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LA Sprouts: A 12-week gardening, nutrition, and cooking randomized control trial improves determinants of dietary behaviors

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Abstract

Objective—To evaluate the effect of an exploratory 12-week nutrition, cooking and gardening RCT (“LA Sprouts”) on preference for fruit and vegetables (FV); willingness to try FV; identification of FV; self-efficacy to garden/eat/cook FV; motivation to garden/eat/cook FV; attitudes towards FV; nutrition and gardening knowledge; and home gardening habits.

Design and Participants—Four elementary schools with 304 predominately Hispanic/Latino 3rd–5th grade students were randomized to either the LA Sprouts (n=167 students) or Control group (n=137 students). LA Sprouts participants received 12 weeks of weekly 90-minute culturally tailored gardening, nutrition, and cooking classes after school. Questionnaire data examining dietary determinants were obtained at baseline and post-intervention.

Results—After the 12-week program, LA Sprouts participants compared with controls improved scores for identification of vegetables (+11% vs. +5%; P=.001), nutrition and gardening knowledge (+14.5% vs. −5.0%; P=.003), and were more likely to garden at home (+7.5% vs. −4.4%; P=.003).

Conclusions—The LA Sprouts program positively impacted a number of determinants of dietary behaviors, which suggest possible mechanisms by which gardening and nutrition education act to improve dietary intake and health outcomes.

Keywords

Gardening and Nutrition Intervention; Dietary Intake; Hispanic/Latino children

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INTRODUCTION

Hispanic/Latino children are disproportionately affected by obesity and obesity-related diseases, such as heart disease, metabolic syndrome, nonalcoholic fatty liver disease, and type 2 diabetes (T2D).[1–5] The prevalence of overweight is 39.7% for Hispanic 6–11 year old children in the United States (US) compared to 27.6% for non-Hispanic white children of the same age.[6] Fruit and vegetable (FV) intake in US children is well below recommended levels, and this problem may be exacerbated in low-income and Hispanic populations.[7] Numerous studies show that diets low in nutrient-dense FV are correlated with multiple chronic diseases, including obesity, heart disease, T2D, and metabolic syndrome in children and adults.[8–10]

School gardening programs have become popular approaches to increase fruit and vegetable intake. In 2010, the non-randomized LA Sprouts pilot school gardening and cooking/ nutrition program (with 104, 4th and 5th grade students) resulted in increased preference for FV intake and improved cooking and gardening skills.[11] A recent review of 13 school garden programs found that the majority was associated with increased FV intake. In addition, the majority of programs resulted in improved preference for vegetables, attitudes towards, willingness to taste, identification of and self-efficacy to prepare and cook FV, which are determinants of dietary behavior.[12] However, many were "proof of concept" studies and none were randomized.[11, 13–22] Since that review was published, a recent cluster RCT with 21 elementary schools in London found that school gardening programs led by external specialists, such as the Royal Horticultural Society, compared to teacher-led gardening programs resulted in increased identification of vegetables, but a lower willingness to try new fruits.[23] A quasi-experimental Farm to School garden program resulted in increased willingness to try FV, and improved knowledge of nutrition/agriculture in 1,117 3rd–5th grade students over the academic school year.[24] Given the popularity of garden-based educational approaches in school settings, more rigorous and well-designed studies are needed to understand whether such programs have an effect on determinants of dietary behaviors.

Numerous studies have used the social cognitive theory (SCT) to explain child dietary behaviors[25]. Cullen et al. hypothesized that personal factors, such as self-efficacy, preferences, and outcome expectations are linked to increased FV intake-related skills and FV intake[26]. Similarly, several studies have shown that FV preference predict FV consumption[27, 28]. Rasmussen et al.[29] reviewed 98 papers and identified a larger number of dietary determinants of FV intake in children including: knowledge, attitudes, liking of FV, self-efficacy, self-rated intake, habit, preferences, and perceived barriers, and intention/ willingness to try. McClain et al.[30] reviewed 35 articles and found that intention to eat healthy, knowledge, preferences were positively associated with FV intake in children and adolescents. The Self Determination Theory (SDT), originally proposed by Deci and Ryan[31] and expounded on by others[32, 33], views the person as an active organism, in which each person has three basic psychological needs: competence (feeling effective), relatedness (feeling connected to others), and autonomy (perception of self as source of one's own behavior). A key principal of SDT is that behavior change results from enhanced autonomy and perceived competence and are consistent with a person's values and goals, and is more effective in changing behavior than a focus on controlled or extrinsic motivation and rewards, such as pleasing others, fear of disease, or avoiding guilt, anxiety, or shame.

In 2012–2014, an exploratory 12-week cluster randomized, controlled extension of the LA Sprouts program was conducted.[34, 35] The conceptual framework is a combination of the SCT and SDT (Figure 1; the solid arrow denotes the relationship examined herein). The main outcomes findings were that LA Sprouts participants compared to wait-listed controls had reductions in BMI, BMI z-scores, waist circumference and increased in intake of dietary fiber and vegetable intake.[34] The goal of this analysis was to evaluate the effect of LA Sprouts program compared to wait-listed controls on changes in determinants of dietary behavior in predominately Hispanic/Latino 3rd–5th grade students. The hypothesis is that LA Sprouts participants compared to wait-listed controls would have improvements in preference for FV, willingness to try FV, identification of FV, self-efficacy to garden, eat and cook FV, motivation to garden, eat, and cook FV, attitudes towards FV, nutrition and gardening knowledge; and gardening at home habits.

METHODS

Participants

LA Sprouts partnered with an existing after-school program ("LA's BEST") within the Los Angeles Unified School District (LAUSD), which provides a free/low-cost on-site service for families. Four elementary schools in Los Angeles were identified as eligible (criteria included participation in existing LA's BEST after-school program, ≥75% Hispanic/Latino, ≥75% on free and reduced lunches, within 10 miles of University of Southern California (USC) campus and willing to participate in the study. Blinded investigators performed randomization and drew numbers from a hat to randomly assign the four schools to either LA Sprouts intervention (n=2 schools) or control (n=2 schools; delayed intervention).

Institutional Review Boards of the USC, the University of Texas at Austin, and Loma Linda University approved the study. Informed written consent from parents and assent from children were obtained. ClinicalTrials.gov identifier NCT02291146.

Description of the Intervention

Gardens were designed and built for the schools, and included a minimum of five raised beds, a designated teaching area that included demonstration space and seating, and ample gardening and cooking supplies.

LA Sprouts intervention classes were taught after school in 90-minute sessions once a week to each grade level for 12 weeks during either a fall or winter/spring school semester. Sessions consisted of two, 45-minute segments each of interactive cooking/nutrition and gardening instruction taught by paid, part-time nutrition and garden educators, with strong backgrounds in cooking and nutrition and gardening, respectively. Educators compiled weekly notes about the successes and challenges of lessons, in addition to documenting any omitted content to be revisited during later lessons. The project manager observed educators on at least two occasions to check for adherence to curriculum content and give feedback on pedagogical style.

An overview of the LA Sprouts curriculum is shown in Table 1. Students worked in small teams led by the educator to cook/prepare the sample recipe each week, which emphasized fruit and vegetables. The cooking component took approximately 20 minutes and included easy to more complex recipes (i.e., salads, broccoli quesadillas, vegetable pasta). The snack was eaten in a “family-style” manner, i.e., together at a table, with a tablecloth, non-disposable plates and silverware. The gardening activity also used a “hands-on” approach, where children learned and participated in planting, growing, maintaining, and harvesting organic fruits and vegetables. The nutrition curriculum reinforced ways and strategies to increase FV intake, such ways to incorporate FV into meals and snacks.

Description of Wait-Listed Control Group

Third-fifth grade students at the two control schools did not receive any nutritional/cooking or gardening information from investigators between pre- and post-testing, and schools were asked to refrain from augmenting their curriculum with similar lessons during the study period. Control schools received their standard after-school LA’s BEST activities. After post-testing was completed, students at the control schools received the full LA Sprouts program (“delayed intervention”), including a school garden being built.

Data Collection Measures

LA Sprouts and control participants completed questionnaires and had anthropometric data collected at baseline and at 12-weeks post intervention (collected within one week of the final lesson) during after-school sessions. Data were collected in waves from spring of 2012 through spring of 2014.

Anthropometrics

Height was measured with a free-standing stadiometer (Seca, Birmingham, UK); weight was measured via bioelectrical impedance (Tanita TBF 300A, Arlington Heights, IL). BMI z-scores and percentiles were determined using Centers for Disease Control cut-points for age and sex.[36]

Questionnaire

A literature review identified measures relevant to nutrition, gardening and cooking behaviors. Selections of survey instruments were based on existing literature and the conceptual model, and then adapted to relate to constructs of interest, simplify readability at grade level, and/or reduce participant burden. Questionnaires were administered in English only, as the children at these schools all spoke and read English. Focus group testing of the resulting composite questionnaire with six Hispanic/Latino 3rd and 4th grade students guided modifications for content, readability/comprehension, and clarity. A test-retest assessment for all questionnaire items was conducted with nineteen 3rd–5th grade predominantly Hispanic/Latino students who were not enrolled in the study. Questionnaire scales were assessed for internal consistency (Cronbach’s alpha, using baseline data from participants in the RCT) and intra-rater reliability (bivariate correlations of averaged scale values for each rater, using the test-retest data from non-participants in the RCT; See Table 2). Internal consistency and intra-rater reliability were satisfactory (alpha >0.7), with the exception of the knowledge questions.[35] However, knowledge questions differ from others in that they test ability, rather than measure individual characteristics, so psychometric principals are not as applicable. The final questionnaire included items to assess the following:

Demographics—Participants were asked basic demographic information, including age, sex, and ethnicity. To ascertain family socioeconomic status, items queried use of a computer at home and mother's ownership of a car.[37]

FV Preferences and Identification—A 25-item scale assessed preference for and identification of FV.[27] Twelve questions asked about preferences for fruits (including apple, avocado, banana, berries,, grapes, melon, oranges, kiwi, peaches, pear, plums, tomato) and 13 questions asked about preference for vegetables (broccoli, carrots, cactus, cauliflower, corn, green beans, kale, lettuce, onion, peas, peppers, radishes, and zucchini) using a 4-point response scale. One response "I don't know what this is" was used to assess identification.

Self-efficacy—A 14-item scale, adapted from Baronowski et al.[38] assessed self-efficacy to eat, cook and garden FV. One question from the motivation to eat FV scale was removed due to poor psychometric properties.

Knowledge—An 8-item scale was developed to assess nutrition and gardening knowledge, which was tailored to address content covered in lessons of the LA Sprouts curriculum.

Attitudes—An 8-item scale was developed to assess attitudes about cooking and gardening and current home gardening practices.

Willingness to Try—A 6-item Willingness to Try (also referred to as Neophobia) scale, adapted from Pliner et al.;[39], was used to assess willingness to try FV (separately).

Motivation—Motivation to eat FV, to cook FV, and to garden was assessed with an adapted version of the Motivation for Healthy Behaving measure from the Treatment and Self Regulation Questionnaire[40, 41]. The original questionnaire was adapted to a 7-item scale for motivation to eat FV, a 7-item scale for motivation to cook FV, and a 9-item scale for motivation to garden. The instrument generates two main subscales: (a) autonomous/intrinsic motivation; (b) controlled/extrinsic motivation.

Statistical Analysis

Histograms and box plots were used to assess normality; vegetable preference, fruit preference and identification of vegetables were not normally distributed, thus the log-transformed values were used for all analyses of these variables. Untransformed means are provided in the tables and text, for ease of interpretation. Average scores for individual scales were calculated. For FV preferences, averages reflect recoding 1–3 and did not include the "don't know" response. The (a) absolute and (b) percentage change in measures from baseline to post-intervention were calculated as the (a) difference between post-intervention and baseline measures, and, (c) that difference divided by the baseline value of the measure and multiplied by 100. Differences between students completing both pre- and post measures vs. pre measures only, and between LA Sprouts and control participants in baseline demographic characteristics were assessed using t-tests or chi square tests, and a P value of ≤ .05 was considered statistically significant for these comparisons. ANCOVAs assessed difference in determinants of dietary behavior change between LA Sprouts and control groups between pre- and post-intervention. Adjustments were made for covariates determined *a priori* including age, sex, ethnicity, season (Fall, Winter/Spring), schools level, attendance at the intervention classes, English spoken at home (yes, no), and baseline value for the measure of interest (continuous variables). Correlations were assessed between the determinants of dietary behavior and the determinants, with the exception of knowledge, attitudes, and gardening at home, were highly correlated with each other, thus, a correction for multiple comparisons (eighteen variables) was applied for these variables, and a *P* value of ≤.003 was considered statistically significant. All statistical analyses were done using SPSS version 21 (SPSS Inc., Chicago, IL).

RESULTS

All 3rd–5th grade students enrolled in an existing after-school care program ("LA's BEST") at the elementary schools were invited to participate (n=409), and 375 (92%) agreed to participate. Two schools were randomly assigned to receive the LA Sprouts intervention (n=204 students), two schools to controls (n=171 students), and baseline data was collected on students. Given the small size of the study (only 4 schools), demographic variables were not different between clusters of participants within treatment and control groups after randomization, prior to the initiation of the intervention. Post-intervention data was missing for 55 students due changing schools, withdrawing from the after-school program, or being sick/absent on testing days. In addition, five more participants were missing questionnaire data used to define determinants of dietary behavior. Analyses herein are based on 304 children (n=167 LA Sprouts; n=137 controls) for whom both complete baseline and post-intervention data were available (Figure 2). There were no statistical differences in any of the demographic data between those participants that completed both baseline and post-intervention measures compared to students that only completed baseline measures. ($P>0.2$) Participants enrolled in LA Sprouts program had similar demographics to children from the same schools not enrolled in LA Sprouts program (e.g., 51% are male and 88.7% are Hispanic ethnicity in the schools). On average, children attended 9.7 ±2.3 intervention classes throughout the 12 weeks, and the minimum amount of classes attended was three classes. However, 71% of the subjects attended at least half of the classes.

There were no significant differences between LA Sprouts and control participants at baseline for sex, race/ethnicity, age, BMI percentile, percent overweight/obese, computer at home, participation in the free and reduced lunch plan, or mothers having their own car (Table 3). LA Sprouts participants tended to speak English at home more often than controls (P=.06). There was also a trend for LA Sprouts participants to have lower BMI at baseline (P=.09) compared to controls.

At baseline, there were no significant differences in determinants of dietary behavior between LA Sprouts participants compared to controls (see Table 4). After the 12-week program, LA Sprouts participants compared to controls improved on identification of vegetables (+11% vs. +5%; $P=.001$), nutrition and gardening knowledge (+14.5% vs. −5.0%; $P=.003$), and increased in the proportion that reported gardening at home (+7.5% vs. −4.4%; $P=.003$) (see Table 4).

DISCUSSION

Numerous quasi-experimental studies have shown that garden-based school programs improve determinants of dietary behavior.[11, 13–17, 19–21, 42–45] A recent cluster RCT conducted with 21 London schools showed that garden programs taught by external specialists were more effective at increasing vegetable identification, but resulted in lower willingness to try new fruits compared to teacher-led garden classes.[23] LA Sprouts is the first exploratory RCT of a garden-based school intervention compared to a wait-listed control leading to changes in determinants of dietary behavior including improved identification of vegetables, gardening and nutrition knowledge, and percentage of children gardening at home.

Several non-randomized garden-based programs have resulted in improved identification of FV.[13, 15, 18] As hypothesized, the LA Sprouts RCT intervention did result in increased identification of vegetables (including those less typically familiar to children like cactus, cauliflower, kale, bell peppers, radishes, sweet potato, and spinach). These less typically familiar vegetables were highlighted in the LA Sprouts culturally tailored lessons and were used in the cooking activities and recipes, which may explain their improved identification. Each lesson comprised of a 20-minute cooking component and included a range of easy recipes, like salads and cut-up vegetables, to more complex recipes, such as broccoli/spinach quesadillas and pasta with vegetables. Contrary to the hypotheses, however, LA Sprouts had no effect on the identification of fruit. One explanation for these findings could be that the majority of the recipes used in the lessons focused on vegetables, and more vegetables than fruit were planted in the garden.

Contrary to our hypothesis, the intervention did not result in significant improvements in self-efficacy to eat FV, to garden or cook. Evans et al.[21] conducted a year-long non-randomized garden-based intervention with 246 adolescents and showed that those with the maximum exposure to the garden lessons compared to those with the least exposure had improvements in self-efficacy for eating FV. In a study across nine European countries, positive self-efficacy to eat FV was related to daily FV intake in 11-year old children.[46] Similarly, a U.S. study with 4th–6th grade students found that self-efficacy to eat FV was positively associated with fruit consumption.[47] Increasing children's self-efficacy to eat FV is one mechanism that could lead to increased FV intake and should continue to be a target of interventions. To date, this is the first study to examine self-efficacy to garden and cook, and more research is warranted in this area. Since other studies support the value of self-efficacy, it should continue to be targeted in interventions.

The LA Sprouts program resulted in improved nutrition and gardening knowledge. Similarly, other school gardening programs have resulted in increased nutrition and gardening knowledge[20, 21, 44]. Numerous studies have shown that increased nutrition knowledge of FV is related to in increased intake of FV in children[48–50], while others have shown no relation.[51, 52] In a large cross-sectional European study with 963 11-year old children, one of the strongest determinants for FV intake was knowledge of FV recommendations. Future analyses will examine if changes in nutrition and gardening knowledge mediated the improvements in dietary intake.

The intervention resulted in more LA Sprouts participants reporting gardening at home. In general the percent of children gardening at home was relatively high in both groups at baseline (38–47%). This is somewhat unexpected given that a large portion of the participants live in apartments with little to no yard space to plant a garden. One explanation for this is that these families might grow their own food because it is more affordable. Another explanation is that many of these families have fruit trees around their homes. Qualitative data was collected on where participants grew FV at home at baseline and after the intervention. At baseline, 45% of participants said they grew FV in the ground at their house, 11% in pots at their house, 8% at a friend or relative's house, 7% in community gardens and 5% in windowsills at baseline. After the intervention, 45% of participants grew FV in the ground at their house, 17% at a friend or relative's house, 16% at a community garden, 12% in pots at their house, and 8% in windowsills. Gardening programs could also extend their approach beyond teaching children to garden at school, but in teaching them ways to garden with their families in their communities. If children were gardening at both school, but also emphasize gardening with their families in their communities, this could offer more exposure and access to FV, reinforce the positive health behaviors, and sustain the positive health benefits for longer.

Also, contrary to our hypothesis and existing literature, there were no significant differences in motivation to eat FV, garden or cook between groups after the intervention. In a cross-sectional study with 92 children (9–11 years of age), concern for health in choosing what to eat (i.e., autonomous motivation) predicted FV consumption.[51] In another study of over 1200 adults participating in a self-help RCT, showed that autonomous motivation (i.e., self-image and personal health) was linked to positive changes in dietary intake.[53] Other research has shown that autonomous motivation is more influential than controlled motivation in promoting health behavior changes.[54, 55] To date, this is the first study to examine how motivation to cook and garden changes in response to a garden-based intervention. Even though these findings did not support changes in motivation, other studies support the value of motivation, thus it still might have merit in examining in future intervention studies.

Surprisingly, the intervention did not lead to improvements in preferences or willingness to try FV. A number of school garden-based interventions have found improvements in preferences for vegetables[11, 14, 15] and increases in willingness to try FV.[15, 20] Ratcliff et al. conducted a 16-week non-randomized garden-based intervention with 320 6th grade students and found improved both preference for and willingness to try vegetables.[15] Morgan et al[20] conducted a 10-week quasi-experimental study with 127 5th and 6th grade student comparing nutrition + gardening (N+G) education to nutrition education alone (N) and control groups and found that N+G compared to N and controls had increases in willingness to taste vegetables as well as preference ratings for vegetables. Both studies used taste-test evaluations, in which students were asked to name, taste and rate their preference for selected vegetables, which may be a more sensitive measure of willingness to try and preferences. It is possible that if a taste-test evaluation measure using FV emphasized in the curriculum were used, improvements in willingness to try and preference for FV would have been seen. Preferences for FV and willingness to try FV have both been linked to increased daily intake of FV in children and should still be considered targets for future interventions.[56, 57]

Of note, the LA Sprouts intervention resulted in reductions in BMI parameters, waist circumference and increased intake of dietary fiber, some vegetables and tended to increase whole grain intake.[34] The current analyses highlight the intervention effects on determinants of dietary behaviors and did not examine the effects of these determinants on dietary intake and health outcomes. These findings show that a garden-based intervention can improve a number of determinants linked to dietary intake, with many of them encompassing gardening behaviors. Improving gardening at home and gardening knowledge are just some of the ways in which garden-based programs can improve health outcomes. Additional analyses to assess how changes in the gardening behaviors mediate changes in dietary and health outcomes are warranted.

There are several limitations of this study. The intervention was only 12-weeks long and longer garden-based interventions are needed to address the long-term effects on determinants of dietary behaviors as well as to understand how to sustain the program and behaviors. However, this study shows that a relatively short intervention can result in acute improvements in determinants of dietary behavior. This is an exploratory study with only four schools and larger cluster RCT examining the impact of gardening programs on dietary behaviors and other other health outcomes are warranted. This study was also conducted in low-income, predominately Hispanic/Latino children and results might not be generalizable beyond this study population. Garden based programs should also consider using taste tests in their evaluation, which may be a more sensitive measure of identification, preference and willingness to try in younger populations.

IMPLICATIONS FOR RESEARCH AND PRACTICE

In conclusion, these findings highlight how a gardening, nutrition, and cooking program can improve many determinants of dietary behavior. These changes in determinants suggest possible mechanisms by which such an intervention acts to improve dietary intake and other health outcomes. Future interventions should focus on ways to improve identification of vegetables, gardening and nutrition knowledge, and gardening at home in children.

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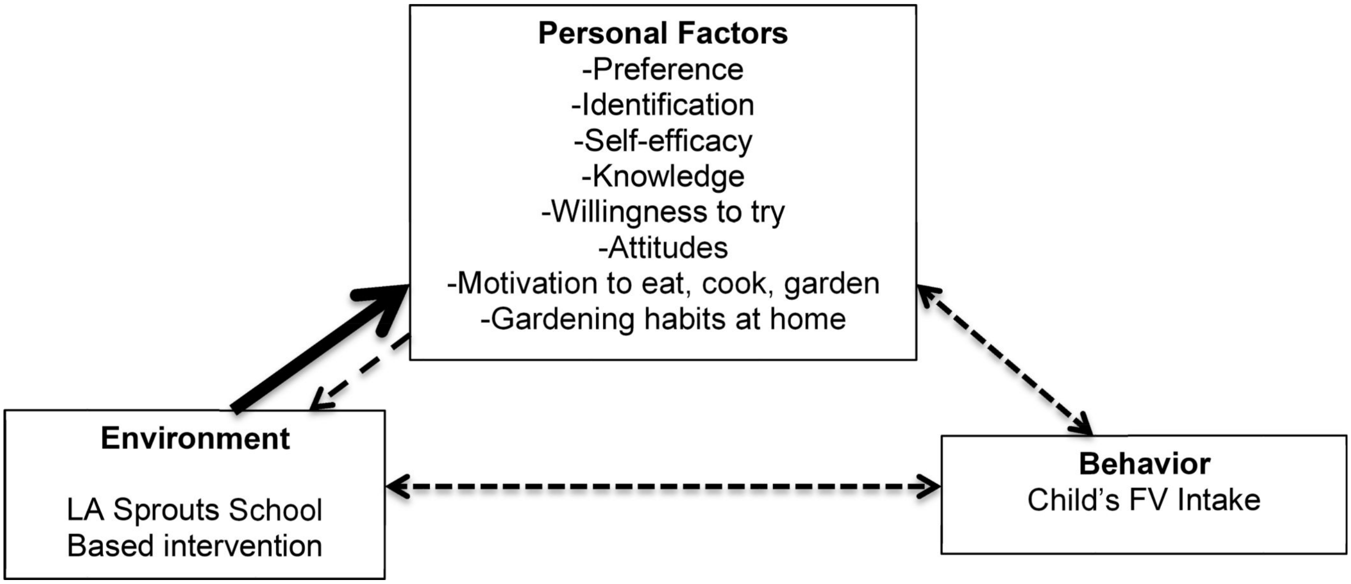

Figure 1.

Conceptual framework of LA Sprouts. The solid arrow denotes the relationship for this data analyses.

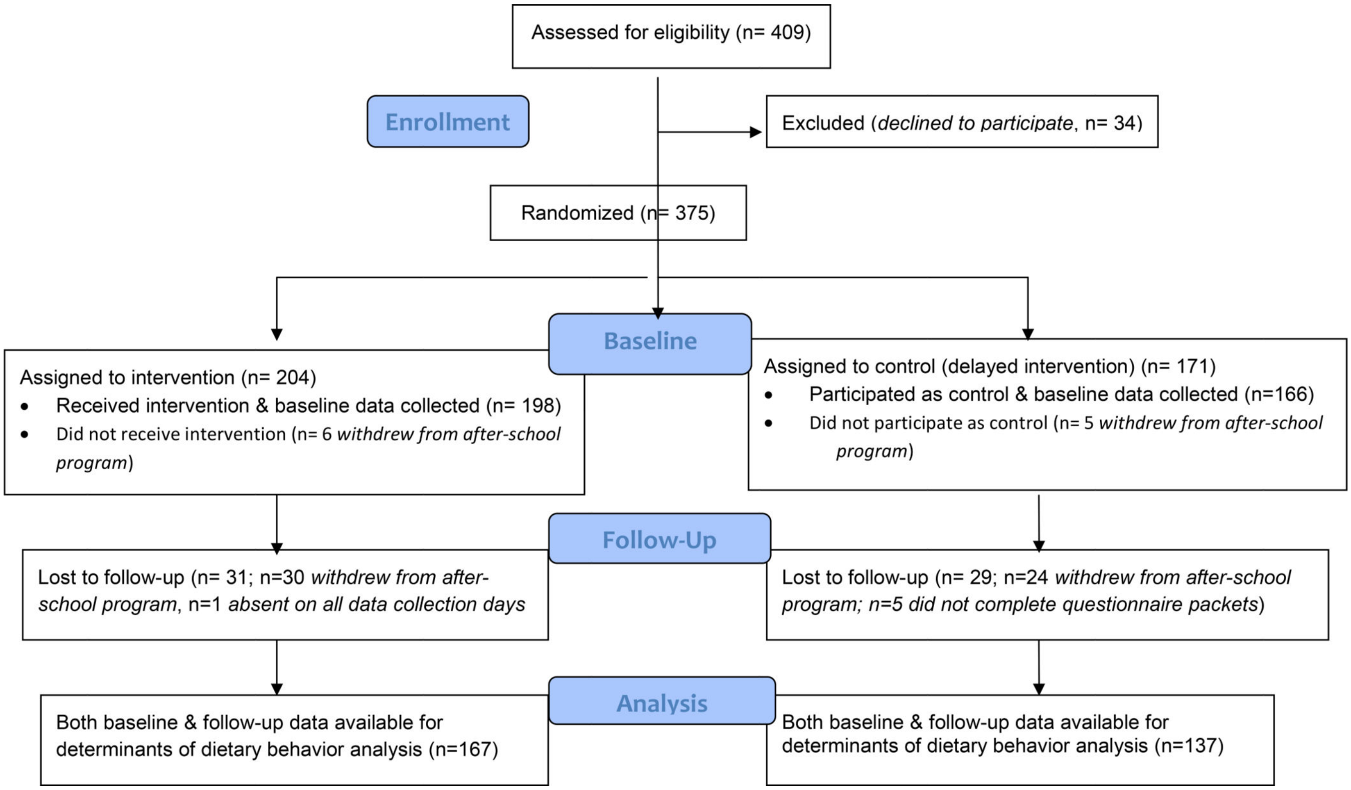

Figure 2.
Flow of participants through the study

Table 1

Overview of LA Sprouts curriculum

Week	Nutrition lessons and topics covered	Gardening lessons and topics covered	Recipe
1	**Introduction:** name game, overview of the program, make class rules, kitchen safety and hand washing	**Introduction:** basic botany, importance of growing food, history of agriculture	Seasonal green salad
2	**Real food:** real food vs. packaged food, where can you find real food, reading ingredients label, number of ingredients in real food, cooking with real food	**Planning a garden:** garden design, soil types and testing	Fresh veggies with yogurt dip
3	**Sugar:** natural vs. added sugar, liquid candy (soda), demonstration of how much sugar is in popular drinks, low sugar beverage taste test	**Sowing and transplanting:** starting seeds for the school garden and home, how-to use of garden tools	Apples with peanut butter, cucumber lemon water, agua de jamaica
4	**Fruits:** types of fruits, health benefits of eating a variety of colors of fruits, fruit intake recommendations, ways to add fruit to your diet, mystery fruit game	**Composting:** importance of recycling, greens and browns, hands-on starting and maintaining a compost pile	Fruit rainbows with yogurt
5	**Vegetables:** parts of the plant you can eat, benefits of eating different colors of vegetables, vegetables intake recommendations, ways to add vegetables to your diet, mystery vegetable game	**Recycling and gardening at home:** review of composting, using items from home in the garden	Vegetable quesadillas with pico de gallo
6	**Fiber:** what is fiber, juice vs. whole fruit, what foods have fiber, where can you find fiber on a nutrition label, adding fiber to your diet, fiber taste test	**Watering:** how-to, how much do plants need, water cycle, measuring seedling progress	Whole grain pasta with veggies
7	**Food and Family:** importance of eating together as a family, family dining habits, dinner conversation starters	**Botany:** plant nutrition, plant life cycles, pollination	Breakfast taco
8	**Garden to Table:** eating in season, where does our food come from, shopping at the farmers market activity	**Garden Maintenance:** weeding, fertilization, good and bad garden bugs	Beet, carrot and avocado salad
9	**Breakfast:** school day skit (with and without breakfast), why is breakfast important, what is a healthy breakfast, choosing a healthy breakfast at school	**Food preservation and seed saving:** preservation methods, herb drying, seed saving history, plant genetics	Yogurt parfait
10	**School Lunch:** importance of a healthy lunch important, choosing a healthy lunch at school, making your own lunch	**Seasonal crops:** climate, length of day, seasonality, local vs. imported foods, where our food comes from	Ultimate sandwich
11	**Parties and Holidays:** healthy vs. unhealthy party foods, how to make parties healthier, planning your own party, tips for eating well at parties	**Plant anatomy:** what we use plants for, parts of plants, edible parts of different plants, indentifying plant parts in cut fruit	Bean dip and pita chips
12	**Review:** jeopardy game	**Harvesting:** gardening awards	Cook-off (make your own snack)

Table 2

Questionnaire scale psychometric values [a]

Item	Number of items	Internal consistency	Intra-rater reliability
Motivation to eat FV	7	0.809	0.665
Motivation to garden	9	0.858	0.739
Motivation to cook FV	7	0.850	0.635
Self-efficacy for FV consumption and related behaviors	14	0.883	0.478
Fruit neophobia	6	0.901	0.521
Vegetable neophobia	6	0.800	0.542
Preferences for fruit	10	0.901	0.722
Preferences for vegetables	15	0.809	0.575
Cooking and gardening attitudes	8	0.866	0.912
Nutrition and gardening knowledge	8	0.842	0.400

[a]Cronbach's alpha was used to determine interval consistency (n=350), and correlations were used to evaluate intra-rater reliability (n=19). All questionnaire items had four response options, with the exception of demographic questions and current home gardening practices (which ranged from 2–7 response options, not included in psychometric tests),

Table 3

Baseline characteristics of LA Sprouts and control participants.

Characteristics, n (%) or mean ± SD	Control (n=137)	LA Sprouts (n=167)	P-value[a]
	← N (%) →		
Sex			
Male	69 (50.4)	78 (46.7)	0.30
Female	68 (49.6)	89 (53.3)	
Race/ethnicity (n)			0.49
Hispanic	119 (88.8)	148 (88.6)	
Asian	2 (1.5)	1 (0.6)	
Non-Hispanic Black	0 (0)	4 (2.4)	
Non-Hispanic White	2 (1.5)	2 (1.2)	
Other	11 (8.2)	12 (7.2)	
	← Mean ± standard deviation →		
Age (y)	9.2 ±0.9	9.3 ±0.9	0.66
BMI [b]	20.7 ±4.6	19.8 ±4.1	0.09
BMI percentile	77.3 ±25.9	73.7 ±26.6	0.24
	← N (%) →		
% Overweight/obese	61 (45.5)	83 (50.6)	0.42
English Spoken at Home, yes	27 (20.0)	47 (28.7)	0.06
Computer at home, yes	32 (23.7)	41 (25.6)	0.79
Mother has own car, yes	38 (40.4)	56 (33.9)	0.26
Free/Reduced Lunches	125 (89.3)	152 (90.5)	0.85

[a]P-values were calculated using t tests (for continuous) and chi-square tests (for categorical ariables);

[b]BMI = Body Mass Index; calculated as kg/m^2

Table 4

Baseline, post, and change determinants of dietary behavior, LA Sprouts RCT [a, b]

Variables [c]	Control			LA Sprouts			P-value for Baseline	P-value for Change
	Pre	Post	Change	Pre	Post	Change		
PREFERENCE								
Vegetable preference	2.2 ±0.5	2.1 ±0.5	−0.1 ±0.5	2.2 ±0.5	2.1 ±0.5	−0.1±0.6	0.97	0.95
Fruit preference	2.6 ±0.3	2.6 ±0.3	0.0 ±0.4	2.6 ±0.4	2.5 ±0.4	−0.1 ±0.5	0.49	0.22
IDENTIFICATION								
Identification of fruit	2.0 ±0.10	2.0 ±0.1	0.02 ±0.1	1.9 ±0.2	1.9 ±0.2	0.0 ±0.20	0.02	0.01
Identification of vegetable	1.9 ±0.2	1.9 ±0.1	0.01 ±0.2	1.8 ±0.2	1.8 ±0.2	0.02 ±0.2	0.02	0.001
SELF EFFICACY								
Self efficacy to garden	3.2 ±0.8	3.4 ±0.9	0.9 ±0.1	3.2±0.9	3.3 ±0.9	1.0 ±0.1	0.36	0.61
Self efficacy to eat fruits and vegetables	3.1 ±0.9	3.0 ±0.9	−0.2 ±1.0	3.0 ±0.9	3.1 ±0.9	0.1 ±1.1	0.04	0.02
Self efficacy for cooking	3.2 ±0.8	3.3 ±0.9	0.1 ±0.9	3.2 ±0.9	3.3 ±0.9	0.1 ±1.0	0.12	0.71
KNOWLEDGE								
% Correct	47.8 ±17.5	45.4 ±18.5	−2.4 ±21.4	43.3 ±19.4	49.5 ±20.4	6.3 ±23.1	0.05	0.003
WILLINGNESS TO TRY								
Willingness to try fruit	3.3 ±0.7	3.3 ±0.7	0.00 ±0.7	3.3 ±0.6	3.2 ±0.70	−0.12 ±0.74	0.48	0.28
Willingness to try vegetables	2.8 ±0.9	2.8 ±0.9	−0.1 ±1.0	3.0 ±0.9	2.9 ±0.8	−0.1 ±0.9	0.07	0.90
ATTITUDES								
Attitudes towards cooking	3.4 ±0.7	3.4 ±0.7	0.0 ±0.7	3.3 ±0.7	3.4 ±0.9	0.0 ±0.8	0.76	0.40
Attitudes towards gardening	3.1 ±0.7	3.0 ±0.7	−0.1 ±0.7	3.2 ±0.6	3.2 ±0.8	0.0 ±0.8	0.15	0.47
GARDENING AT HOME	47.1%	42.7%	−4.4%	37.5%	45.0%	7.5%	0.06	0.003
MOTIVATION								
Motivation to cook	3.1 ±0.8	2.9 ±0.8	−0.2 ±0.9	3.2 ±0.7	3.1 ±0.8	−0.1 ±0.9	0.05	0.05
Autonomous motivation to cook	3.3 ±0.8	3.0 ±0.9	−0.2 ±1.0	3.2 ±0.8	3.1 ±0.9	−0.1 ±1.0	0.17	0.07
Controlled motivation to cook	3.0 ±0.8	2.8 ±0.8	−0.2 ±0.9	3.1 ±0.8	3.0 ±0.8	−0.1 ±1.0	0.05	0.11
Motivation to garden	3.1 ±0.7	2.8 ±0.8	−0.3 ±1.0	3.0 ±0.7	2.9 ±0.8	−0.1 ±0.9	0.01	0.04
Autonomous motivation to garden	3.2 ±0.8	3.0 ±0.8	−0.2±1.0	3.2 ±0.8	3.2 ±0.9	0.0 ±1.0	0.04	0.009
Controlled motivation to garden	2.9 ±0.8	2.7 ±0.8	−0.3 ±1.0	3.0 ±0.8	2.8 ±0.8	−0.3 ±1.0	0.09	0.24
Motivation to eat FV	3.1 ±0.7	2.9 ±0.7	−0.3 ±0.8	3.1 ±0.7	3.0 ±0.8	−0.2 ±0.8	0.08	0.02

Variables [c]	Control			LA Sprouts			P-value for Baseline	P-value for Change
	Pre	Post	Change	Pre	Post	Change		
Autonomous motivation to eat FV	3.3 ±0.8	3.1 ±0.7	−0.2 ±0.8	3.2 ±0.8	3.2 ±0.9	0.0 ±1.0	0.10	0.008
Controlled motivation to eat FV	3.0 ±0.77	2.7 ±0.8	−0.4 ±0.9	3.0 ±0.8	2.8 ±0.8	−0.3 ±0.9	0.07	0.10

[a] ANCOVAs assess differences in change scores between the groups;

[b] Data is presented in mean ± SD. All pre, post, and change values were adjusted for sex, ethnicity, age (y), English language spoken at home (yes/no), school (as a categorical variable), attendance at the LA Sprouts lessons (average of classes attended), and season (fall/spring). All change scores are also adjusted for baseline value of the outcome variable.

[c] Averages for the scales were used.