day achievement badge program with 9-18 year old African American old boy scouts still living at home with their parents. Presented by registered dietitians, activities included

how to increase availability and accessibility of fruit and vegetables in the homes of the scouts by reinforcing healthy home food environment practices with weekly comic books illustrating what was expected to be done at home to promote dietary change.¹³¹ The intervention was successful in increasing home availability and accessibility of fruits and vegetables, and this information was collected through telephone interviews with parents.¹³¹ Of particular interest is the study by Eriksen et al.¹³² The study looked at the effectiveness of a school fruit and vegetable subscription on children's intake of fruits and vegetables after a 5-week intervention. There were four schools that participated in the intervention condition, while three control schools were not impacted by the intervention. Every school day, students who subscribed to the program received a piece of fruit or vegetable. Intake was measured at baseline and following termination of the program through 24-hour recall forms and a food frequency questionnaire. Similar to our study's non-significant change in vegetable availability and fresh vegetable accessibility, no change was observed in vegetable intake.

Though previously cited research has demonstrated changes in intake, including vegetable consumption, it is important to discuss why our current study did not find significant changes in vegetable availability and fresh vegetable accessibility. One possibility is that fruit and vegetable consumption may be approached similarly in interventions, though they may have very separate home environmental triggers. Literature suggests that home environmental triggers may not impact fruit and vegetable consumption in comparable ways, though relationships have been researched more for fruit and vegetable intake when combined, and less for fruit intake and vegetable intake separately.³⁷ To illustrate, while proximity to a grocery store may influence fruit and

vegetable consumption similarly, evidence suggests that placing a fruit bowl on the table may elicit increased fruit intake, while other factors like culture-specific eating patterns practiced in the home may determine the amount of vegetables eaten during meals.³⁷ While perhaps these dietary measure should not be combined as one outcome, the review was still clear that fruit and vegetable intake is likely to be higher among individuals with good availability and accessibility of fruits and vegetables, and supportive food environments should be explored in research.³⁷ There are some implications of our finding on non-significant changes in availability and accessibility of vegetables, including that while theory-based nutrition education programs may be effective increasing fruit availability and accessibility in the home as well as fruit intake, there needs to be a larger focus on vegetables to see its effect. Another implication is that small sample sizes may not be large enough to see significant changes in vegetable availability, accessibility, or intake.

Sugar-Sweetened Products and Beverages

Since the most frequently advertised product to children in the United States during Saturday morning television programming is high-sugar cereal,¹³³ often not in compliance with dietary recommendations, it is a familiar product to children and can be a significant contributor to overall sugar intake in the diet.¹³³ To address this, a dry cereal section was added to the Home Food Inventory.

While there was no change in availability of sugar-laden dry cereal in our study from baseline to follow-up, there was a statistically significant increase in availability of high fiber/low sugar cereal per household. While one study has suggested that intake of

presweetened cereals actually increases the likelihood of children and adolescents meeting recommendations for calcium, folate, and iron,¹³⁴ another study that examined the adverse effect of high added sugar consumption on dietary intake in American preschoolers found that, even while potentially fortified, low fiber ready-to-eat cereal ranked as a top-10 food source of added sugar consumption in preschoolers.¹³⁵ Further, in an experimental study comparing two randomly assigned groups of children, children in the high-sugar condition consumed significantly more cereal and almost double the refined sugar in total when compared to children in the low-sugar cereal condition.¹³⁶ These children in the high-sugar cereal group also had a lower nutritional quality breakfast. Interestingly, children who ate the low-sugar cereal were more likely to put fruit on their cereal.¹³⁶ This finding in our study implies that theory-based, multicomponent dietary change interventions show promise for increasing availability of high fiber/low sugar cereals in households, but improvements must be made in intervention curriculum to decrease availability of high sugar/low fiber cereals in the homes of participants, perhaps through exposing participants to more superior breakfast cereal options. This may also indirectly increase fruit intake, and parents should be reminded that children will eat what is available and offered in the home, regardless of nutrient quality.¹³⁶

There was a statistically significant decrease in availability of all available sugar-sweetened products identified on the Home Food Inventory from baseline to follow-up. These products included sugar-sweetened beverages, prepared desserts, and candy varieties. There was also a significant increase in households with accessible bottled/contained water. These are importance changes to note, as items like sugar-

sweetened beverages, sweets, and other sources of added sugar have been shown to have a negative impact on the diet quality of children.¹³⁴

Other types of interventions and interventions in different settings have resulted in decreased sugar intake or increased intention to reduce sugar intake, specifically through the products in which we saw significant changes. In one study, researchers performed open inventories, similar to our study, in 65 predominately white, middle-class families to examine the association between weight status and home food storage.⁹³ One significant finding was that the degree of overweight in fathers was positively associated with availability of “junk” foods and desserts.⁹³ Though a meaningful finding, a cross-sectional secondary analysis of baseline data from a school-based intervention targeting obesity and obesogenic behaviors among middle school children study focused more on minority families, illustrating that white children had significantly better home food environments than Hispanic and Black children with greater availability and accessibility of healthy foods.¹³⁷ In 2010, the city of Philadelphia launched a theory-based media campaign, which served as an intervention to reduce sugar-sweetened beverage consumption among homes with children.¹³⁸ Exposure to campaign messages increased intention to reduce sugar-sweetened beverages per the post-campaign assessment, and researchers noted how integrating behavioral change into their campaign could be applied to the development of a public health intervention,¹³⁸ Though our study is not a public health-level intervention, these successful strategies in reducing sugar-sweetened beverage consumption are still important in the context of our community-based dietary behavior change setting. In a study investigating development of effective interventions to discourage sugar-sweetened beverage consumption, results showed that low

availability and more structured family food rules about sugar-sweetened beverages were associated with decreased sugar-sweetened beverage consumption from baseline to follow-up.¹³⁹ The study utilized longitudinal data of the “FATaintPHAT” intervention study for secondary analysis. The original intervention study targeted adolescents in an effort to prevent weight gain through a computer-tailored intervention that provided personal feedback to participants on health related behavior and how to modify unfavorable behaviors that could cause weight gain, such as sedentary behavior, consumption of snacks and sugar-sweetened beverages.¹⁴⁰ The program offered suggestions on how to modify less healthful patterns, such as physical activity and consumption of fruit, vegetables, and fiber. The intervention website included eight modules, the first serving as an introduction to weight, weight gain, and related behaviors, while the remaining seven addressed relevant behaviors. Each module included a questionnaire to gauge where each participant was at with the information, and subsequent and personalized advice was then generated at the end, which could be printed or reread again in a module titled “Your advice” on the website. While this initial study only served to create the intervention content and did not assess its effectiveness in preventing weight gain in adolescents and improving related behaviors,¹⁴⁰ during the secondary analysis, researchers concluded that interventions like the FATaintPHAT program that are aimed at decreasing sugar-sweetened beverage intake should focus on improving individuals’ behavioral control to reduce intake, as well as limiting physical presence of these products in the home.¹³⁹

A meaningful finding in our study was that flavored milk, both chocolate and strawberry, were present and accessible at baseline, and at follow-up no households had

any flavored milk products accessible in the refrigerator. Interestingly, one study has shown that the consumption of sweetened dairy products was positively associated with dairy product servings and calcium intakes in children and adolescents.¹³⁴ However, low-fat milk including flavored milk has been listed as one of the top-10 food sources of added sugar consumption in preschoolers.¹³⁵ In the context of this research, this change implies that theory-based, multicomponent dietary change interventions show promise for decreasing accessibility of flavored milk products in the homes of participants, potentially limiting sugar intake. However, other interventions have not focused on decreased accessibility of flavored milk products as a main outcome. In another intervention where selection of low-fat milk over whole milk was an outcome in elementary school cafeterias in an inner-city Latino community, the intervention did not promote or discourage consumption of low-fat chocolate milk, since there is debate over whether it should be offered in schools or not.¹⁴¹

It is important to note that, while the program emphasized water consumption, especially over sugar-sweetened beverages, follow-up home visits took place as the Arizona summer approached and the large change in accessibility of bottled/contained water could be related to the change in weather.

While our study did not examine the relationship between home food availability/accessibility and actual intake within our sample, other studies have examined the home food environment in relation to children's diet quality and weight status, as well as intake in adults. Studies have concluded that the home food environment plays a large role in shaping dietary intake and weight status in children, specifically that having healthful foods available in the home is positively associated with

child dietary quality and weight status.¹⁰⁹ In adolescents and adults, several studies illustrate not only a positive correlation between availability of fruits and vegetables and intake,¹⁴ but also that availability may be the strongest single predictor of intake.⁹⁶ These studies have concluded that interventions to increase fruit and vegetable consumption in adolescents must target the need to increase availability of these items.⁹⁶

Home Visit

Literature on the home food environment, specifically studies measuring home food availability and accessibility through open inventories, is extremely scarce. It is hypothesized this is due to high burden for research staff and participants.²⁵ To better comprehend the feasibility of an open inventory to measure the home food environment, a set of process evaluation questions were added to the end of the Home Food Inventory.

Experiences and Attitudes

From the baseline home visit to the follow-up visit, participants increasingly liked the overall experience about participating in the home visit, there was a statistically significant change in the family's attitude toward participation in the home visit, and participants stated they were more likely to allow a home visit in the future. Overall, the addition of the evaluation questions and comment section better illustrated the home visit to be a feasible measurement of the home food environment and a well received and enjoyed piece of the intervention. There was an overwhelming participant suggestion that the inventory generate some sort of "health grade" so parents could understand what to improve in their home. While this might serve as an intervention in and of itself, the

original Home Food Inventory produced an obesogenic household food availability score and it may be worthwhile in the future to not only further updated and validate our modified version of the inventory but also create a scoring matrix and recommendations so parents could have a better understanding of their home food environment and how to enhance it.¹⁹

Feasibility

Open inventories carried out by trained researchers are scarce throughout the literature,²⁵ especially capturing changes pre- and post-intervention, and this is widely attributed to low feasibility for data collectors. However, one other notable study measured foods in the homes of families categorized as obese or non-obese and likewise noted changes in the home food environment.⁹⁵ In this study, researchers similarly recorded availability and accessibility of foods in the homes of these families, as well as eating styles. Comparably focused on openly visible foods located in kitchen cabinets, refrigerators, and freezers, researchers conducted kitchen inventories and family observations on two separate visits. Caloric totals of stored and visible home food and calories consumed appeared to be higher in obese households at the first observation, although obese families reduced the quantity of visible foods, as well as food consumption at the second time point.⁹⁵ Though this particular change could be attributed to social desirability bias, the risk for this type of error was limited in our study by decreasing familiarity between participants and research staff who entered homes, avoiding sharing with participants details about specific foods itemized the home food

checklist, and assuring members of the household the inventory was not a judgment on their home.

Speaking more to the feasibility of these open inventories, our home visit team did not feel the visits to be burdensome, and in addition to this insight, one other notable study measured food availability in the homes of 9 participants for 30 days, conducting 5 in-home assessments over that period of time, and likewise concluded that not only are multiple home assessments feasible, but it was confirmed with 100% retention of their participants and contributed to the literature on home food availability as identified by multiple open inventories.¹⁴²

Study Strengths and Limitations

To the best of our knowledge, this study is the first of its kind to measure the efficacy of a school and community-based dietary change intervention on the home food environment among parents with school-aged children through pre- and post-intervention home visits conducted by research staff. While our study is novel and adds greatly to the literature on the home food environment, several potential limitations of our study deserve mention. Though this study attempted to evaluate a potential causal relationship between the intervention and the home food environment through availability and accessibility of fruits, vegetables, and sugar-sweetened products, the quasi-experimental design of the study prohibits us from drawing causal conclusions about the relationship between this dietary behavior change intervention and the home food environment. However, our study was strengthened by our precautions to limit additional influence on the home food environment of participants, particularly through our efforts to reduce or

eliminate social desirability bias. Regardless, participants may have still wished to please researchers conducting the home visits, for example grocery shopping for food items they believed we were looking for but that they do not typically store in their homes. Families could have additionally hidden items they believed to be undesirable, potentially presenting a false image of their home food environment. We were further able to limit the potential of participants misrepresenting their home food environment by sending researchers to conduct open inventories in the homes of participants at baseline and following the end of the intervention. Our participants were given the opportunity to consent to the home visit, and since all who completed the home visit self-elected to do so, our sample may not represent the general population. While conducting open inventories pre- and post-intervention allows for a more accurate inventory of what is present in the home and what changes over time, this study only included food kept in main food storage areas of the home. Households may keep food in additional rooms, cupboards, and other assorted small storage areas separate from where we targeted attention, therefore potentially generating a limited view of the home food environment. Furthermore, since research involving direct measurement of the home food environment through home visits is limited, especially pre- and post-intervention as a measure of program efficacy, it was difficult to calculate a proper sample size. The majority of studies that did measure the home food environment in the literature utilized only self-reported data, so those sample sizes were extremely large and could not be generalized for this study.

Though the original Home Food Inventory is a validated measure of the home food environment, our shortened and modified version is not currently validated.

Currently, both the Home Food Inventory and our modified version can inform researchers of the kind of food that is present in the home, but these checklists are not quantitative. While researchers can observe that there are bananas and soda in a kitchen, the tool does not capture how many bananas, nor does it differentiate between a small can of soda and a liter of soda. This is a limitation for many validated inventory tools, including a tool comparably designed to measure household food availability among low-income Mexican families.⁶⁶ The inventory asked participants to answer when their most recent food-shopping trip was, where they shopped on that last food-shopping trip, if on that grocery shopping trip any unusual purchases were made that were still in the home at the time of the visit, if the home contained the usual amount of food the family would typically keep, where they buy most of their food, how many individuals live in the household, and how often they shop at other grocery stores, markets, etc, but this can still limit data. Additionally, our analysis did not control for these items, nor did it control for intervention site location, household monthly income, ethnicity, gender, education, employment, or being on public food assistance. Our study did not account for age of family members, nor did we account for household size.

Participants were asked if there were any unusual grocery store purchases in the house at the time of each home visit, but it is difficult to control for seasonality and holidays. For example, the baseline home visit took place around the Super Bowl, and the follow-up visit fell around Mother's Day, Cinco de Mayo, and graduation. Further, the visits took place at two very different time points, one in the winter and one in the spring, so different fruits and vegetables were available at supermarkets and consequently in the homes of participants. Though several culturally-relevant items were added prior to the

start of our intervention, throughout the experience of being in homes the research team realized numerous items that were popular in our sample that could be added to the inventory including: papaya, turnip, nopales (cactus), radish, edamame, jicama, blackberries, and a space to indicate if a household had a family garden. Overall, the Home Food Inventory allowed us to evaluate the home food environment with excellent sensitivity and specificity.¹⁹ Though not without minor limitations, the Home Food Inventory overall was well suited for the purposes of this research, as it had been suggested in its validation study as potentially useful for community-based behavioral nutrition and obesity prevention research and anecdotally it showed to be participant and researcher-friendly.¹⁹ It allowed our study to utilize open inventory data collected pre- and post-intervention, which strengthened our research over studies that have utilized self-reported home food environment data in the literature. Further, the Home Food Inventory already included an extensive list of fruits and vegetables, as well as wide-ranging items that were both healthful and less healthful to expand beyond inventories targeting foods for a specific intervention,¹⁹ and this allowed us to take more accurate snapshots of participants' homes. Though the majority of studies that have conducted open inventories before us labeled the measure as burdensome, we found our shortened inventory conducted by two research assistants to be a quick and efficient way to measure food available and accessible in the home.

In the future, a randomized controlled study is needed to confirm if observed changes were a result of the intervention, or if there were alternative explanations to our home food environment findings. These potential factors could include time from the last shopping trip, weather change, a family event or celebration, and seasonality of fruits and

vegetables. Since the home visit could potentially act as an intervention in and of itself, future research is needed to confirm that positive changes in the home food environment were not a result of social desirability. This could also be accomplished through a randomized controlled study, where the control group is comprised of participants receiving only two home visits, and the treatment group is enrolled in the behavior change program with home visits pre- and post-intervention. In the future, research is also needed to perform further analysis that takes sociodemographic data into account. Further, household food information such as last grocery shopping trip and unusual purchases still in the kitchen at time of visit should in the future be taken into account during analysis. More research should be conducted to validate our edited version of the Home Food Inventory, as well as add more culturally-relevant food items to the inventory based on the findings with our population.

Future research may also want to expand further upon the Home Food Inventory or our shortened version to allow researchers to quantify the number or amount of available and accessible foods in the home during a visit, either by weighing or counting. While participants in our study reported household size at both home visits, future research may want to measure household size in relation to the number or amount of available and accessible foods in the home during a visit.

As interventions address the importance of a health-promoting and balanced home food environment, future research should specifically emphasize while availability relates to intake, accessibility of a food in the home further increases the likelihood it will actually be eaten. This should be a focal point in programs, as the majority of our non-significant changes related to accessibility (fresh fruit, dry cereal, candy, soda pop,

desserts, and sports/fruits drinks), even when there were significant changes in the availability of these products. Also, future research should not only look at changes in availability and accessibility of fruits, vegetables, and sugar-containing products in the home pre- and post-intervention, but also intake to further understand how home availability and accessibility can influence overall consumption and diet quality.

CHAPTER 6

CONCLUSION

Environment plays a role in diet quality and overall wellness, and the home food environment has been suggested as the most influential environmental factor on a child's eating.¹⁸ In our study, a 10-week dietary behavior change intervention showed to be effective in significantly increasing availability of fruit in the homes of participants based on data collected at baseline and follow-up home visits, as well as availability of high fiber/low sugar cereal. There was likewise a significant increase in households with accessible 100% fruit juice, accessible bottled/contained water, accessible ready-to-eat fruits, and accessible ready-to-eat vegetables. There was a significant reduction in availability of sugar-sweetened beverages, prepared desserts, and candy, as well as meaningful changes in the number of households with accessible chocolate milk, strawberry milk, and diet soda pop. Our study did not see significant changes in availability of vegetables and sugar-laden cereals, or accessibility of fresh fruit, fresh vegetables, dry cereal, candy, soda pop, desserts, and sports/fruit drinks.

Given that there are few studies that have utilized open inventories to measure the home food environment pre- and post-intervention, our study is a novel contribution to literature that have explored the feasibility of researcher-conducted home visits to measure the home food environment. With this quasi-experimental study we were also able to show positive changes in home food availability and accessibility after a dietary behavior change intervention, namely statistically significant increases in the number of households with accessible ready-to-eat fruits and ready-to-eat vegetables in the refrigerator. Though a scientific strength of the study was that the home food

environment was not measured based on self-reported data in our study, our results are limited by both study design and inventory tool design. This study did not have a control group, and a randomized controlled study is needed to confirm if observed changes were a result of the intervention before results of this study can be generalized to the population. Though the modified inventory tool used in this study was based on a validated measure, our edited version is not validated and future research is required to validate it.

Looking forward, this research provides a better understanding of how feasible these open inventories are. Existing health education programs could benefit from focusing on modifying the home food environment to promote healthier eating behaviors of families, and health behavior changes interventions focused on modifying the home food environment could utilize home visits as an additional measure of program efficacy. In addition to dietary behavior change interventions focusing on how to improve the home food environment, program developers should also include strategies for navigating the food environment outside of the home. Future research should explore the relationship between home food environment and intake, dietary quality, and weight.

These home visits give researchers a unique insight on participants outside the context of a program. Researchers come to better understand food preference, food choice, preferred method of food preparation and presentation, and available food storage and resources within the home. Our perspective is expanded and may lead to more relevant programs when we step into the home and peek in the pantry.

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APPENDIX A

FAMILIES FOR HEALTH IRB APPROVAL FORM



APPROVAL: EXPEDITED REVIEW

Sonia Vega-Lopez
 SNHP - Nutrition
 602/827-2268
 Sonia.Vega.Lopez@asu.edu

Dear Sonia Vega-Lopez:

On 11/8/2013 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Pilot study of a school-based family-focused diet and physical activity behavior modification program for parents of elementary school age children.
Investigator:	Sonia Vega-Lopez
IRB ID:	STUDY0000267
Category of review:	(2)(a) Blood samples from healthy, non-pregnant adults
Funding:	Name: (Unspecified);
Grant Title:	
Grant ID:	
Documents Reviewed:	<ul style="list-style-type: none"> • ConsentForm-Vega-Lopez-PilotParentProgram, Category: Consent Form; • HRP-503b-Vega-Lopez-PilotParentProgram, Category: IRB Protocol; • Survey-Parent-Vega-Lopez-PilotParentProgram, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • PostEvaluationQuestionnaire-Vega-Lopez-PilotParentProgram, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Survey-Child-Vega-Lopez-PilotParentProgram, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Survey-HomeFoods-Lopez-PilotParentProgram,

	<p>Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</p> <ul style="list-style-type: none"> • Letter of Support_DLujan_ASUPrep.pdf, Category: Off-site authorizations (school permission, other IRB approvals, Tribal permission etc); • Letter of Support_PMollen_Mollen Foundation.pdf, Category: Off-site authorizations (school permission, other IRB approvals, Tribal permission etc); • Goal Tracking Sheets.pdf, Category: Participant materials (specific directions for them); • Goal Setting cards.pdf, Category: Participant materials (specific directions for them); • RecruitmentNewsletterAd-Vega-Lopez-PilotParentProgram, Category: Recruitment Materials; • ScreeningForm-Vega-Lopez-PilotParentProgram, Category: Screening forms; • ProgramOutline-Vega-Lopez-PilotParentProgram, Category: Technical materials/diagrams; • InterventionOutline-Vega-Lopez-PilotParentProgram, Category: Technical materials/diagrams;
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The IRB approved the protocol from 11/8/2013 to 11/7/2014 inclusive. Three weeks before 11/7/2014 you are to submit a completed “FORM: Continuing Review (HRP-212)” and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 11/7/2014 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the “Documents” tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc:

Monica Gutierrez
Meredith Bruening
Sonia Vega-Lopez
Noe Crespo
Karen Saenz
Ginger Hook

Peggy Gomez
Ariana Cano
Adrian Chavez
Leopoldo Hartmann Manrique
Cassandra Smith
Abigail Nielsen
Rachel Cassinat

APPENDIX B

ATHLETES FOR LIFE 2 IRB APPROVAL FORM



APPROVAL: EXPEDITED REVIEW

Noe Crespo
 SNHP - Exercise and Wellness
 602/827-2279
 Noe.Crespo@asu.edu

Dear Noe Crespo:

On 1/8/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Second Phase: feasibility of a recreation center-based childhood obesity prevention program: "Athletes for Life 2"
Investigator:	Noe Crespo
IRB ID:	STUDY00000427
Category of review:	(4) Noninvasive procedures, (7)(b) Social science methods, (7)(a) Behavioral research
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> • Photography_Consent and Release_revised_120613.pdf, Category: Consent Form; • Child Assent Form_English_Spanish_AFL_P2_010614-SVL.pdf, Category: Consent Form; • Adult Informed Consent_English_AFL_P2_121013_NC-SVL.pdf, Category: Consent Form; • Adult Informed Consent_Spanish_AFL_P2_010614SVL.pdf, Category: Consent Form; • Parental Consent Form_Spanish_AFL_P2_010614SVL.pdf, Category: Consent Form;

	<ul style="list-style-type: none"> • Parental Consent Form_English_AFL_P2_121013_NC-SVL.pdf, Category: Consent Form; • HRP-503b- PROTOCOLBioscience_CRESPO_AFL_P2_NC_121 213 (1).docx, Category: IRB Protocol;
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The IRB approved the protocol from 1/8/2014 to 1/7/2015 inclusive. Three weeks before 1/7/2015 you are to submit a completed “FORM: Continuing Review (HRP-212)” and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 1/7/2015 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the “Documents” tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Monica Gutierrez
Peggy Gomez
Carla Dellaserra
Noe Crespo
Gabriel Shaibi
Sonia Vega-Lopez
Andrea Medina
Rachel Ganger
Monica Gonzalez
Abigail Nielsen
Sarah MULLANE
Rylee Toltzman
Erika Fimbres
Ariana Cano
Jennifer Huberty
Monica Gutierrez
Rachel Cassinat
Alex Carnahan
Adrian Chavez
Jeremy Webb
Andrian McGhee
Argemiro A Florez Pregonero

Karen Saenz
Leopoldo Hartmann Manrique

APPENDIX C

FAMILIES FOR HEALTH NEWSLETTER ADVERTISEMENT

Are you concerned about the health of you and your family?

The Mollen Foundation and the School of Nutrition and Health Promotion at ASU are interested in starting a 12-week nutrition and health program for parents of 6-11 year old students who attend ASU Preparatory Academy. If you would be interested in this type of program, please take our short survey to help us understand how to best serve you.

Click here to take a short survey if you are interested

https://qtrial.qualtrics.com/SE/?SID=SV_87zU2ywaDsrHBNr

¿Está interesado(a) en su salud y la de su familia?

La Fundación Mollen Foundation y la Escuela de Nutrición y Promoción de Salud de ASU están interesadas en implementar un programa de nutrición y salud con duración de 12 semanas para padres de niños de 6 a 11 años de edad que asisten a ASU Preparatory Academy. Si está interesado(a) en este tipo de programa, le pedimos que llene esta encuesta para que podamos entender como servirle mejor.

Presione aquí para tomar la encuesta si está interesado(a)

https://qtrial.qualtrics.com/SE/?SID=SV_87zU2ywaDsrHBNr

APPENDIX D

FAMILIES FOR HEALTH TELEPHONE SCREENING SCRIPT

Screening Form

Screening ID#: _____ Date of Phone Call: _____ Recruiter: _____

Recruiter: Obtain verbal consent to ask eligibility criteria questions by reading and asking the following:

In order to determine whether you qualify or not for the study I need to ask a few questions about you and some general health information. This will take about 10 minutes. Can I ask these questions at this time?

YES NO

If YES, continue asking eligibility verification questions.

If NO, inform participant that you cannot proceed and thank him/her for their time. **(STOP)**

(Do not read) Participant's gender: MALE FEMALE

ELIGIBILITY VERIFICATION

Do you have a child that that is 6-11 years old and attend school at ASU Preparatory Academy?

YES NO, STOP

Are you able to participate in English languages classes that will be going over a variety of topics related to health, nutrition, and physical activity?

YES NO, STOP

Are you available to participate in this study each week at _____ (time) on _____ (day)?

YES NO, STOP

Do you have a medical condition that requires you to follow a specific diet?

YES NO, STOP

Are you currently participating in a diet modification program?

YES NO, STOP

Are you currently pregnant?

YES NO, STOP

Do you consume more than 5 servings of fruits and vegetables daily?

YES NO, STOP

Screening Form

Is patient eligible for participation? YES NO (STOP)

As part of this research study we will ask you to meet us at ASU Preparatory Academy to explain the study to you, ask you to sign a consent form, fill out a socio-demographic survey and give you a step counter to wear for the week prior to your first study visit . We would then ask you to come to our ASU study site at the Nutrition Laboratory at ASU's downtown campusso that we canmeasure, your height, weight, waist and hip circumferences, and blood pressure. We will also draw your blood to measure heart disease and diabetes risk. You will have to fast for 10-12 hours before your study visit. During this time we will also be scheduling a time to visit your home and take an inventory of the foods that you have available in the home. Following these measures we will have sessions that occur weekly for 90 minutes each and last 12 weeks. After the completion of these sessions we will conduct all measurements again. Based on the information I have provided you, are you willing and able to participate in this study?

YES NO, STOP

Have you donated blood in the past 4 weeks? YES NO

If YES, when? / _____

Do not schedule a blood draw within 4 weeks of blood donation.

Study visit date and time: _____ **Study ID:** _____

Are you allergic to LATEX? YES NO

If yes, make note and ask laboratory personnel to draw blood with latex-free supplies.

Read the following:

Thank you for your time.

APPENDIX E

ATHLETES FOR LIFE 2 RECRUITMENT FLYER (ENGLISH)



ATHLETES FOR LIFE

A 12-week program (2 times per week) that teaches **youth 6 - 11 years old** important sports skills while improving overall fitness so that they are better prepared to participate in sports and be physically active.

Mondays and Wednesdays 5:30 - 7:00pm

Classes start February 10, 2014

South Mountain Community Center

212 E. Alta Vista

Phoenix, AZ 85042

Additional information on back.





Join the ***ATHLETES FOR LIFE*** Revolution!

We are seeking child and adult participants to enroll in the ***ATHLETES FOR LIFE*** program.



ATHLETES FOR LIFE is a 12-week program (2 times per week) that teaches children important sports skills and help children improve fitness so that they are better prepared to participate in sports and be physically active. At the end of the program children will participate in a fun **Youth Olympics** event where children will show off their improved skills.

Adults are also invited to participate in a 12-week (2 times per week) health education program consisting of informative and interactive nutrition and physical activity classes.

This program is also part of a research study conducted by Arizona State University to determine the most effective programs for children and adults.

Who can participate?

Youth between the ages of 6-11 years old and adults 18 year or older.

Where will this take place?

At the South Mountain Community Center
212 E Alta Vista Rd.
Phoenix, AZ 85042.

What else is involved?

Parents will be asked to complete a survey before and after the program and children's fitness and body composition will be measured before and after the program.

For more information please contact
Monica Gutierrez at (602) 827-2503 or moni.gutierrez@asu.edu

APPENDIX F

ATHLETES FOR LIFE 2 RECRUITMENT FLYER (SPANISH)



ATHLETES FOR LIFE

Un programa de 12 semanas (2 veces por semana) para niños(as) de **6-11 años** de edad. Este programa enseña a los niños(as) como mejorar sus habilidades deportivas y mejorar su condición física general para que estén mejor preparados para participar en deportes y ser activos físicamente.

Lunes y Miércoles

5:30-7:00pm

Las clases empiezan el 10 de febrero de 2014

South Mountain Community Center

212 E. Alta Vista

Phoenix, AZ 85042

Información adicional al reverso





Sea Parte de **ATHLETES FOR LIFE** Revolución!

Estamos buscando niño(a)s y adultos que participen y formen parte del programa **ATHLETES FOR LIFE**.



ATHLETES FOR LIFE es un programa de 12 semanas (2 veces por semana) que le enseña a los niños(as) como mejorar sus habilidades deportivas y les ayuda mejorar su condición física para estar mejor preparados para participar en deportes y ser físicamente activos. Al final del programa los niños participarán en unas **Olimpiadas Juveniles** donde los niños mostrarán sus habilidades.

Los adultos también son invitados a participar en un programa de 12 semanas (2 sesiones por semana) de educación en salud que consiste en clases informativas e interactivas en nutrición y actividad física.

Este programa también es parte de un estudio de investigación conducido por Arizona State University para definir los programas más eficaces para niños y adultos.

¿Quién puede participar?

Niño(a)s entre 6-11 años y adultos mayores de 18 años.

¿Dónde se llevará a cabo este programa?

En el Centro Comunitario de South Mountain
212 E Alta Vista Rd.
Phoenix, AZ 85042

¿Qué más es incluido?

Se les pedirá a los padres llenar un cuestionario antes y después del programa. La aptitud física y composición corporal serán medidas antes y después del programa.

Para más información por favor de contactar
Mónica Gutierrez al (602) 827-2503 moni.gutierrez@asu.edu

APPENDIX G

ATHLETES FOR LIFE 2 TELEPHONE SCREENING SCRIPT (ENGLISH)

Recruitment Script

Description: This script will be used by Dr. Crespo's research staff when parents call for more information about the Athletes For Life Program.

Script: Answer call or make call

"Hello, my name is _____ I am a _____ for the Athletes for Life program, how may I help you?"

Parent/guardian is interested in program

"Athletes for Life is a free 6-week program aimed at teaching children important sports skills and improving fitness so that they are better prepared to participate in sports and be physically active. This program will be held twice a week on Mondays and Wednesdays from 5:30 pm-7:00pm at the South Mountain Community Center. Adults are also invited to participate in a 6-week (1 time per week) health education program consisting of informative and interactive nutrition and physical activity classes. This class will also be held at the community center from 5-6:30pm. This class will be offered in Spanish on Mondays and English on Wednesdays. This program is part of a research study conducted by Arizona State University to determine the most effective programs for children and adults. Is this program something you or your child/children would like to participate in?

- Ask possibly how many children?

If no

- Thank you so much for your time and interest.
- Have a good night/day.

If yes proceed to child screening check- list.

- Since this program is part of a research study, there are certain criteria necessary for you and your child/children to be able to participate.
- To determine if you are eligible for the next phase I will need to ask you some short questions.

Continue

- 1. Is your child/children 6-11 years of age?**

₁ Yes
₀ No

If all items are "yes", then check exclusion criteria below:

- 2. Does child have a mental or physical condition that is contraindicated to participate in sports?**

₁ Yes
₀ No

- 3. Does child have a chronic condition that limits mobility?**

₁ Yes
₀ No

4. Is child taking medications that influences body composition?

- ₁ Yes
₀ No

If any exclusion criteria are “yes” then child is not eligible.

- ineligible (skip to wait listed or ineligible section)
₀ eligible (skip to eligible component)

Continue to adult screening

5. Is adult 18 years of age or older?

- ₁ Yes
₀ No

If “yes”, then adult is eligible.

WAIT LISTED:

- It appears that you and your child meets most, but not all of the criteria to be eligible for the Athletes for Life Program.
- I will place you on our waiting list, if the criteria for this program is expanded we will give you a call back. Also we would like to have your contact information so we may contact you when we begin another phase for this program.

What is your full name...?

First Name _____ Middle Name _____

Last Name _____

The best number to reach you at (_____) _____ - _____

- If you have questions, you can call us at () - ####.
- Thank you for your time! Have a good day/night.

INELIGIBLE:

- Because this is a research project, we had to identify criteria so we can accurately describe some common characteristics of the participants in the study. Based on your responses to the eligibility questions your child is not between the 6-11 age range and is not eligible for the program. However we want to develop future programs for more age groups, may we get your contact information so we can notify of any upcoming programs?

If no

Thank you for your time! Have a good day/night.

If yes

What is your full name...?

First Name _____ Middle Name _____

Last Name _____

The best number to reach you at (_____) _____ - _____

If you have questions, you can call us at () - ####.

Thank you for your time! Have a good day/night.

If parent still wants to know more about not being eligible

- I can have my supervisor call you if you would like, as she can more thoroughly explain the study criteria and eligibility.

ELIGIBLE:

- Great news, you and your child/children are eligible for the Athletes for Life Program. The next step would be to schedule an appointment to sign a consent form.
- The appointment can take up to 2 hours and our appointment times are after school and on weekends. If you have any questions, concerns or need clarifications about the project we will gladly answer them at this appointment.
- In order to complete the measures we will need you to sign a consent form and will need to get your child's permission as well.
- This is a research project and we are required to give you access to ALL of the information about the project so you can make an informed decision about participating.
- If you agree to participate, we will go ahead and measure your child's height, weight, waist circumference and your height and weight during this appointment as well as a survey.
- Copies will be made for all of the consent forms that you sign at this appointment for your own personal record as well as record for the program.
- Do you have your schedule available so we can set that appointment up now?

If "yes", then schedule appointment

If "no"

- Is there a better day/time I can reach you to schedule an appointment?
 - Day: _____ Time: _____
- What is the best number to reach you?
 - # ____ - ____ - _____
- Thank you so much for your time and interest.
- Have a good night/day.

Scheduling appointment

1. The appointment can be held at the South Mountain Community Center

2. Schedule the date and time

Date: _____

Time: _____

3. What is your full name...?

First Name _____ Middle Name _____

Last Name _____

4. What is your child's full name?

First Name _____ Middle Name _____

Last Name _____

5. What is the best telephone number to reach you?

(_____) _____ - _____

- We look forward to seeing you and (*name of child*) on (*date / time*), we will call you a day before to remind you.
- If you have questions before then, you can call us at _____
- Thank you for your time! Have a good day/night.

APPENDIX H

ATHLETES FOR LIFE 2 TELEPHONE SCREENING SCRIPT (SPANISH)

Guion de Reclutamiento

Descripción: Este Guion va ser usado por el personal de investigaciones de Dr. Crespo cuando los padres llamen para mas información sobre el programa Athletes for Life.

Guion: Contesta llamado o has la llamada.

“Hola mi nombre es _____ y yo soy _____ para el programa Athletes for Life, en que te puedo ayudar?”

Padres/Tutor legal esta interesado en el programa

“Athletes for Life es un programa de 12 semanas. El programa esta enfocado en enseñando niños importantes habilidades de deportes y en mejorar su salud física para que sean mejores preparados para participar en deportes y para ser físicamente activos. El programa va ser ofrecido 2 veces a la semana, lunes y miércoles a las 5:30 -7:00 pm en el centro comunitario de South Mountain. Adultos también están invitados para participar en un programa gratis de 12 semanas (dos veces a la semana). El programa para los adultos esta enfocado en educación sobre la salud y consiste en clases informativas y interactivas de nutrición y actividad física. Esta clase también va ser ofrecida en el centro comunitario de South Mountain a las 5:30 pm-7:00pm. Esta clase va ser ofrecida en español y ingles lunes y miércoles. Este programa es parte de una investigación conducido por Arizona State University para determinar el programa mas efectiva para adultos y niños. Usted piensa que este programa es algo que usted o su niño/niños gustaría participar?”

Si dicen No

- Muchas Gracias por su tiempo y interés.
- Que tenga un buen día/Noche

Si dicen “Si”, procede a la lista de chequeo para filtrar niños.

- Por que este programa es parte de una investigación, hay cierto requisitos necesario para que usted y su niño/niños pueden participar.
- Para determinar si usted esta elegible para el seguido fase necesito hacerle unas preguntas cortas.

Continua

Refer to questions in database on columns J-AI

Lista de Espera:

- Aparentemente usted y su niño complacen la mayoría, pero no todos los requisitos para ser elegible para el programa Atletas Por Vida.
- Te voy a poner en nuestra lista de espera, si los requisitos para este programa expande nosotros te contactaremos. En adición nosotros gustaremos tener su información de contacto para poder contactare a usted cuando nosotros comencemos otra fase para este programa.

Que es su nombre entero...?

Primer Nombre _____ Segundo Nombre _____

Apellido _____

El numero mejor para contactarte (____) _____ - _____

- Si usted tiene preguntas, puede contactar nos a este numero (____) - #####.
- Muchas gracias por su tiempo y interés! Que tenga buen día/noche.

INELIGIBLE:

- Por que esto es un proyecto de investigaciones, nosotros identificamos requisitos para exactamente describir características común de los participantes en esta investigación. Basado en sus respuestas a las preguntas de los requisitos su niño no tiene entre 6-11 anos de edad y no es elegible para el programa. Sin embargo nosotros gustaremos desarrollar programas en el futuro para niños de otras edades, podemos tener su información de contacto para poder notificarte de los programas próximos.

Si Dicen NO

Muchas gracias por su tiempo y interés! Que tenga buen día/noche.

Si dicen Si

Que es su nombre entero...?

Primer Nombre _____ Segundo Nombre _____

Apellido _____

El Numero mejor para contactarte (____) _____ - _____

Si usted tiene preguntas puede contactar nos a este numero (____) - #####.

Muchas gracias por su tiempo y interés! Que tenga buen día/noche.

Si los padres quieren saber mas sobre no ser elegible

- Mi supervisor puede llamar a usted si gustaría, mi supervisor puede explicar la investigación y los requisitos de la investigación mejor.

ELIGIBLE:

- Gran noticias, usted y su niño/niños son elegible para el programa Atletas por Vida. El paso seguido será que usted haga una cita para firmar una forma de consentimiento.
- La cita puede tomar hasta una hora y media y nuestras horas de citas son después de la escuela. Si usted tiene preguntas, preocupaciones o necesita clarificación sobre el proyecto nosotros, con alegría, podemos contestar sus preguntas en la cita.
- Para completar las medidas necesitamos que usted firme la forma de consentimiento y necesitamos permiso de su niño también.
- Esto es un proyecto de investigaciones y es nuestra obligación darle a usted acceso a toda la información de este proyecto para que usted pueda hacer una decisión informada sobre participando.

- Si usted esta de acuerdo en participar nosotros vamos a medir el peso, altura, y circunferencia de la cintura de su hijo/hija. También vamos a medir su peso y altura durante la cita. En adición usted va participar en un estudio corto.
- Nosotros vamos hacer copias de todas las formas de consentimiento que usted firma en esta cita para sus archivos y también para los archivos de el programa.
- Tiene su disponibilidad para poder hacer la cita ahorita?

Si dicen “Si”, has la cita

Si dicen “No”

- Hay un día/tiempo mejor que te puedo contactarte para hacer una cita?
- Día: _____ Tiempo: _____
- Que es el numero mejor para contactarte?
- # _ _ _ - _ _ _ - _ _ _
- Muchas gracias por su tiempo y interés.
- Que tenga un buen día/noche.

Haciendo la Cita

2. La cita puede ser en el centro comunitario South Mountain Community Center

2. Día y Tiempo de la cita

Día: _____

Tiempo: _____

3. Que es su nombre entero...?

Primer nombre _____ Segundo nombre _____

Apellido _____

4. Que es el nombre entero de su niño/niña?

Primer nombre _____ Segundo Nombre _____

Apellido _____

5. Que nombre de teléfono es el mejor para poder contactarte?

(_ _ _) _ _ _ - _ _ _

- Nosotros estamos excitados para conocerte a usted y a (*nombre de niño/niña*) en (*día / tiempo*), nosotros te vamos a llamar un dia antes de tu cita para recordarte.
- Si tienes preguntas antes de la cita puedes contactar nos a este numero

Gracias por su tiempo! Que tenga buen noche/dia.

APPENDIX I

FAMILIES FOR HEALTH CONSENT FORM

**Arizona State University
Families for Health
Informed Consent Form**

Adult Health Education Classes

Principal Investigator: Sonia Vega-López, PhD
Co-Investigators: Noe Crespo, PhD
Meg Bruening, PhD
Adrian Chavez, M. Ed.
Rachel Cassinat, BS

INTRODUCTION

The purposes of this form are to provide you (as a prospective research study participant) information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in the study.

RESEARCHERS

Drs. Sonia Vega-López, Meg Bruening, and Noe Crespo are Assistant Professors, and Adrian Chavez and Rachel Cassinat are graduate students in the School of Nutrition and Health Promotion at Arizona State University. These researchers in collaboration with the Arizona State University Preparatory Academy and the Mollen Foundation have invited you to participate in a research study.

STUDY PURPOSE

The purpose of the research is to determine the effectiveness of a group-based family health program delivered at ASU preparatory academy to help improve your eating habits and physical activity levels.

DESCRIPTION OF RESEARCH STUDY

If you decide to participate, then you will join a study to assess the effects of delivering a group-based healthy lifestyle program at ASU Preparatory Academy on eating habits and physical activity levels. You can enroll in this study if you are a parent of a 6-11 year old student at ASU Preparatory Academy, you are at least 18 years old, and you are willing and available to participate in a 12-week program at ASU Preparatory Academy.

Before you are enrolled in the study, we will explain the study in detail to you, allow you to ask questions and address your concerns regarding your participation in the study. We will ask you to sign this informed consent form indicating that you agree to participate in the study.

If you agree to participate, we will ask you to complete a survey today that will take about 45 minutes. This survey asks about your and your child's eating and physical activity habits. We will also give you a pedometer that we will ask you to wear on your right hip for 7 days. A pedometer is a small device that is worn at the hip and counts the number of steps you take. We will collect this from you after 7 days either at the next data collection visit or at the first

group session. After you receive your pedometer with instructions about how to wear it, we will schedule an initial data collection visit to measure body composition and to take a small blood sample to assess your risk for heart disease.

The initial data collection will take place at the Nutrition Laboratory of the School of Nutrition and Health Promotion at Arizona State University. You will have to come fasted for 10-12 hours for this visit. At the time of the visit we will give you a chance to ask any additional questions you may have about this study. When you arrive we will collect your pedometer and we will ask you to use the restroom to empty your bladder after which we will measure your height and weight and waist circumference. We will then ask you to sit down for a few minutes after which we will measure your blood pressure three times. Once we have measured your blood pressure we will collect a blood sample from your arm to assess fats in your blood (cholesterol and triglycerides), sugar, and other indicators of how cholesterol and sugar are transported and processed in your vessels and removed from the blood. The total amount of blood that we will draw will be 20 ml (about 1.5 tablespoons). We will store some of the blood we collect (10 ml or less than 1 tablespoon) for the future measurement of additional indicators of diabetes and heart disease risk, diet quality and response to oxidation. You will be given the option to decide whether you want us to store your blood for future use. If you agree to have your blood stored for future use, you give us permission to share this blood with other investigators without notifying you. No genetic analysis will be performed on any blood collected. Once we have drawn your blood this study visit will be over. We expect this visit to last approximately 90 minutes including the blood draw.

We are also interested in foods that you keep in your home, so we would like to visit your home and take notes on foods that you have available. If you give us permission to visit your home, two trained research assistants will come to your home and after your permission to enter, will complete a checklist of the foods in your household. At least one adult participant from the study must be present during the entirety of this visit. We expect each home food evaluation to take approximately two hours.

After the study visit you will take part in a twelve week Family Lifestyle Program at ASU Preparatory Academy. This program consists of twelve weekly, 90 minute sessions that will deliver information about health, nutrition, and physical activity. As part of this program you will participate in a variety of activities that will require you to frequently work in groups with other parents to answer questions, practice skills, or do some role playing. At each session, we will also guide you through individual activities such as recording your physical activity and the fruits, vegetables and/or sugary drinks you are consuming. Additionally, we will help you set goals and ask you to try activities related to them at home. You will be asked to discuss your experiences with these recommendations at the following session.

After the 12 week program is over we will perform the same assessments completed before the start of program: we will ask you to wear a pedometer again for 7-days, we will ask you to attend the Nutrition Laboratory in which we will measure your body and take a blood sample, we will ask you to complete a survey, and we will visit your home to complete the checklist of foods. We will also conduct a short interview about your experiences in the program that will be audio-recorded by our study staff. We will schedule a follow-up home visit and data collection within two weeks from the end of the group sessions. The home visit will be conducted the same as it was at the start of the study and will last approximately 2 hours. For the follow up data collection, we will ask you to come to the Nutrition Laboratory of the School of Nutrition and Health Promotion again in the morning before you have eaten. We will ask you to sit down a few minutes and then measure your blood pressure three times. Then we will take another small

blood sample (another 20 ml or 1.5 tablespoons). After this we will give you a snack and take some measurements of your body composition. Then we will ask you to complete a survey similar to the one you completed at the beginning of the study. After this we will conduct an interview about your experiences with the program. This session will last approximately 2 hours including the interview.

If you say you agree to participate in this study, then your participation will last for up to 16 weeks including two visits to ASU Nutrition Laboratory, two home visits by our research participants, and 12 weekly group healthy lifestyle sessions at ASU Preparatory Academy. Approximately 25 parents from ASU preparatory academy will be participating in this study.

RISKS

There are no known risks for participating in the 12-week program, although some people may feel a little uncomfortable participating in a group-based program.

There are risks of bruising, discomfort, dizziness and fainting associated with blood drawing. However, this risk is small. The research team will minimize these risks by using trained personnel to draw your blood and by giving you a snack after the blood draw. You might experience mild discomfort during blood pressure testing as the cuff inflates. However, this risk is small and the discomfort will go away after the cuff is deflated. There is also a small risk that you may not feel comfortable answering some of the questions on the survey, in which case you can decide not to answer.

There is also the chance that you do not feel comfortable with us going into your home. This visit is not required and you will have the opportunity to indicate if you do not want to have the home visit. There may also be discomfort in participating in the group sessions. If at any time you do not feel comfortable you can make the choice to not participate. As with any research there is some possibility that you may be subject to risks that have not yet been identified. There are no feasible alternative procedures available for this study. You can ask your doctor for a health exam.

BENEFITS

There is no direct benefit from participation in this study. We expect many participants to improve nutrition knowledge, and dietary and physical activity habits, which could improve health, but we cannot predict how each participant will respond to the intervention.

NEW INFORMATION

If the researchers find new information during the study that would reasonably change your decision about participating, then they will provide this information to you.

CONFIDENTIALITY

All information obtained in this study is strictly confidential unless disclosure is required by law. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you. In order to maintain confidentiality of your records, the research team will code all the data so that they do not contain any information that could identify you. All confidential information will be kept in a locked filing cabinet in Dr. Sonia Vega-

López's office or in a password-protected computer, and will only be available to members of the research team. All study materials will be destroyed 5 years after the study has been completed or upon your withdrawal from the study. All study-related documents will be shredded.

WITHDRAWAL PRIVILEGE

Taking part in this research study is totally your choice. It is ok for you to say no. Even if you say yes now, you are free to say no later. You can decide to stop taking part in this research study at any time for any reason. Deciding to stop participation in this study will not affect your or your child's relationship with ASU Preparatory Academy.

COSTS AND COMPENSATION

The researchers want your decision about participating in the study to be absolutely voluntary. Yet they recognize that your participation may pose some inconvenience due to the time needed to complete the evaluation activities. In order to compensate for your time and discomfort, you will receive an incentive with an approximate value of \$10 (e.g. small kitchen appliances and utensils, assortments of different packaged healthy foods, weekly planners, etc.) for each visit in which you have your blood drawn and another \$10 incentive for allowing us to go into your home and complete the food inventory. You will also have the opportunity to participate in a raffle for a prize valued at \$10 for each of the sessions that you attend.

There is no cost to you for participating in this research study except for costs associated with your own transportation to ASU preparatory academy.

COMPENSATION FOR ILLNESS AND INJURY

If you agree to participate in the study, then your consent does not waive any of your legal rights. However, no funds have been set aside to compensate you in the event of injury.

VOLUNTARY CONSENT

Any questions you have concerning the research study or your participation in the study, before or after your consent, will be answered by Dr. Vega-López. You can contact her at 500 North 3rd Street, Phoenix, Arizona, 85004; Sonia.vega-lopez@asu.edu; or 602-827-2268.

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480-965-6788.

This form explains the nature, demands, benefits and any risk of the project. By signing this form you agree knowingly to assume any risks involved. Remember, your participation is voluntary. You may choose not to participate or to withdraw your consent and discontinue participation at any time without penalty or loss of benefit. In signing this consent form, you are not waiving any legal claims, rights, or remedies. A copy of this consent form will be given (offered) to you.

Your signature below indicates that you consent to participate in the above study.

_____	_____	_____
Printed Name	Subject's Signature	Date
_____	_____	_____
Other Printed Name (If appropriate)	Signature	Date

Your initials here indicate whether you give us permission to store 15 ml (1 tablespoon) of your blood for future use. If you agree to have your blood stored for future use, you give us permission to share this blood with other investigators without notifying you. No genetic analysis will be performed on any blood collected.

I DO consent to have my blood stored for future analyses.

I DO NOT consent to have my blood stored for future analyses.

Subjects Initial's

Your initials here indicate whether you give us permission to come to your home to complete the home food inventory. If you agree to this, we will have two research assistants attend your home and complete an inventory of the food available in your kitchen. This MUST be attended by at least one adult that is participating in this study.

I DO consent to the home food inventory

I DO NOT consent to the home food inventory

Subjects Initial's

INVESTIGATOR'S STATEMENT

"I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature. These elements of Informed Consent conform to the Assurance given by Arizona State University to the Office for Human Research Protections to protect the rights of human subjects. I have provided (offered) the subject/participant a copy of this signed consent document."

Signature of Investigator

Date

APPENDIX J

ATHLETES FOR LIFE 2 CONSENT FORM (ENGLISH)

**Arizona State University
Athletes for Life 2: Adult Healthy Lifestyle Program
Adult Informed Consent Form**

Principal Investigator: Noe Crespo, PhD, MPH

Co-Investigators: Sonia Vega-López, PhD
Gabriel Shaibi, PhD

INTRODUCTION

The purposes of this form are to provide you (as a prospective research study participant) information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in the study.

RESEARCHERS

Drs. Noe Crespo, Sonia Vega-López, and Gabriel Shaibi are professors in the School of Nutrition and Health Promotion at Arizona State University. These professors in collaboration with the City of Phoenix Park and Recreation Department's South Mountain Community Center have invited you to participate in a research study.

STUDY PURPOSE

The purpose of the research is to determine the effectiveness of health education classes delivered at the City of Phoenix Parks and Recreation Department's South Mountain Community Center to help improve you and your child's physical activity level, nutrition knowledge, and eating habits.

DESCRIPTION OF RESEARCH STUDY

If you decide to participate, then you will join a study to assess the effects of delivering healthy lifestyle education classes at the City of Phoenix Parks and Recreation Department's South Mountain Community Center on your physical activity, nutrition knowledge, and eating habits. You can enroll in this study if you are a parent of a 6-11 year old, you are at least 18 years old, and you are willing and available to participate in a 12-week program at South Mountain Community Center.

Before you are enrolled in the study, we will explain the study in detail to you, allow you to ask questions and address your concerns regarding your participation in the study. We will ask you to sign this informed consent form indicating that you agree to participate in the study. If you say YES, then your participation will last up to 16 weeks. Before the program starts, immediately after it ends, and four weeks after the program is over we will invite you to City of Phoenix Parks and Recreation Department's South Mountain Community Center for data collection visits. Upon your arrival we will ask you to use the restroom to empty your bladder after which we will measure your height and weight. After that we will give you a brief survey about your socioeconomic status, and you and your child's eating and physical activity habits. We will also give you a pedometer with instructions about how to wear it. A pedometer is a small device that is worn at the hip and counts the number of steps you take. We will ask you to wear the pedometer on your right hip for 7 days. We will collect this from you after 7 days either at the next data collection visit or at the first group session. Each data collection visit will take approximately two hours to complete.

We are also interested in foods that you keep in your home, so we would like to visit your home two weeks before the program starts and four weeks after the program is over. We will take notes on foods that you have available. If you give us permission to visit your home, two trained research assistants will come to your home and after your permission to enter, will complete a checklist of the foods in your household. At least one adult participant from the study must be present during the entirety of this visit. We expect each home food evaluation to take approximately two hours.

Four to six weeks after the program has ended we will contact you to complete a follow up interview to obtain feedback about your participation in the program (administered at City of Phoenix Park and Recreation Department's South Mountain Community Center or over the phone).

The parents of approximately 50 children from the Phoenix area will be participating in this study. The Healthy Lifestyle Program will last twelve weeks, with twice per week sessions each lasting 90 minutes. During each session we will deliver information about health, nutrition, and physical activity. In addition to information we will also be doing light-to-moderate physical activity (like brisk walking) in many of the sessions and familiarizing you with certain pieces of exercise equipment. Starting on the second session we will also provide some type of small snack that goes along with the nutrition lesson that we are teaching for that day.

Study Timeline

Before the program starts

Height and weight measurements
Fitted with Pedometer & wear for 7 days
Survey
Home visit

12 week Healthy Lifestyle Program

Immediately after the program finishes

Height and weight measurements
Fitted with Pedometer & wear for 7 days
Survey
Home visit

Four – six weeks after the program ends

Follow up interview to obtain feedback about your participation in the program (administered at City of Phoenix Park and Recreation Department's South Mountain Community Center or over the phone)
Brief survey to about your family's continued progress
Height and weight measurements

RISKS

There are no known risks for participating in the 12-week program. There is some risk for injury while being physically active. This risk is very small, however, as we will only be performing light-to-moderate activities and proper precaution will be taken with any physical activity being performed within this program. The research team will try to reduce the risks by utilizing recommended exercise training procedures for adults including having warm-up and cool-down activities, using appropriate facilities and equipment for the sessions, and giving you recommendations for wearing appropriate clothing and shoes. All our staff members have

received thorough training to ensure these activities are conducted appropriately. There is also the chance that you do not feel comfortable with us going into your home. This visit is not required and you will have the opportunity to indicate if you do not want to have the home visit.

BENEFITS

There is no direct benefit from participation in this study. We do expect an improvement in nutrition knowledge, and dietary habits, which could improve health, but we cannot predict how each participant will respond to the intervention.

NEW INFORMATION

If the researchers find new information during the study that would reasonably change your decision about participating, then they will provide this information to you.

CONFIDENTIALITY

All information obtained in this study is strictly confidential unless disclosure is required by law. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you. In order to maintain confidentiality of your records, the research team will code all the data so that they do not contain any information that could identify you. All confidential information will be kept in a locked filing cabinet in Dr. Crespo's office or in a password-protected computer, and will only be available to members of the research team. All study materials will be destroyed 5 years after the study has been completed or upon your withdrawal from the study. All study-related documents will be shredded.

WITHDRAWAL PRIVILEGE

Taking part in this research study is totally your choice. It is ok for you to say no. Even if you say yes now, you are free to say no later. You can decide to stop taking part in this research study at any time for any reason.

COSTS AND COMPENSATION

The researchers want your decision about participating in the study to be absolutely voluntary. We ask that all participants in the research study (at least one parent and all children) obtain a City of Phoenix Park and Recreation Department Recreation Pass/membership card to allow them to use the Community Center's facilities. The yearly cost of membership is \$10.00 for adults (18 – 59 y) and \$5.00 for youth (3 – 17 y). In the event your family is unable to pay for the Recreation pass please contact the City of Phoenix Park and Recreation Department's South Mountain Community Center to inquire about scholarships that may be available to you. We recognize that your participation may pose some inconvenience due to the time needed to complete the research activities and because we will ask you to complete a survey at each measurement visit. In order to compensate for your time and discomfort, you will receive a \$10.00 gift card for each time you complete a study survey (once at the beginning and once after the 12-week program), another \$10.00 incentive for allowing us to go into your home and complete the food inventory (once at the beginning and once after the 12-week program), and you will receive another \$10.00 gift card if you decide to participate in the four – six week follow up after the program. Total potential compensation for your participation in the study could be \$50.00.

COMPENSATION FOR ILLNESS AND INJURY

If you agree to participate in the study, then your consent does not waive any of your legal rights. However, no funds have been set aside to compensate you in the event of injury.

VOLUNTARY CONSENT

Any questions you have concerning the research study or your participation in the study, before or after your consent, will be answered by Dr. Crespo. You can contact him at 500 North 3rd Street, Phoenix, Arizona, 85004; noe.crespo@asu.edu; or 602-827-2279.

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480-965-6788.

This form explains the nature, demands, benefits and any risk of the project. By signing this form you agree knowingly to assume any risks involved. Remember, your participation is voluntary. You may choose not to participate or to withdraw your consent and discontinue participation at any time without penalty or loss of benefit. In signing this consent form, you are not waiving any legal claims, rights, or remedies. A copy of this consent form will be given (offered) to you.

Your signature below indicates that you consent to participate in the above study.

Printed Name Participant Signature Date

Other Printed Name Signature Date
(If appropriate)

Your initials here indicate whether you give us permission to come to your home to complete the home food inventory. If you agree to this, we will have two research assistants attend your home and complete an inventory of the food available in your kitchen. This MUST be attended by at least one adult that is participating in this study.

I DO consent to the home visit

I DO NOT consent to the home visit

Participant Initial's

INVESTIGATOR'S STATEMENT

"I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature. These elements of Informed Consent conform to the Assurance given by Arizona State University to the Office for Human Research Protections to protect the rights of human subjects. I have provided (offered) the subject/participant a copy of this signed consent document."

Signature of Investigator Date

APPENDIX K

ATHLETES FOR LIFE 2 CONSENT FORM (SPANISH)

**Arizona State University
Athletes for Life 2
Consentimiento Informado de Adultos**

Principal Investigator: Noe Crespo, PhD, MPH

Co-Investigadores: Sonia Vega-López, PhD
Gabriel Shaibi, PhD

Introducción:

El propósito de este formato es proveerle con información importante (como estudio participativo de investigación prospectivo) que pudiera afectar su decisión en el caso que participe o no en este estudio y registrar en consentimiento de aquellos quienes acepten involucrarse en este estudio.

Investigadores:

Los Drs. Noe Crespo, Sonia Vega-López, y Gabriel Shaibi son profesores en la escuela de Nutrición y Promoción de la Salud de la Universidad del estado de Arizona. Estos profesores en colaboración con el el Centro Comunitario South Mountain del Departamento de Parques y Recreación de la Ciudad de Phoenix (City of Phoenix Park and Recreation Department's South Mountain Community Center), lo han invitado a usted a participar en un estudio de investigación.

Propósito del estudio

El propósito del estudio es determinar la eficacia de las clases de educación de salud realizadas en el Centro Comunitario South Mountain del Departamento de Parques y Recreación de la Ciudad de Phoenix (City of Phoenix Park and Recreation Department's South Mountain Community Center) para ayudar a mejorar el nivel de actividad física, conocimientos en nutrición y hábitos alimenticios de usted y su hijo.

Descripción del estudio de investigación:

Si decide participar, entonces usted va a formar parte en un estudio para evaluar los efectos de las clases de educación de estilo de vida saludables que se llevará a cabo en el Centro Comunitario South Mountain del Departamento de Parques y Recreación de la Ciudad de Phoenix (City of Phoenix Park and Recreation Department's South Mountain Community Center) en su actividad física, conocimientos en nutrición, y hábitos alimenticios. Usted podrá formar parte de este estudio si tiene uno o más hijos entre los 6 y 11 años de edad, si usted tiene al menos 18 años de edad, y si está de acuerdo y disponible para participar en el programa de 12 semanas en el centro comunitario de South Mountain.

Antes de empezar con el estudio, le explicaremos en detalles el estudio, y le permitiremos hacer preguntas y aclarar sus dudas sobre su participación en este estudio. Le pediremos firmar esta forma de consentimiento informado indicando que usted está de acuerdo en participar en este estudio. Si usted dice que SI, entonces su participación tendrá una duración de hasta 16 semanas. Antes de empezar el programa, inmediatamente después de terminado, y cuatro semanas después de terminado el programa lo invitaremos a que visite el Centro Comunitario South Mountain del Departamento de Parques y Recreación de la Ciudad de Phoenix (City of Phoenix Park and Recreation Department's South Mountain Community Center) para coleccionar información. A su llegada se le pedirá que use el baño para vaciar la vejiga, luego le mediremos su altura y peso. Después le realizaremos una pequeña encuesta acerca de su situación socioeconómica, hábitos alimenticios y actividad física de usted y su hijo. También le proveeremos un podómetro con instrucciones acerca de cómo usarlo. Un podómetro es un pequeño dispositivo que se coloca en la cadera y cuenta el número de pasos caminados. Le pediremos que use el

podómetro en su cadera derecha durante 7 días y después lo colectaremos ya sea en la próxima visita para tomar datos o en la primera sesión de grupo. Cada visita para coleccionar información tomará aproximadamente 2 horas aproximadamente.

También estamos interesados en los alimentos que mantiene en su casa. Nos gustaría visitar su casa dos 2 semanas antes de comenzar y 4 semanas después de terminado el programa para tomar nota de los alimentos disponibles en su casa. Si usted nos da permiso de visitarlo en su casa, 2 asistentes de investigación entrenados irán a su casa y después de que usted haya dado autorización de entrar, completarán una lista de control de alimentos en su hogar. Al menos un participante adulto del estudio debe estar presente durante toda la visita. Esperamos que cada evaluación de los alimentos en casa tome 2 horas aproximadamente.

De 4 a 6 semanas después de finalizado el programa lo contactaremos para completar una entrevista de seguimiento para obtener información en su participación en el programa (administrado en el Centro Comunitario South Mountain del Departamento de Parques y Recreación de la Ciudad de Phoenix o por teléfono).

Los padres de aproximadamente 50 niños del área de Phoenix serán los participantes en este estudio. La programa durara 12 semanas, con dos sesiones por semanas de 90 minutos cada una. Durante cada sesión nosotros les proveeremos información acerca de la salud, nutrición, y actividad física. En muchas de las sesiones también haremos actividad física de ligera a moderada (como caminar a paso ligero) para familiarizarlo con algunos tipos y equipo usado para hacer ejercicio. A partir de la segunda sesión también le proveeremos algún tipo de refrigerio que irá en conjunto con la lección de nutrición que enseñaremos ese día.

Riesgos

No hay riesgo conocido por participar en el programa de 12 semanas. Sin embargo puede haber algún riesgo de lesión durante las actividades físicas. Este riesgo es muy pequeño; sólo se realizaran actividades de ligeras a moderadas con la debida precaución en cualquier actividad física que se realiza dentro de este programa. El equipo de trabajo tratará de reducir los riesgos mediante la utilización de ejercicio de entrenamiento recomendados para adultos, incluyendo tener actividades de calentamiento y relajación, utilizando instalaciones y equipos apropiados para las sesiones, y recomendando el uso de ropa y calzado adecuados. Todos los miembros de trabajo han recibido un entrenamiento para asegurar que estas actividades serán conducidas apropiadamente. También existe la posibilidad que usted no se sienta cómodo con nosotros al visitarlo a su casa. Esta visita no es requisito y tendrás la oportunidad de indicar si usted no quiere la visita a domicilio.

Beneficios

No hay beneficio directo del participante en este estudio. Esperamos mejorar los conocimientos en nutrición, hábitos dietéticos, lo que pudiera mejorar la salud, pero no podemos predecir cómo va a responder cada participante en la intervención.

Nueva información

Si los investigadores encuentran alguna nueva información durante el estudio que pudiera cambiar su decisión acerca de su participación, entonces ellos le proveerán esta información a usted.

Confidencialidad:

Toda la información obtenida en este estudio es estrictamente confidencial a menos que sea requerida por la Ley. El resultado de este estudio de investigación puede ser usado en reportes, presentaciones, y publicaciones; pero los investigadores no lo identificarán a usted. Para mantener la confidencialidad de los registros, el equipo de investigación codificará toda la información para que no contenga ninguna información que lo pueda identificar a usted. Toda la información confidencial será resguardada en armarios cerrados con llave dentro de la oficina del Dr. Crespo o en la computadora por contraseña, y solo estará disponible para los miembros del equipo de investigación. Todo el material de estudio será destruido 5 años después de que el estudio ha sido completado o cuando sea retirado del estudio. Todos los documentos relacionados con el estudio serán triturados.

Retiro del privilegio:

Tomar parte de este estudio de investigación es totalmente su decisión. Está bien para usted decir no. Aun si usted dice SI ahora, usted es libre de decir NO luego. Usted puede decidir dejar de ser parte del estudio de investigación en cualquier momento sin razón alguna.

Costos y Pagos

Los investigadores quieren que su decisión de participar en este estudio sea absolutamente voluntaria. Se requiere que todos los participantes del estudio (al menos un padre y todos los hijos) obtengan su carnet de pase/membresía en el Centro Comunitario South Mountain del Departamento de Parques y Recreación de la Ciudad de Phoenix, el cual les permite usar las instalaciones del centro comunitario. El costo anual es de \$10.00 para los adultos (18-59 años) y \$5.00 para los jóvenes (3-17 años). En el caso de que su familia no pueda pagar por el pase de recreación, por favor contacte al Departamento de Parques y Recreación de la Ciudad de Phoenix para más información sobre las becas que pudieran estar disponibles para usted. Reconocemos que su participación pueda plantear algún inconveniente por el tiempo que se necesita para completar las actividades del estudio y porque le solicitaremos que complete una encuesta en cada una de las visitas para las mediciones. Para compensarle su tiempo y malestar, recibirá \$10.00 de incentivo cada vez que usted complete la encuesta del estudio (una al inicio y otra después de las 12 semanas del programa), otros \$10.00 de incentivo por permitirnos ir a su casa y completar el inventario de los alimentos (una al inicio y otra después de las 12 semanas del programa), y recibirá otro \$10.00 más si decide participar en el seguimiento de 4 a 6 semanas después del programa; con un potencial de compensación por su participación en este estudio de hasta \$50.00.

Compensación por enfermedad y lesión:

Si usted acepta participar en el estudio, su consentimiento informado no renuncia a ninguno de sus derechos legales. Sin embargo, los fondos no se han destinado a compensar en caso de lesión.

Consentimiento Voluntario

Cualquier pregunta concerniente al estudio de investigación o su participación en ella, antes o después de su consentimiento, serán respondidas por el Dr. Crespo. Usted puede contactarlo en 500 North 3rd Street, Phoenix, Arizona, 85004; noe.crespo@asu.edu; o 602-827-2279.

Si usted tiene alguna pregunta acerca de sus derechos como sujeto/participante en este estudio, o si usted siente que ha sido colocado en riesgo, puede contactar a la Presidencia del Comité de Revisión Institucional de recursos humanos a través de la Oficina de ASU de Integridad de la Investigación y Aseguramiento al (480) 965-6788.

Este formato explica la naturaleza, demanda, beneficios y riesgos del proyecto. Al firmar este formato usted acepta y asume cualquier riesgo involucrado. Recuerda, su participación es voluntaria. Usted puede escoger no participar o retirar su consentimiento y renunciar la participación en cualquier momento sin ninguna penalidad o pérdida de beneficios. Al firmar este consentimiento informado, usted no está renunciando a cualquier reclamo legal, derechos o remedios. Se dará una copia de este consentimiento informado a usted.

Su firma abajo indica que usted está de acuerdo con participar en el estudio antes descrito

_____ Nombre (Letra impresa)	_____ Firma del Participante	_____ Fecha
_____ Otro Nombre (Si es apropiado)	_____ Firma	_____ Fecha

Sus iniciales indican que usted nos da permiso para ir a su casa y completar el inventario de alimentos en el hogar. Si está de acuerdo, vamos a tener dos ayudantes de investigación para asistir a su casa y completar un inventario de los alimentos disponibles en su cocina. Esto debe ser atendido por al menos un adulto que este participando en este estudio.

- Acepto la visita domiciliaria.
- NO acepto la visita domiciliaria

Iniciales del Participante

INVESTIGATOR'S STATEMENT

"Certifico que he explicado al individuo por encima de la naturaleza y la finalidad, los posibles beneficios y los posibles riesgos asociados con la participación en este estudio de investigación, se han contestado todas las preguntas que se han planteado, y han sido testigos de la firma del participante. Estos elementos del consentimiento informado se ajustan a la garantía ofrecida por la Universidad Estatal de Arizona por la Oficina de Protección de la Investigación en humanos para proteger sus derechos. He proporcionado (ofrecido) el sujeto / participante una copia firmada de este documento de consentimiento".

_____ Firma del Investigador	_____ Fecha
---------------------------------	----------------

APPENDIX L
SURVEY (ENGLISH)

Section A – Demographic information

1. What is your date of birth? ____/____/____
2. Are you...?
- ₀ Female
- ₁ Male
3. How many people live in your household including yourself? ____ children ____ adults
4. Which of the following describes your employment?? (check all that apply)
- ₁ Employed full-time, 35 hours or more per week
- ₂ Employed part-time, less than 35 hours per week
- ₃ Employed in seasonal labor
- ₄ Out of work for more than 1 year
- ₅ Out of work for less than 1 year
- ₆ Homemaker
- ₇ Retired
- ₈ Student
- ₉ Unable to work
- _{.777} Don't Know
- _{.888} Refuse
5. What is the highest degree or level of school you completed in the U.S. or in your home country if raised outside the U.S.? (Choose only one in each column)
- ₀ No school or only kindergarten
- ₁ 1st grade
- ₂ 2nd grade
- ₃ 3rd grade
- ₄ 4th grade
- ₅ 5th grade
- ₆ 6th grade
- ₇ 7th grade
- ₈ 8th grade
- ₉ 9th grade
- ₁₀ 10th grade
- ₁₁ 11th grade
- ₁₂ 12th grade/GED
- ₁₃ Trade /vocational school certificate
- ₁₄ Some college
- ₁₅ College graduate
- _{.777} Don't Know
- _{.888} Refuse

6. Do you consider yourself...? *(Choose only one)*
- | | |
|--|---|
| <input type="checkbox"/> ₁ Mexican | <input type="checkbox"/> ₅ Chicano/a |
| <input type="checkbox"/> ₂ Mexican-American | <input type="checkbox"/> ₆ Other, specify: _____ |
| <input type="checkbox"/> ₃ Hispanic | <input type="checkbox"/> .777 Don't Know |
| <input type="checkbox"/> ₄ Latino/a | <input type="checkbox"/> .888 Refuse |
7. Which of the following categories would you use to describe yourself? *(Choose all that apply)*
- | | |
|---|---|
| <input type="checkbox"/> ₁ White | <input type="checkbox"/> ₅ American Indian or Alaskan Native |
| <input type="checkbox"/> ₂ Black or African-American | <input type="checkbox"/> ₆ Other, specify: _____ |
| <input type="checkbox"/> ₃ Asian | <input type="checkbox"/> .777 Don't Know |
| <input type="checkbox"/> ₄ Native Hawaiian or Other Pacific Islander | <input type="checkbox"/> .888 Refuse |
8. What is your household's monthly income from all sources? *(Choose only one)*
- | |
|---|
| <input type="checkbox"/> ₁ Less than \$500 |
| <input type="checkbox"/> ₂ \$500 to \$999 |
| <input type="checkbox"/> ₃ \$1000 to \$1499 |
| <input type="checkbox"/> ₄ \$1500 to \$1999 |
| <input type="checkbox"/> ₅ \$2000 to \$2499 |
| <input type="checkbox"/> ₆ \$2500 to \$2999 |
| <input type="checkbox"/> ₇ \$3000 to \$3499 |
| <input type="checkbox"/> ₈ \$3500 to \$3999 |
| <input type="checkbox"/> ₉ \$4000 to \$4499 |
| <input type="checkbox"/> ₁₀ \$4500 to \$4999 |
| <input type="checkbox"/> ₁₁ \$5000 to \$5999 |
| <input type="checkbox"/> ₁₂ \$6000 or more |
| <input type="checkbox"/> .777 Don't Know |
| <input type="checkbox"/> .888 Refuse |
9. Please check any public assistance your household currently receives...
- | |
|---|
| <input type="checkbox"/> ₁ SNAP/EBT/Food Stamps |
| <input type="checkbox"/> ₂ WIC |
| <input type="checkbox"/> ₃ TANF |
| <input type="checkbox"/> ₄ Other (please specify) _____ |
| <input type="checkbox"/> ₅ I don't know if my family receives public assistance or what public assistance we receive |
| <input type="checkbox"/> ₆ My household does not currently receive any public assistance |

APPENDIX M
SURVEY (SPANISH)

Sección A – Información demográfica

1. ¿Cuál es su fecha de nacimiento? ____/____/____

2. Es usted...?

- _0 Mujer
_1 Hombre

3. ¿Cuántas personas viven en su vivienda incluyéndolo? ____ Niños ____ Adultos

4. ¿Cuál de las siguientes opciones describe su trabajo ??

- _1 Empleo a tiempo completo, 35 horas o más a la semana
_2 Empleo de tiempo parcial, menos de 35 horas a la semana
_3 Empleo de trabajo en temporadas
_4 Sin trabajo por más de un año
_5 Sin trabajo por menos de un año
_6 Trabajo del hogar
_7 Retirado
_8 Estudiante
_9 Discapacitado para trabajar
_777 No sé.
_888 Rehusa

5. ¿Cuál es el más alto grado o nivel educativo que usted completo en los Estados Unidos y en su país de origen si usted creció fuera de los Estados Unidos? (Escoja solo uno en cada columna)

- _0 No asistió a la escuela o solo a preescolar
_1 1^{er} grado
_2 2^{do} grado
_3 3^{er} grado
_4 4^{to} grado
_5 5^{to} grado
_6 6^{to} grado
_7 7^{mo} grado
_8 8^{vo} grado
_9 9^{no} grado
_10 10^{mo} grado
_11 11^{ro} grado
_12 12^{do} grado/GED
_13 Comercio/ Certificado vocacional por escuela
_14 Alguna escuela superior
_15 Graduado universitario
_777 No se
_888 Rehusa

6. ¿Se considera usted...? (Escoja solo una respuesta)

- ₁ Mexicano
- ₂ Mexicano-Americano
- ₃ Hispano
- ₄ Latino/a

- ₅ Chicano/a
- ₆ Otro, especifique: _____
- _{.777} No sé
- _{.888} Rehúsa

7. ¿Cuál de las siguientes categorías usaría usted para describirse? (Seleccione todas las que apliquen)

- ₁ Blanco
- ₂ Negro o afro americano
- ₃ Asiático
- ₄ Nativo de Hawái o de las Islas del Pacífico

- ₅ Índio Americano o nativo de Alaska
- ₆ Otros, especifique: _____
- _{.777} No sé
- _{.888} Rehúsa

8. ¿Cual es el ingreso mensual familiar? (Escoja solo una)

- ₁ Menos de \$500
- ₂ \$500 a \$999
- ₃ \$1000 a \$1499
- ₄ \$1500 a \$1999
- ₅ \$2000 a \$2499
- ₆ \$2500 a \$2999
- ₇ \$3000 a \$3499
- ₈ \$3500 a \$3999
- ₉ \$4000 a \$4499
- ₁₀ \$4500 a \$4999
- ₁₁ \$5000 a \$5999
- ₁₂ \$6000 o más
- _{.777} No sé.
- _{.888} Rehúsa.

9. Por favor chequee cualquier asistencia pública que su hogar recibe actualmente.

- ₁ SNAP/EBT/Food Stamps
- ₂ WIC
- ₃ TANF
- ₄ Otro (por favor especifique) _____
- ₅ No sé si mi familia recibe asistencia pública o que asistencia pública nosotros recibimos.
- ₆ Mi familia no recibe actualmente ninguna asistencia pública.

APPENDIX N
MODIFIED HOME FOOD INVENTORY

Home Food Inventory (AFL Modified)

Date: |_|_| / |_|_| / |_|_|

|_|_| Sent initial safety text to Dr. Vega-López

|_|_| Confirmed if participant has an additional fridge/freezer outside of kitchen

START TIME: _____ AM/PM

1. RESEARCH ASSISTANTS: Please look around the kitchen (countertop, top of refrigerator, table) and indicate which of the following items are visible and readily accessible.

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | a. Fresh fruit |
| <input type="checkbox"/> | <input type="checkbox"/> | b. Dried Fruit |
| <input type="checkbox"/> | <input type="checkbox"/> | c. Canned fruit |
| <input type="checkbox"/> | <input type="checkbox"/> | d. Fresh vegetables |
| <input type="checkbox"/> | <input type="checkbox"/> | e. Canned vegetables |
| <input type="checkbox"/> | <input type="checkbox"/> | f. Regular snack crackers, pretzels, chips, popcorn |
| <input type="checkbox"/> | <input type="checkbox"/> | g. Reduced-fat snack crackers, pretzels, chips, popcorn |
| <input type="checkbox"/> | <input type="checkbox"/> | h. Dry cereal |
| <input type="checkbox"/> | <input type="checkbox"/> | i. Bread or rolls |
| <input type="checkbox"/> | <input type="checkbox"/> | j. Regular soda pop |
| <input type="checkbox"/> | <input type="checkbox"/> | k. Diet soda pop |
| <input type="checkbox"/> | <input type="checkbox"/> | l. Candy |
| <input type="checkbox"/> | <input type="checkbox"/> | m. Regular cookies, cake, cupcakes, muffins |
| <input type="checkbox"/> | <input type="checkbox"/> | n. Reduced-fat cookies, cake, cupcakes, muffins |

Go to next page.

2. Now please open the refrigerator (kitchen). Which of the following items can you see without moving items around?

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	a. Plain whole milk
<input type="checkbox"/>	<input type="checkbox"/>	b. Plain 2% milk
<input type="checkbox"/>	<input type="checkbox"/>	c. Plain 1% milk
<input type="checkbox"/>	<input type="checkbox"/>	d. Plain Skim milk
<input type="checkbox"/>	<input type="checkbox"/>	e. Flavored milk (chocolate)
<input type="checkbox"/>	<input type="checkbox"/>	f. Flavored milk (strawberry)
<input type="checkbox"/>	<input type="checkbox"/>	g. Flavored milk (other flavors)
<input type="checkbox"/>	<input type="checkbox"/>	h. Non-dairy milks (soy, rice, almond, etc)
<input type="checkbox"/>	<input type="checkbox"/>	i. 100% fruit juice (any flavor)
<input type="checkbox"/>	<input type="checkbox"/>	j. Diet 100% fruit juice (any flavor)
<input type="checkbox"/>	<input type="checkbox"/>	k. Fruit drinks/sports drinks (not 100% juice)
<input type="checkbox"/>	<input type="checkbox"/>	l. Diet fruit drinks/sports drinks (not 100% juice)
<input type="checkbox"/>	<input type="checkbox"/>	m. Regular soda pop
<input type="checkbox"/>	<input type="checkbox"/>	n. Diet soda pop
<input type="checkbox"/>	<input type="checkbox"/>	o. Bottled/contained water
<input type="checkbox"/>	<input type="checkbox"/>	p. Reduced-fat yogurt drinks
<input type="checkbox"/>	<input type="checkbox"/>	q. Fresh ready-to-eat vegetables
<input type="checkbox"/>	<input type="checkbox"/>	r. Fresh ready-to-eat fruit

Go to next page.

Note, please check whether each prepared dessert type present is homemade or store-bought (mark all that apply). For example, if the household has both homemade and store-bought chocolate chip cookies, you would check “yes” to regular cookies and check in both the store bought and homemade columns.

5. Prepared Desserts (do not count boxed mixes that are not prepared)

Yes	No		Store-bought	Homemade
(Mark all that apply)				
<input type="checkbox"/>	<input type="checkbox"/>	a. Regular cookies (any flavor/variety)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	b. Reduced-fat cookies (any flavor/variety)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	c. Regular cake/cupcakes (any flavor)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	d. Reduced-fat cake/cupcakes (any flavor)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	e. Regular muffins (any flavor/variety)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	f. Brownies/bars (any variety)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	g. Other snack cakes (any variety)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	h. Pastry, sweet rolls, donuts	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	i. Flan	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	j. Pan dulce (sweet bread)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	k. Ice cream (any variety or flavor)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	l. Pudding or Jello (any variety or flavor)	<input type="checkbox"/>	<input type="checkbox"/>

6. Beverages (do not include alcoholic beverages)

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	a. Regular soda pop (any variety, flavor)
<input type="checkbox"/>	<input type="checkbox"/>	b. Diet soda pop (any variety, flavor)
<input type="checkbox"/>	<input type="checkbox"/>	c. Prepared iced teas or lemonade (example: Snapple)
<input type="checkbox"/>	<input type="checkbox"/>	d. Prepared light iced teas or lemonade (example: diet Snapple)
<input type="checkbox"/>	<input type="checkbox"/>	e. Sports drinks (example: Gatorade, Vitamin Water)
<input type="checkbox"/>	<input type="checkbox"/>	f. Diet sports drinks
<input type="checkbox"/>	<input type="checkbox"/>	g. 100% fruit juice (labeled as 100% juice)
<input type="checkbox"/>	<input type="checkbox"/>	h. Diet 100% fruit juice
<input type="checkbox"/>	<input type="checkbox"/>	i. Fruit drinks (example: <100% juice, Capri Sun)
<input type="checkbox"/>	<input type="checkbox"/>	j. Diet fruit drinks
<input type="checkbox"/>	<input type="checkbox"/>	k. Bottled water (unsweetened, any variety, flavor)
<input type="checkbox"/>	<input type="checkbox"/>	l. Plain whole milk
<input type="checkbox"/>	<input type="checkbox"/>	m. Plain 2% milk
<input type="checkbox"/>	<input type="checkbox"/>	n. Plain 1% milk
<input type="checkbox"/>	<input type="checkbox"/>	o. Plain Skim milk
<input type="checkbox"/>	<input type="checkbox"/>	p. Flavored milk (chocolate)
<input type="checkbox"/>	<input type="checkbox"/>	q. Flavored milk (strawberry)
<input type="checkbox"/>	<input type="checkbox"/>	r. Flavored milk (other flavors)
<input type="checkbox"/>	<input type="checkbox"/>	s. Non-dairy milks (soy, rice, almond, etc)
<input type="checkbox"/>	<input type="checkbox"/>	t. Energy Drink (any variety or flavor)
<input type="checkbox"/>	<input type="checkbox"/>	u. Aguas frescas

Go to next page.

7. Candy

Yes	No	
1 <input type="checkbox"/>	0 <input type="checkbox"/>	a. Chocolate candy (any variety, except chocolate exclusively for baking)
1 <input type="checkbox"/>	0 <input type="checkbox"/>	b. Hard candy
1 <input type="checkbox"/>	0 <input type="checkbox"/>	c. Gummies
1 <input type="checkbox"/>	0 <input type="checkbox"/>	d. Fruit rollups, fruit snacks or other fruit based candy
1 <input type="checkbox"/>	0 <input type="checkbox"/>	e. Chewy candy (example: Skittles, caramel, tamarindo)

8. Dry Cereal

Note, the goal in this section is for the cereals to follow WIC-Guidelines, which include no more than 6g of sugar per serving as well as at least 5 g of dietary fiber. Please make note of all cereals in the household.

Does the household have available dry cereal with more than 6 g sugar per serving?

Yes	No
1 <input type="checkbox"/>	0 <input type="checkbox"/>

*If yes, please list up to five below (pick highest sugar content per serving):
Examples include Frosted Flakes, Lucky Charms, Honey Smacks, Fruit Loops, Captain Crunch, etc.*

Name of cereal	Brand name	Sugar (g/serving)	Fiber (g/serving)	Box size

Does the household have available dry cereal with no more than 6 g of sugar and/or at least 5 g or more fiber per serving?

Yes	No
1 <input type="checkbox"/>	0 <input type="checkbox"/>

*If yes, please list up to five below (pick lowest sugar/highest fiber content per serving):
Examples include plain/multigrain Cheerios, Kix, Chex, Shredded Wheat, Plain Rice Krispies, etc.*

Name of cereal	Brand name	Sugar (g/serving)	Fiber (g/serving)	Box size

Go to next page.

END TIME: _____ **AM/PM**

Before leaving, make sure to ask and record the following questions (#9-16):

9. When was your last food-shopping trip? _____
a. How many days ago was that? _____

10. Where did you shop on your last food-shopping trip? _____

11. On your last grocery shopping trip, did you make any purchases that are not typical for your family that are still in the home? (e.g. birthday party supplies, groceries for a friend, etc.)

Yes No

If yes, please elaborate _____

12. Is this the usual amount of food you would keep in your home?

Yes No

If no, please elaborate _____

11. Where do you buy *most* of your food? _____

12. How often do you shop at other grocery stores, markets, etc? _____
a. Would you call that *daily, weekly, monthly, rarely, or never?* _____

13. How many individuals live in your household? _____

Go to next page.

16. How was your overall experience about participating in the home visit?

- Strongly disliked
- Disliked
- Neutral
- Liked
- Strongly Liked

17. What was your family's attitude towards your participation in the home visit?

- Strongly disliked
- Disliked
- Neutral
- Liked
- Strongly Liked

18. How likely would you be to allow a home visit in your household again?

- Very Unlikely
- Unlikely
- Unsure
- Likely
- Very Likely

Please provide any additional comments or suggestions about this home visit.

This is the end of the food inventory.

Genuinely thank the participant for allowing you into their home!

| | Sent final safety text to Dr. Vega-López