

A Multicomponent, School-Based Intervention, the *Shaping Healthy Choices Program*, Improves Nutrition-Related Outcomes

Rachel E. Scherr, PhD^{1,2}; Jessica D. Linnell, PhD³; Madan Dharmar, MBBS, PhD⁴; Lori M. Beccarelli, PhD^{1,2}; Jacqueline J. Bergman, PhD¹; Marilyn Briggs, PhD, RD^{1,2}; Kelley M. Brian, MPH^{5,6}; Gail Feenstra, EdD, RD^{6,7}; J. Carol Hillhouse, MS^{6,7}; Carl L. Keen, PhD^{1,6,8}; Lenna L. Ontai, PhD^{6,9}; Sara E. Schaefer, PhD¹⁰; Martin H. Smith, EdD^{6,9,11}; Theresa Spezzano, MS^{6,12}; Francene M. Steinberg, PhD, RD^{1,6}; Carolyn Sutter, MS⁹; Heather M. Young, PhD, RN, FAAN⁴; Sheri Zidenberg-Cherr, PhD^{1,2,6}

ABSTRACT

Objective: To evaluate the effectiveness of the *Shaping Healthy Choices Program* (SHCP).

Design: A clustered, randomized, controlled intervention lasting 1 school year.

Setting: Schools in northern and central California.

Participants: Fourth-graders (aged 9–10 years) at 2 control schools (n = 179) and 2 intervention schools (n = 230).

Intervention: Garden-enhanced education, family, and community partnerships; increased regionally procured produce in the lunchroom; and school-site wellness committees.

Main Outcome Measures: Changes in body mass index (BMI) percentiles/Z-scores; nutrition knowledge, science process skills, and vegetable identification and preferences; and reported fruit and vegetable intake.

Analysis: Student *t* test, chi-square, ANOVA of change, and multilevel regression mixed model to evaluate change in outcomes with school as a random effect to account for cluster design effects. Statistical significance was set at $P < .05$.

Results: There was a greater improvement in BMI percentile (-6.08 ; $P < 0.01$), BMI Z-score (-0.28 ; $P < .001$), and waist-to-height ratio (-0.02 ; $P < .001$) in the intervention compared with the control schools.

Conclusions and Implications: The SHCP resulted in improvements in nutrition knowledge, vegetable identification, and a significant decrease in BMI percentiles. This supports the concept that the SHCP can be used to improve the health of upper elementary school students.

Key Words: childhood obesity, nutrition education, multicomponent programs, body mass index percentiles, school-based programs (*J Nutr Educ Behav.* 2016; ■:1-12.)

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¹Department of Nutrition, University of California, Davis, Davis, CA

²Center for Nutrition in Schools, University of California, Davis, Davis, CA

³Oregon State University Extension Service, Tillamook, OR

⁴Betty Irene Moore School of Nursing, University of California, Davis, Sacramento, CA

⁵University of California Cooperative Extension, Placer and Nevada Counties, University of California Agriculture and Natural Resources, Auburn, CA

⁶University of California Agriculture and Natural Resources, Davis, CA

⁷Agricultural Sustainability Institute, University of California Sustainable Agriculture Research and Education Program, University of California, Davis, Davis, CA

⁸Department of Internal Medicine, University of California, Davis, Davis, CA

⁹Department of Human Ecology, University of California, Davis, Davis, CA

¹⁰Foods for Health Institute, University of California, Davis, Davis, CA

¹¹Department of Population Health and Reproduction, University of California, Davis, Davis, CA

¹²University of California Cooperative Extension, Merced and Stanislaus Counties, University of California Agriculture and Natural Resources, Modesto, CA

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Address for correspondence: Sheri Zidenberg-Cherr, PhD, Department of Nutrition, Center for Nutrition in Schools, University of California Davis, 1 Shields Ave, Davis, CA 95616; Phone: (530) 752-3817; Fax: (530) 752-8905; E-mail: sazidenbergcherr@ucdavis.edu

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INTRODUCTION

The risk for childhood obesity is influenced by complex interactions among individual, environmental, and behavioral factors.¹ Individual factors associated with the risk for obesity include genetics, epigenetics, race/ethnicity, socioeconomic status, physical activity, snacking, consumption of high-calorie foods, and time spent watching television.^{1,2} Parent feeding practices during childhood are also potential determinants for a child's risk of obesity; however, in older children there may be differences in how these practices are related to obesity.^{3,4} Environmental factors, such as availability of food, access to fruits and vegetables, and the lack of safe areas to engage in physical activity, are also associated with risk for obesity.¹

Schools can provide an ideal setting for nutrition interventions because they serve as a focal point to engage students, families, educators, administrators, and community members. By bringing individuals together to support a common vision, existing resources can be used to create a sustainable healthy school environment.⁵ Thus, there is a need for comprehensive nutrition programs spanning the child's home and school environment.

School-based nutrition interventions enhanced by garden activities demonstrate greater improvements in nutrition knowledge and consumption of, preferences for, and willingness to taste vegetables compared with those without those activities.⁶⁻¹¹ Moreover, nutrition education programs that increase exposure to vegetables and encourage children to try new foods have demonstrated improvements in children's acceptance, preference, and willingness to taste vegetables.¹²⁻¹⁴ Improving the school and home environments can also make an impact on health behaviors.¹⁵ Studies demonstrate small but statistically significant increases in fruit and vegetable consumption in the school lunchroom when a greater variety of these foods are offered.¹⁶ Considering obesity interventions more generally, the Academy of Nutrition and Dietetics¹⁷ suggested that reducing pediatric overweight requires a comprehensive approach including parent education and modeling behavior. This concept is supported in the Dietary Guidelines for Americans 2015–2020,¹⁸ which focuses on improvement

of overall dietary patterns to improve health.

Although current policies support the use of collaborative, school-based approaches to address children's health, more evidence is needed to support the effectiveness of nutrition interventions combining classroom education with environmental changes such as improving access to nutritious foods, increasing physical activity, involving parents and the community, and implementing wellness policies.^{19,20} Programs that integrate theoretical models of behavior change demonstrate significant improvements in nutrition- and health-related behaviors.²¹ Consistent with Social Cognitive Theory (SCT) and the Social Ecological Model (SEM), when the target population is overweight/obese children, long-term obesity treatment programs with multiple points of intervention are more likely to improve body mass indexes (BMIs) than are programs aimed at obesity prevention.²²⁻²⁷ Although clinical weight loss programs are of clear value, obesity prevention programs at the community level provide an upstream, population-based approach to improving children's health.

The objective of the current research was to investigate the effectiveness of a multicomponent, school-based nutrition intervention, the *Shaping Healthy Choices Program* (SHCP), based on the SCT and SEM, to improve children's dietary behaviors and prevent childhood obesity.^{28,29} A detailed description of how these behavior change models/theories provided the framework for this intervention can be found elsewhere.³⁰ Briefly, as described in a previous publication, the tenets of the SCT were addressed through the SHCP components, which were aligned with each of the sectors of the SEM. The hypothesis tested was that children participating in the SHCP would demonstrate greater improvements in nutrition- and health-related outcomes compared with those not receiving the intervention.

METHODS

Study Design

The study design and methods were reported in a research methods article.³⁰ Four schools in 2 California districts were randomly selected from a total

pool of 7 schools to participate in a randomized, controlled intervention. Schools were randomly assigned in fall, 2012 to a control or intervention setting through random digit generation. The intervention was implemented during the 2012–2013 academic year. All procedures were reviewed and approved by the University of California Davis Institutional Review Board, which determined that this study protocol was expedited and required a passive consent process to enroll study participants. A policy at 1 of the districts (Central Valley) required active consent for research. The passive consent process used to enroll participants in the other district (Northern California) included a letter with information about the study and instructions regarding how to decline to participate. The active consent process used in the Central Valley district included information about the study and required a parent's signature. Children received a letter describing the study with instructions regarding how to opt out of the study at any time.

Determination of sample size. Sample size was calculated using anticipated SDs: nutrition knowledge questionnaire, vegetable preference scores, and BMI percentile.

Intervention

The SHCP was designed for upper elementary schoolchildren with the following objectives: (1) increase nutrition knowledge and use of science processing skills; (2) promote availability, consumption, and enjoyment of fruits and vegetables; (3) improve dietary patterns and encourage physical activity; (4) foster positive changes in the school environment; and (5) facilitate the development of an infrastructure to sustain the program. The goal of the SHCP was to improve dietary behaviors and prevent childhood obesity by improving students' individual factors and factors in the home and school environments while simultaneously creating a community-based support system.³⁰

Five overlapping components comprised the SHCP: (1) nutrition education and promotion, (2) family and community partnerships, (3) supporting regional agriculture, (4) foods available on the school campus, and (5)

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