Research Article

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 trial (*LA Sprouts*) on preference for fruit and vegetables (FV); willingness to try FV; identification of FV; self-efficacy to garden, eat, and cook FV; motivation to garden, eat, and cook FV; attitudes toward FV; nutrition and gardening knowledge; and home gardening habits.

Design: Randomized controlled trial.

Setting: Four elementary schools.

Participants: Three hundred four predominately Hispanic/Latino third- through fifth-grade students were randomized to either the *LA Sprouts* group (n = 167 students) or control group (n = 137 students).

Intervention: Twelve-week after-school nutrition, cooking, and gardening intervention.

Main Outcome Measures: Determinants of dietary behavior as measured by questionnaire at baseline and postintervention.

Analysis: Analyses of covariance.

Results: After the 12-week program, compared with controls, *LA Sprouts* participants improved scores for identification of vegetables (+11% vs +5%; $P = .001$) and 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 affected a number of determinants of dietary behaviors that suggest possible mechanisms by which gardening and nutrition education act to improve dietary intake and health outcomes.

Key Words: gardening and nutrition intervention, dietary intake, Hispanic/Latino children (*J Nutr Educ Behav*. 2016;48:2-11.)

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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.[1-5] The prevalence of overweight is 39.7% for Hispanic children aged 6–11 years in the US compared with 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, type 2 diabetes, and metabolic syndrome in children and adults.[8-10]

School gardening programs have become popular approaches to increase FV intake. In 2010, the nonrandomized *LA Sprouts* pilot school gardening and cooking and nutrition program (with 104 fourth- and fifth-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 were associated with increased FV intake. In addition, the majority of programs resulted in improved preference for vegetables; and attitudes toward, 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

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randomized.[11,13-22] Since that review was published, a recent cluster randomized, controlled trial (RCT) with 21 elementary schools in London found that school gardening programs led by external specialists, such as the Royal Horticultural Society, compared with 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 and agriculture in 1,117 third- to fifth-grade students over the academic school year.[24] Because of 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 Social Cognitive Theory to explain child dietary behaviors.[25] Cullen et al[26] hypothesized that personal factors such as self-efficacy, preferences, and outcome expectations are linked to increased FV intake-related skills and FV intake. Similarly, several studies have shown that FV preference predicts 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, perceived barriers, and intention or willingness to try. McClain et al[30] reviewed 35 articles and found that intention to eat healthy, knowledge, and preferences were positively associated with FV intake in children and adolescents. Self-determination Theory (SDT), originally proposed by Ryan and Deci[31] and expounded on by others,[32,33] views the person as an active organism, and proposes that each person has 3 basic psychological needs: competence (feeling effective), relatedness (feeling connected to others), and autonomy (perception of self as the source of one's own behavior). A key principal of SDT is that behavior change results from enhanced autonomy and perceived competence, is 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 Social Cognitive Theory and SDT (Figure 1; the solid arrow denotes the relationship examined here). The main outcomes findings were that compared with wait-listed controls, *LA Sprouts* participants had reductions in body mass index (BMI), BMI *z* scores, waist circumference, and increased intake of dietary fiber and vegetables.[34] The goal of this analysis was to evaluate the effect of the *LA Sprouts* program compared with wait-listed controls on changes in determinants of dietary behavior in predominately Hispanic/Latino third- to fifth-grade students. The hypothesis was that compared to wait-listed controls, *LA Sprouts* participants 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 toward FV, nutrition and gardening knowledge; and gardening at home habits.

METHODS

Participants

LA Sprouts partnered with an existing after-school program (*LA's Better Educated Students for Tomorrow* [*BEST*]) within the Los Angeles Unified School District, 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 the existing *LA's BEST* after-school program, ≥ 75% Hispanic/Latino ethnicity, ≥ 75% receiving free and reduced lunches, location within 10 miles of University of Southern California campus, and willingness to participate in the study. Investigators who were blinded to the study protocol performed randomization and drew numbers from a hat to assign the 4 schools randomly to either the *LA Sprouts* intervention (n = 2 schools) or the control group (n = 2 schools; delayed intervention).

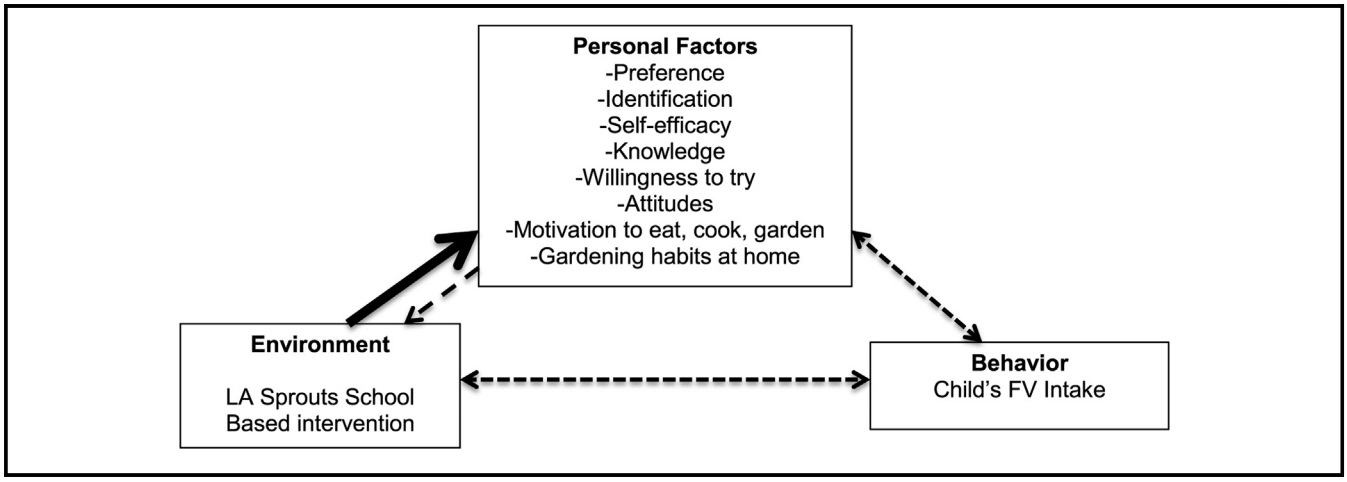

Figure 1. Conceptual framework of *LA Sprouts*. The solid arrow denotes the relationship for this data analysis. FV indicates fruit and vegetables.

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