

SNAP-Ed Can Improve Nutrition of Low-Income Americans Across Life Span

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Abstract

Nutrition education in the Supplemental Nutrition Assistance Program (SNAP-Ed) is designed to promote healthy eating behaviors in a low-income target population. In particular, SNAP-Ed programming encourages participants to increase consumption of fruit and vegetables and switch to lower fat dairy products. With funding from the U.S. Department of Agriculture's Food and Nutrition Service (FNS), we independently evaluated eight programs that were selected as possible model SNAP-Ed programs. Our evaluations used robust research designs (experimental or quasi-experimental), similar primary outcome measures across the studies, and statistical analyses to account for clustering of participants within settings. These evaluations found a significant effect in outcomes for four programs: one in child care settings, two in elementary schools, and one in senior centers, suggesting that SNAP-Ed has the potential to be effective for some individuals across all age groups. Additionally, the study findings suggest that the maturity of the program (that is, experience in implementing the program over time) may make nutrition education more effective. Future studies should assess the longer-term effects on nutrition behaviors and sustainability of SNAP-Ed programs for preschool- and elementary-aged children, adults, and senior citizens.

Contents

Introduction	2
Methods	2
Results	4
Impacts in Child Care Settings	4
Impacts in Elementary School Settings	4
Impacts in Adult Settings	5
Discussion	5
Conclusion	6
References	6
Acknowledgments	inside back cover

Introduction

The Supplemental Nutrition Assistance Program (SNAP) provides nutrition assistance benefits to eligible low-income households, including nearly 47.6 million people living in over 23 million households in 2013, or about one in seven Americans. As part of its mission to improve access to a healthy and nutritious diet, the U.S. Department of Agriculture's Food and Nutrition Service (FNS) provides SNAP education (SNAP-Ed), which encourages SNAP participants and those eligible to receive SNAP benefits to make healthy food choices on a limited budget and choose physically active lifestyles consistent with current Dietary Guidelines for Americans.¹

Although SNAP-Ed is an optional component of SNAP operated at the discretion of state agencies, its federal funding grew to nearly \$400 million in 2011. SNAP-Ed programs aim to increase participants' consumption of fruit and vegetables and to switch to lower-fat dairy products. The Healthy, Hunger-Free Kids Act of 2010 (PL 111-296) removed the requirement for states to provide matching funds to receive SNAP-Ed funding, thereby potentially broadening the range of nutrition education programs that SNAP-Ed can provide. At the same time, the Act imposed a cap on federal funding for SNAP-Ed. Hence, it is especially important that this newfound flexibility be used to fund those nutrition education programs that are most effective at improving nutrition behaviors.

Accordingly, with funding from USDA's FNS, we independently evaluated eight demonstration projects that were selected as possible model SNAP-Ed programs. Our evaluations used robust research designs (experimental and quasi-experimental), similar primary outcome measures across the studies, and statistical analyses to account for clustering of participants within settings (i.e., child care centers, schools, and senior centers). Evidence from these studies demonstrates that SNAP-Ed has the potential to improve nutrition behaviors across the lifespan.

Methods

The eight programs were selected as possible model SNAP-Ed programs through a competitive review process. FNS issued requests for application to states to propose model SNAP-Ed programs, and an independent technical review panel chaired by FNS competitively scored and ranked the programs. The target audiences for the programs were children and adults, and the programs were heterogeneous with respect to participant dose as well as lesson content and delivery mode.

We used a conceptual framework adapted from Green et al.² that assessed predisposing, reinforcing, and enabling factors for nutrition behavior. The primary outcome measures were daily at-home consumption of fruit and vegetables. We assessed cups of fruit consumed each day and cups of vegetables consumed each day using two questions adapted from University of California Cooperative Extension Food Behavior Checklist.³ In programs that promoted use of lower-fat dairy products, the evaluation also assessed use of low-fat/fat-free milk instead of whole or reduced-fat milk. For interventions with children, parents reported on their children's at-home consumption.

Study designs involved a baseline survey and postintervention follow-up survey with data provided by program participants or, in the case of interventions with children, their parents, in the intervention and comparison groups (see Table 1). Baseline data were collected 1 to 4 weeks before the start of the intervention and the follow-up survey was conducted starting 1 week after the end of the intervention (see Table 1 for the length of the intervention period). Retention rates in the study were between 73 percent and 99 percent in the intervention groups and between 78 percent and 98 percent in the control/comparison groups.

To evaluate the impact of each intervention, while accounting for clustering of individuals within schools or centers, we used general linear mixed models for continuous impact variables and generalized linear mixed models for dichotomous impact variables. These models were estimated via

Table 1. Comparison of key features for the SNAP-Ed interventions evaluated

Intervention, Implementing Agency*	Target Audience/Year First Implemented	Intervention Period	Planned Per-Participant Exposure to Lessons	Intervention Sites and Participants (Retention Rate)	Control/ Comparison Sites and Participants (Retention Rate)
Child care settings					
All 4 Kids, UNCE	Preschool-age children and their parents or caregivers in Nevada; 2008	12 weeks	Children: 24 lessons (30 minutes each) Parents: 3 family activity sessions (60 minutes each)	294 children in 6 Head Start child care centers (83%)	328 children in 6 Head Start child care centers (81%)
EWPHCCS, NYSDOH	Preschool-age children and their parents or caregivers in New York; 2006	6 to 10 weeks	Children: 6 lessons (30 minutes each) Parents: 6 lessons (60 minutes each)	552 children in 12 CACFP child care centers (80%)	591 children in 12 CACFP child care centers (78%)
Elementary school settings					
BASICS & BASICS Plus, INN	Third-grade students and their parents or caregivers in Iowa; 2003, revised in 2010	6 months	BASICS and BASICS Plus Children: 8 lessons (30 minutes each) BASICS Plus also included a social marketing campaign with point-of-purchase signage and demonstrations at supermarkets, billboards, signage, and television and radio ads	BASICS: 342 children in 11 elementary schools (74%) BASICS Plus: 343 children in 11 elementary schools (73%)	352 children in 11 elementary schools (78%)
Eagle Adventure, CNNS	Children in grades 1–3 and their parents or caregivers in Oklahoma; 2010	9 weeks	Children: 1 play (25 minutes) and 4 classroom lessons (40 minutes each)	441 children in 5 elementary schools (84%)	445 children in 5 elementary schools (85%)
LEAP2, UKCES	Children in grades 1–3 and their parents or caregivers in rural Kentucky; 2004, modified in 2009	3 months	Children: 8 lessons (30 minutes each)	450 children in 8 elementary schools (84%)	399 children in 8 elementary schools (86%)
Adult settings					
Eat Smart, Live Strong, MSUE	Adults 60–80 years old in Michigan; 2012	4 weeks	Four 45-minute sessions	267 adults (ages 60–80) in 17 senior centers (99%)	347 adults (ages 60–80) in 16 senior centers (98%)
About Eating, PSU	Women receiving or eligible for SNAP benefits with Internet access in Pennsylvania; 2010	Self-paced	5 web-based sessions	282 adult women (83%)	218 adult women (88%)

* University of Nevada Cooperative Extension Service's (UNCE) All 4 Kids. New York State Department of Health's (NYSDOH) Eat Well Play Hard in Child Care Settings (EWPHCCS). Iowa Nutrition Network's (INN) Building and Strengthening Iowa Community Supports (BASICS & BASICS Plus). Chickasaw Nation Nutrition Services' (CNNS) Eagle Adventure. University of Kentucky Cooperative Extension Service's (UKCES) Literacy, Eating, and Activity for Primary Youth Health (LEAP2). Michigan State University Extension's (MSUE) Eat Smart, Live Strong. Pennsylvania State University's (PSU) About Eating.

CACFP = Child and Adult Care Food Program.

difference-in-difference estimates of program effect, comparing change across time (baseline to follow-up) in the intervention group with change across time in the control or comparison group. Model covariates included individual and household characteristics, such as age, sex, race and ethnicity, and household size. Missing data for covariates ranged from 2 percent to 10 percent of responses. See the FNS final reports for additional information on the study methods.^{4,5}

Results

Impacts in Child Care Settings

The New York State Department of Health program Eat Well Play Hard in Child Care Settings (EWPHCCS), the longest-established of the child care programs in our study, had a statistically significant impact on children's at-home daily consumption of vegetables (see Table 2). Children in the intervention group consumed a net increase of 0.12 mean cups of vegetables relative to the number of cups of vegetables the control group consumed. However, statistically significant effects were not evident for at-home consumption of fruit and vegetables in a more recently developed program (All for Kids in Nevada).

In addition, EWPHCCS showed a significant increase in the proportion of children who drank low-fat/fat-free milk during the prior week, from 36.5 percent to 41.0 percent in the model-adjusted estimate compared with a decrease from 36.3 percent to 33.2 percent in the control group ($p < 0.05$; data not shown in table). In adjusted models, children in the intervention group were about 39 percent more likely than children in the control group to drink low-fat/fat-free milk (odds ratio: 1.39, $p < 0.05$).

Impacts in Elementary School Settings

The Iowa Nutrition Network implemented two programs: Building and Strengthening Iowa Community Supports (BASICS) and BASICS Plus; the latter has the same goal and approach as BASICS but supplements the program with a social marketing campaign. These were the longest-established programs offered in elementary school settings, and both yielded statistically significant effects. Compared with the no-treatment comparison group (model adjusted), BASICS increased at-home daily consumption of fruit and vegetables combined by about one-quarter cup (0.24, $p < 0.05$) and at-home consumption of fruit by 0.16 cups ($p < 0.05$). Similarly, compared with the comparison group

Table 2. Intervention impacts and 95% confidence intervals for the SNAP-Ed interventions evaluation

Intervention	Cups of Fruit and Vegetables Combined	Cups of Fruit	Cups of Vegetables	Low-Fat/Fat-Free Milk
Child care settings				
All 4 Kids	-0.04 (-0.43, 0.36)	0.09 (-0.15, 0.32)	-0.12 (-0.33, 0.09)	NA
EWPHCCS	0.19 (-0.09, 0.48)	0.06 (-0.12, 0.24)	0.12* (0.00, 0.24)	1.39* (1.05, 1.84)
Elementary school settings				
BASICS	0.24* (0.03, 0.45)	0.16* (0.01, 0.31)	0.07 (-0.03, 0.18)	0.99 (0.75, 1.30)
BASICS Plus	0.31** (0.10, 0.53)	0.17* (0.02, 0.32)	0.13* (0.03, 0.24)	1.32* (1.00, 1.74)
Eagle Adventure	0.07 (-0.18, 0.32)	0.07 (-0.07, 0.21)	-0.01 (-0.18, 0.16)	NA
LEAP2	0.06 (-0.20, 0.32)	0.02 (-0.14, 0.18)	0.05 (-0.10, 0.20)	NA
Adult settings				
Eat Smart, Live Strong	0.52** (0.23, 0.82)	0.20* (0.01, 0.38)	0.31** (0.16, 0.47)	NA
About Eating	-0.10 (-0.39, 0.19)	-0.03 (-0.20, 0.14)	-0.07 (-0.23, 0.10)	0.85 (0.52, 1.38)

* Indicates statistical significance if $p < .05$.

**Indicates statistical significance if $p < .01$.

Notes: Intervention impact (with 95% confidence interval) was estimated via difference-in-difference models comparing change across time in the intervention versus comparison groups. Impact estimates provided as odds ratios for low-fat/fat-free milk. General linear mixed models (SAS PROC MIXED) and generalized linear models (SAS PROC GLIMMIX) were used to evaluate the program impact while accounting for the clustering of individuals within schools or centers.

NA = not applicable.

(model adjusted), BASICS Plus increased at-home consumption of fruit and vegetables combined by about one-third cup (0.31 cups, $p < 0.01$), increased at-home consumption of fruit by 0.17 cups ($p < 0.05$), and increased at-home consumption of vegetables by 0.13 cups ($p < 0.05$). The marginal effect of BASICS Plus versus BASICS was not statistically significant. In addition, BASICS Plus, which featured a new social marketing campaign with the message “Their bodies change, so should their milk,” increased the likelihood that children would drink low-fat/fat-free milk rather than whole or reduced-fat milk compared with the control group (odds ratio: 1.32, $p < 0.05$).

In contrast, more recently developed SNAP programs for use in elementary school settings—Eagle Adventure in Oklahoma and Literacy, Eating, and Activity for Primary Youth Health (LEAP2) in Kentucky—did not have a statistically significant effect on parental reports of children’s at-home daily consumption of fruit and vegetables.

Impacts in Adult Settings

An experimental Internet-based program with low-income women in Pennsylvania did not affect nutrition-related behavior, in part due to high attrition among program participants and the inability to review previously completed lessons. The Eat Smart, Live Strong program, conducted in nonresidential senior centers in Michigan, had a significant effect (model-adjusted) on consumption of fruit (0.20 cups, $p < 0.05$) and vegetables (0.31 cups, $p < 0.01$). Following the implementation of the program, Eat Smart, Live Strong program participants consumed a net of one-half more cups of fruit and vegetables per day ($p < 0.01$) than the comparison group.

Discussion

These evaluations found significant effects in a program offered in a child care setting, two programs offered in elementary schools, and a program offered in senior centers, suggesting that SNAP-Education has the potential to be effective at improving nutrition behaviors across all age groups.

The findings from this study also suggest a factor that may make nutrition education more effective:

experience in implementing such programs over time. Among the programs targeting children, the child care program with the greatest effect (New York’s EWPHCCS) and the two elementary school programs with the greatest effects (Iowa’s BASICS and BASICS Plus) have been operating for some time. EWPHCCS was first implemented in 2006, making it the longest running of the interventions. Similarly, the Iowa Nutrition Network has offered BASICS since 1995, and core elements of BASICS Plus were pilot tested in 2003; the version implemented in the evaluation was first offered in 2010. According to findings from the process evaluations that FNS conducted, these programs systematically refined and improved their efforts over prior years, suggesting that sustained efforts to refine and improve SNAP-Education programs can positively affect participants’ behaviors.

Research suggests that other factors may contribute to the effectiveness of nutrition education programs. For example, a review by Olander⁶ found that there is generally a positive association between intervention dose and dietary improvement. Other factors that may influence program effectiveness include content and delivery, which varied across the eight programs. In our evaluation, we did not find sufficient variability in dosage to quantify the relationship between intervention dose and other program characteristics. Further research will help identify the elements of successful programs so that they can be disseminated to other programs.

We note that the measures of children’s consumption were based on parents’ reports of their children’s at-home consumption, which may be subject to recall inaccuracies of the child’s actual consumption. Despite these concerns, research suggests that parents’ reports of young children’s diets are accurate enough to be useful measures of fruit and vegetable intake.^{7,8} Further, we examined changes in intake shortly after the interventions, and it is not known whether or how long these changes may be maintained postintervention.

Our findings suggest that SNAP-Education for low-income children and their parents has the potential to improve children’s nutrition behaviors, but not all programs resulted in changes in consumption at home. These programs need to do more to strengthen

the carryover of their message into the home. At the other end of the age spectrum, senior citizens who participated in the Eat Smart, Live Smart program significantly increased their fruit and vegetable consumption, suggesting that nutrition education programs can be effective across the lifespan. Southwell⁹ described the importance of a lifespan perspective for health intervention development and evaluation.

While all four of the effective programs delivered lessons in a classroom-type setting, each program was tailored to the age of the target audience, and the number of lessons varied (ranging from 4 lessons over a 4-week period to 8 lessons over a 6-month period). Each program also included take-home materials (targeted to parents for the programs in child care and school settings), intended to reinforce the messages delivered in the classroom.

Conclusion

Although we did not evaluate all SNAP-Ed programs, our findings indicate that SNAP-Ed has the potential to improve nutrition behaviors among low-income individuals. The programs that appeared to show stronger results in child care and school settings were those that had been established for some years. Our evaluations indicate that SNAP-Ed programs can work across a variety of age groups. However, our evaluations were unable to address the broader question “How well do SNAP-Ed programs work overall?” Future studies should assess the effectiveness of the broader range of SNAP-Ed program offerings and assess how well programs meet the needs of various segments of low-income individuals. Future studies might also look at the longer-term effects and sustainability of SNAP-Ed programs for children, adults, and senior citizens.

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