

After-School Gardening Improves Children's Reported Vegetable Intake and Physical Activity

Janice R. Hermann, PhD, RD/LD,
*Oklahoma Cooperative Extension
Service, Department of Nutritional
Sciences, Oklahoma State University,
Stillwater, OK

Stephany P. Parker, PhD,
Department of Nutritional Sciences,
Oklahoma State University,
Stillwater, OK

Barbara J. Brown, PhD, RD/LD,
Oklahoma Cooperative Extension Service,
Department of Nutritional Sciences,
Oklahoma State University,
Stillwater, OK

Youmasu J. Siewe, PhD, MPH,
Oklahoma Cooperative Extension Service,
Department of Nutritional Sciences,
Oklahoma State University,
Stillwater, OK

Barbara A. Denney, BS,
Oklahoma Cooperative Extension Service,
Oklahoma State University,
Stillwater, OK

Sarah J. Walker, MS, RD/LD,
Department of Nutritional Sciences,
Oklahoma State University,
Stillwater, OK

(*J Nutr Educ Behav.* 2006;38:201-202)

*Address for correspondence: Janice R. Hermann,
PhD, RD/LD, Nutrition Education Specialist,
Oklahoma Cooperative Extension Service,
Department of Nutritional Sciences, Oklahoma
State University, Stillwater, OK 74078-6141;
Tel: (405) 744-6824; Fax: (405) 744-1461;
doi: 10.1016/j.jneb.2006.02.002

INTRODUCTION

The USDA MyPyramid recommends increased amounts of fruits, vegetables, low-fat milk, whole grains and physical activity for children.¹ After-school programs incorporating gardening provide opportunities for hands-on food, nutrition and physical activity education for children. In-school gardens have been

utilized to enhance children's eating habits.^{2,3} In a survey of fourth grade teachers at schools reported to have gardens, 47% reported they taught nutrition along with the use of gardening and 43% reported they perceived the garden to be somewhat to very effective at enhancing children's eating habits.² Another study reported fourth grade children's preference for some vegetables improved when in-school gardening was combined with nutrition education.³ The purpose of this study was to evaluate the impact of an Oklahoma Cooperative Extension Service (OCES) after-school education and gardening program on reported vegetable intake and physical activity among children in 3rd through 8th grade.

PROGRAM DESCRIPTION

The OCES collaborated with a rural school to provide food, nutrition and physical activity education to children in Kindergarten through 8th grade participating in the school's after-school program. The school participating in this program was 72% Native American, 25% white, non-Hispanic and 3% Hispanic. The duration of the after-school program was approximately ninety minutes and operated five days a week.

The county OCES Project Coordinator provided gardening, nutrition, food preparation, food safety and physical activity education to children participating in the after-school program in a group setting using a variety of curriculums including Junior Master Gardeners⁴, Ag in the Classroom⁵, and USDA Team Nutrition⁶. The garden was incorporated as a method to actively involve children in hands-on nutrition, food preparation, food safety and physical activity education. The garden was an ideal way to incorporate Native American culture by growing traditional foods, using gardening concepts

such as the "three sisters" garden (corn, beans and squash), and preparing traditional foods. Due to the wide age range of children participating in the after-school program, education and gardening was provided one day a week for children in kindergarten, 1st and 2nd grade, one day a week for children in 3rd, 4th and 5th grade, and one day a week for children in 6th, 7th and 8th grade. Gardening activities included planting, watering, weeding, fertilizing, mulching and harvesting. Produce grown in the garden included corn, beans, squash, onions, peppers, tomatoes, carrots, okra, zucchini, cucumbers, lettuce and spinach. Children received education on the pyramid food groups, portions, snacks, breakfast, eating-out, food labels, hand washing, food safety and physical activity. Children also participated in food preparation activities emphasizing garden produce including soups, cornbread, roasted potatoes, salads, vegetable casseroles, zucchini bread, carrot salad, and salsa.

PROGRAM EVALUATION

The after-school education and gardening program was evaluated using two pre/post questions "I eat vegetables every day" and "I am physically active every day" with a three category "yes," "sometimes," and "no" response scale. These questions were from an Oklahoma Cooperative Extension pre/post questionnaire previously tested for reliability with children in 3rd through 5th grade, $r = 0.94$.⁷ Responses were scored as "yes" = 2, "sometimes" = 1, and "no" = 0. Data were analyzed using the PC Statistical Analysis System (SAS) for Windows, Version 9.1 SAS, Inst. Inc., Cary N.C.). The McNemar non-parametric test was used to analyze the data. In order to conduct the data analysis the responses "sometimes" and "no" were collapsed into one group and labeled "no." Significance was set at $p < 0.05$.

Table 1. Effect of an After-School Education and Gardening Program on Children's Reported Daily Vegetable Intake and Physical Activity

| Question | Pre | | | | Post | | | | McNemar Test | |
|----------------------------------|-----|----|-----|----|------|----|-----|----|--------------|---------|
| | No | | Yes | | No | | Yes | | χ^2 | p value |
| | n | % | n | % | n | % | n | % | | |
| I eat vegetables every day | 34 | 79 | 9 | 21 | 24 | 56 | 19 | 44 | 6.8 | <0.02 |
| I am physically active every day | 20 | 49 | 21 | 51 | 9 | 21 | 33 | 79 | 4.8 | <0.05 |

RESULTS

Forty-three children completed the pre and post evaluation questions, forty-seven percent were male and fifty-three percent were female. There was a significant increase in the proportion of children reporting "I eat vegetables every day" and "I am physically active every day" after the education and gardening program (Table 1).

IMPLICATIONS

Incorporating gardening along with food preparation, nutrition and physical activity education was an effective way to improve children's reported vegetable intake and physical activity in an after-school setting. The garden also provided opportunities to engage school teachers, parents, county OCES Master Gardeners and local businesses. School teachers used the garden for classroom art, science and humanities projects. Parents and volunteers from the county OCES

Master Gardeners volunteered their time to help with gardening activities, and local businesses stores donated gardening materials and supplies.

Added benefits of the after-school education and gardening program were also observed. The school principal reported he observed use of the school's salad bar doubled following incorporation of the after-school gardening and education program. Additionally, the acceptance of the after-school gardening and education project led to the school seeking and receiving external funds to purchase a greenhouse. The greenhouse has been used by school personnel to grow plants and flowers as a method to generate school revenue.

NOTE

This project was funded by USDA Children, Youth and Families at Risk. This project was approved by the Oklahoma State University Institutional Review Board for Human Subjects.

REFERENCES

1. United State Department of Agriculture. MyPyramid: Steps to a Healthier You, 2005. Available at www.mypyramid.gov. Accessed February 7, 2006.
2. Graham L, Zidenberg-Cherr S. California teachers perceive school gardens as an effective nutritional tool to promote healthful eating habits. *J Am Diet Ass.* 2005; 105: 1707-1800.
3. Morris J, Zidenberg-Cherr S. Garden-enhanced nutrition curriculum improves fourth-grade school children's knowledge of nutrition and preferences for some vegetables. *J Am Diet Ass.* 2002; 102:91-93.
4. *Junior Master Gardener Teacher/Leader Guide.* College Station, TX: Texas Agricultural Extension Service, Agricultural Communications; 1999.
5. *Oklahoma Ag in the Classroom.* Available at <http://www.clover.okstate.edu/fourh/aitc/>. Accessed February 7, 2006.
6. *Team Nutrition.* Available at <http://www.fns.usda.gov/tn/>. Accessed February 7, 2006.
7. Brown B, Hermann J. Super nutrition activity program. *J Extension.* 2004; 42. Available at www.joe.org/joe/2004august/iw1.shtml. Accessed February 7, 2006.

CALL FOR GEMS and EDUCATIONAL MATERIALS RELATED TO THE NEW FOOD GUIDE PYRAMID AND 2005 DIETARY GUIDELINES FOR AMERICANS

Editors at the *Journal of Nutrition Education and Behavior (JNEB)* are actively seeking GEMs (Great Educational Materials). GEMs describe innovative programs and materials along with results from their initial evaluations. We are particularly interested in GEMs that illustrate how the 2005 Dietary Guidelines for Americans and/or MyPyramid are being used to train professionals or educate the public. GEMs should include evaluation information.

Authors and publishers of educational materials that have not been formally evaluated are encouraged to send items for review in JNEB. Guidelines for Writing GEMs and reviews of EDUCATIONAL MATERIALS are at www.jneb.org; scroll down the page to locate pertinent links. Questions may be directed to Barbara Lohse, PhD, RD, Associate Editor, GEMs and Reviews, at lohseb@psu.edu.