

The Shaping Healthy Choices Program: Design and Implementation Methodologies for a Multicomponent, School-Based Nutrition Education Intervention

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ABSTRACT

Objective: To provide a framework for implementation of multicomponent, school-based nutrition interventions. This article describes the research methods for the Shaping Healthy Choices Program, a model to improve nutrition and health-related knowledge and behaviors among school-aged children.

Design: Longitudinal, pretest/posttest, randomized, controlled intervention.

Setting: Four elementary schools in California.

Participants: Fourth-grade students at intervention ($n = 252$) and control ($n = 238$) schools and their parents and teachers. Power analyses demonstrate that a minimum of 159 students per group will be needed to achieve sufficient power. The sample size was determined using the variables of nutrition knowledge, vegetable preference score, and body mass index percentile.

Intervention: A multicomponent school-based nutrition education intervention over 1 academic year, followed by activities to support sustainability of the program.

Main Outcome Measures: Dietary and nutrition knowledge and behavior, critical thinking skills, healthy food preferences and consumption, and physical activity will be measured using a nutrition knowledge questionnaire, a food frequency questionnaire, a vegetable preferences assessment tool, the Test of Basic Science Process Skills, digital photography of plate waste, PolarActive accelerometers, anthropometrics, a parent questionnaire, and the School and Community Actions for Nutrition survey.

Analysis: Evaluation will include quantitative and qualitative measures. Quantitative data will use paired t , chi-square, and Mann-Whitney U tests and regression modeling using $P = .05$ to determine statistical significance.

Key Words: nutrition education, multicomponent interventions, school-based research, childhood nutrition, methodology (*J Nutr Educ Behav.* 2014;46:e13-e21.)

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INTRODUCTION

The current epidemic of childhood obesity in the US is a leading public health problem, with recent estimates from the National Health and Nutrition Examination Survey 2009–2010 indicating that over 31% of children aged 2–19 years are at or above the 85th percentile for body mass index (BMI) for age and about 17% are at or above the 95th percentile.¹ In addition to the rising rates of obesity, children are not meeting the current Dietary Guidelines for Americans recommendations for fruit and vegetable intake.² Based on National Health and Nutrition Examination Survey data from 2001–2004, average vegetable intakes in cup equivalents were 1.2 (standard error, 0.06) and 1.1 (standard error, 0.04) for boys and girls aged 9–13 years, respectively; these intakes are much lower than recommendations.³ The causes of obesity are complex with numerous, interrelated etiologies. A health problem with this degree of complexity is unlikely to be solved through programs that address only a limited number of contributing factors, and multiple government agencies have recognized a critical need for integrative and innovative strategies that promote healthy lifestyle choices for children.

A comprehensive program connecting key stakeholders, such as parents and school-site personnel, and integrating school and community programs has the potential to overcome obstacles such as limited parental involvement or classroom time. By bringing individuals together to support a common vision, existing resources and efforts may be used to create a sustainable healthy school environment.⁴

The Shaping Healthy Choices Program (SHCP) is a 4-year study that uses the social-ecological framework and Social Cognitive Theory (SCT)⁵ to implement and measure the effectiveness of an integrated, school-based, multicomponent intervention. A collaborative research team is working with 4 schools within 2 counties to develop a system-wide, sustainable program to achieve the following objectives: (1) increase nutrition knowledge and use of science processing skills in fourth-grade children; (2) promote availability,

consumption, and enjoyment of fruits and vegetables in the school environment; (3) improve dietary patterns and encourage physical activity; (4) foster positive changes in the school environment; and (5) facilitate development of an infrastructure to sustain the program. The long-term goal of the SHCP is to improve students' dietary intake and physical activity behaviors to prevent childhood obesity. In an effort to move beyond previously conducted studies and embrace the concepts of integration and student self-efficacy, the SHCP aims to improve students' dietary intake and physical activity behaviors while simultaneously creating a community-based support system to prevent childhood obesity.

The following study design will be used to test the hypothesis that schools employing the SHCP will have improved and measurable student outcomes with regard to dietary and nutrition knowledge and behavior, science process and critical thinking skills, healthy food preferences and consumption patterns, and physical activity compared with control schools.

METHODS

Study Design

The study follows a pretest/posttest, randomized, controlled intervention design. Four schools in California from 2 counties will participate in the study. The study design uses 4 phases, the first of which is a planning phase. During the planning phase, school connections will be made and project collaborators will participate in planning meetings. The second phase is the intervention phase. The third phase of the program is the sustainability phase. The fourth phase is the formation of the Shaping Healthy Choices Collaborative, which includes Shaping Healthy Choices schools mentoring other schools. Only the first 2 phases will be discussed in detail here. Project collaborators include researchers from the university with diverse areas of expertise such as nutrition, health, agriculture, education, science literacy, human development, and program dissemination. The following activities will be completed during the

planning phase of the project in preparation for the intervention phase.

Determination of sample size.

Calculation of sample size is based on anticipated SDs for the following: nutrition knowledge questionnaire, vegetable preference scores, and BMI for age. For all sample size calculations (SAS, version 9.2, Cary, NC, 2010), a 5% type I error rate with 80% power to detect a difference of 20% is assumed based on previous experience. Assuming an SD of 0.4 for nutrition knowledge,⁶ it was calculated that sufficient power would be achieved with 50 students/group. Assuming an SD of 0.4 for vegetable preference scores,⁶ 50 students/group will result in sufficient power. For BMI for age, assuming an SD of 3 kg/m²,⁷ the power to detect a change in BMI of 1 kg/m² will occur with 143 students/group. Thus, the sample size goal is 159 students/group as determined using the most conservative sample size calculation parameter (BMI for age) and assuming a 10% attrition rate. Because randomization is at the school level, this could result in a reduction in the effective sample size owing to potential residual intra-class correlation in responses among students from within the same school. Therefore, even if the planned sample of 200 students/group is reduced to 150 students/group owing to the design effect, the study will be able to detect the specified effect size for the most conservative outcome parameter (BMI for age) at 80% power and an alpha of 5%.

School recruitment. The selection of participating schools will begin with creating a pool of schools from 1 school district in each selected county. These schools will be statistically similar on several covariates including school size, ethnicity, and proportion of children eligible for free and reduced-price meals. To be eligible to participate in the SHCP, schools will be required to meet all of the following inclusionary criteria: (1) between 30% and 49.9% of children eligible to receive free or reduced-price meals; (2) a minimum of 4 fourth-grade classrooms; and (3) the absence of a garden currently being used for academic instruction.

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